

**Minutes  
of the  
32<sup>nd</sup> Meeting of the Academic Council  
held on  
Wed 24<sup>th</sup> & Thu 25<sup>th</sup> Oct 2018  
Through VLC**



**Bahria University Islamabad**

## **Reference Designators & Terms used in this Document**

These designators/terms are meant to introduce clarity, standardisation and ease of reference while consulting or referring to this document.

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***Acronyms & Abbreviations used in this Document***

BUAR	Bahria University Academic Rules
CCH	Course Code Handbook
CE	Computer Engineering
CS	Computer Sciences
CSE	Computer & Software Engineering
DIC	Director Islamabad Campus
DIPP	Director IPP
DKC	Director Karachi Campus
DLC	Director Lahore Campus
DMPRC	Director MPRC (Islamabad) & (Karachi)
DS	Dental Section BUMDC
EDC	Estimated Date of Completion
EE	Electrical Engineering
EES	Earth & Environmental Sciences
EMBA	Executive Master of Business Administration
EP	Examination Policy
ES	Engineering Sciences
FHB	Faculty Handbook
FYP	Final Year Project
HS	Health Sciences
HSS	Humanities & Social Sciences
iaw	in accordance with
ie	that is
IR	International Relations
M&SS	Management & Social Sciences
MS	Management Sciences
NBEAC	National Business Education Accreditation Council
SE	Software Engineering
SHB	Student Handbook
wef	with effect from

## Attendance

### BUHO

#### Present

1. Vice Adm (R) Muhammad Shafiq HI(M)	Rector	In Chair
2. Rear Adm (R) Nasir Mahmood HI(M)	Pro-Rector/DGIC	Member
3. Surg Rear Adm Najm Us Saqib Khan HI(M),T.Bt	DG (HS)	Member
4. Rear Adm (R) Mukhtar Khan HI(M)	DG IMA	Member
5. Cdre (R) Muhammad Hisham SI(M)	Registrar	Member
6. Prof Dr M Najam ul Islam	Dean (ES)	Member
7. Snr. Associate Professor Mr Fazal Wahab	Dir Academics/DQA	Member & Secy
8. Cdre (R) Asim Raza SI(M)	DE	Member
9. Captain (R) Imtiaz Khan PN	DA	Member
10. Surg Cdr (R) Hamidullah Arif PN	DHS	Member
11. Prof Dr Shehzad Khalid	Dir R&D/ORIC	Member
12. Associate Prof Dr Riaz Ahmed	Dir PGP	Member
13. Snr. Assistant Prof Mr. Khalid Mumtaz Khan	DLDC	Member

#### In Attendance

14. Cdre Muhammad Aslam Khan SI(M)	DF
15. Cdre (R) Iqbal Javaid SI(M)	DMSTP
16. Cdre (R) M Mateen Ur Rehman SI(M)	DP&D
17. Capt (R) Munawwar Ahmad PN	Dy. Registrar (A & C)
18. Capt (R) Ahmad Farooq Butt PN	DHR
19. Ms. Sundal Mufti	DSA
20. Senior Assistant Prof Mr M Awais Mehmood	DIO
21. Capt (R) Azhar Iqbal PN	Dy. Registrar (Academics)
22. Cdr (R) M Khaleeq Khan PN	DD (Coord)
23. Cdr (R) Abdul Ghaffar PN	Dy Director Academics

### BUIC

#### Present

24. Cdre Zahid Iqbal SI(M)	Director	Member
25. Senior Prof Dr Tehseen Ullah Khan	HOD(E&ES)	Member
26. Senor Prof Dr Syed Abdul Siraj	HOD(Media Studies)	Member
27. Prof Dr Muhammad Arif Khattak	HOD(MS)	Member
28. Prof Dr Atif Raza Jafri	HOD(EE)	Member
29. Prof Dr Faisal Bashir	HOD(CS)	Member
30. Associate Prof Dr Awais Majeed	HOD(SE)	Member
31. Associate Prof Dr Uzma Masroor	HOD(PP)	Member
32. Associate Prof Dr Azhar Ahmed	HOD(H&SS)	Member
33. Senior Assistant Prof Dr.Khalid Javed	HOD(CE)	Member
34. Assistant Prof Ms Malieka Farah Deeba	HOD(LAW)	Member

### BUKC

#### Present

35. Cdre (R ) Arshad M Khan SI(M)	DG/Director	Member
36. Senior Prof Dr Farooq-e-Azam Cheema	Dean M&SS/HOD(MS)	Member
37. Prof Dr Bashir Ahmad	HOD (H&SS)	Member
38. Prof Dr Nurgis Yasmeen	HOD (E&ES)	Member
39. Prof Dr Haroon Ur Rasheed	HOD(EE)	Member
40. Associate Prof Dr Humera Farooq	HOD(CS)	Member
41. Associate Prof Dr Sohaib Ahmed	HOD(SE)	Member
42. Senior Asstt Prof Dr Rizwan Iqbal	HOD (CE)	Member

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43. Senior Lecturer Mahe Darakhshan	HOD(Media Studies)	Member
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**In Attendance**

44. Dr Sayma Zia	AD (Academics)
45. Erum Shafiq	AD (QA)
46. Syed Rizwan Ali	Manager BIC

**BULC**

**Present**

47. Cdre (R) M Amjad Zaman SI(M)	Director	Member
48. Associate Prof Dr Urooj Sadiq	HOD (PP)	Member
49. Senior Asstt Prof Mr Farhan Saeed Sherazi	HOD(CS&IT)	Member
50. Assistant Prof Dr Muhammad Ahmad	HOD(MS)	Member

**In Attendance**

51. Cdr (R) Faisal Shabbir T.Bt PN	Deputy Director
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**BUMDC**

**Present**

52. Rear Adm (R) Imtiaz Ahmad HI(M)	DG	Member
53. Prof Dr Asadullah Khan	Principal & Dean HS	Member
54. Prof Dr Shakeel Ahmed	HOD(Paediatrics)	Member
55. Prof Dr Naheed Sultan	HOD(Surgery)	Member
56. Prof Dr Nasim Karim	HOD(Pharmacology)	Member
57. Prof Dr Iqbal Hussain Udaipurwala	HOD(ENT)	Member
58. Prof Dr Khalida Nasreen Abdullah TI(M)	HOD(Obst and Gynae)	Member
59. Prof Dr Nighat Rukhsana	HOD(Psychology)	Member
60. Assistant Prof Dr Mehreen Latif	HOD(MDRL)	Member
61. Prof Dr Wahab Bukh Kadri	Principal (DS)	Member
62. Prof Dr Mushtaq Ahmed	HOD(Periodontology)	Member
63. Dr Shama Asghar	HOD(Preventive Dentistry)	Member
64. Dr Daud Mirza	HOD(Oral Pathology)	Member
65. Dr Beenish Alam	HOD(Oral Biology)	Member
66. Senior Associate Prof Dr Khalid Aziz	Vice Principal (DPT)	Member

**In Attendance**

67. Brig (R) Prof Dr Syed Parvez Asghar	Prof of Medicine
68. Dr Talea Hoor	Prof of Pharmacholoy/Incharge DME
69. Dr Shafaq Sultana	Member of DME
70. Dr Sara Shakil	Member of DME
71. Dr Shazia Shakoor	Prof of Physiology
72. Lt Cdr Maryam Behram PN	Secy PNNC
73. Dr Iram Saddiq	Prof of Physiology
74. Brig Shahid Ali Khan	Clinical Coordinator
75. Surg Cdr Faisal Hanif PN	Liaison Officer PNS Shifa

**IPP**

**Present**

76. Prof Dr Zainab F. Zadeh	Dean/Director	Member
77. Senior Associate Prof Dr Zainab Hussain Bhutto	HOD (IPP)	Member

## Proceedings

### Preliminaries

#### **Commencement of the Meeting, Opening Remarks of the Chair and Meeting Schedule**

1. With the quorum complete, the proceedings commenced at 10:00 hrs on both days with recitation from the Holy Quran and continued till 18:00 hrs on Day-1 and 19:30 hrs on Day-2. The meeting recessed for lunch and prayer at 13:00 hrs and resumed proceedings at 14:00 hrs on both days.

2. In his opening remarks, the Chair prayed to Almighty Allah and begged from Him to give wisdom and strength to this Council to make right decisions. He also stressed the importance for participation in the proceedings while staying focused on the point under deliberation.

#### **Confirmation of the Minutes of the 31st ACM held on 17 & 18 April 2018**

3. The Secretary apprised the Council that:

- a. Draft minutes of the 31<sup>st</sup> ACM were communicated to all members and non-member participants, for comments, on 27<sup>th</sup> April 2018. No comments or observations was received. Consequently, the draft minutes were processed on file and the approved minutes were disseminated on 21<sup>st</sup> May 2018.
- b. Later, following few amendments have been requested by sponsors while sending 2<sup>nd</sup> progress report of respective items which are presented for approval in ensuing paragraphs.

#### **Item 2234: Bahria University Lahore Campus - Progress Report**

4. a. Director IPP proposed amendment to the name of department from "Psychology Department" to "Professional Psychology Department" at BULC on the same format as at IPP Karachi and at BUIC.
- b. Director BULC proposed twice a year admission intake (Fall and Spring) instead of yearly intake (Fall only) in BS Psychology to target left over candidates from MBBS/BDS admission in Medical Colleges.

#### **Decision 32(2234)**

5. a. Amendment approved as "Professional Psychology Department" at BULC.
- b. One-time admission in BS Psychology in Spring 2019 approved at BULC. However, it will be reviewed later to decide whether to continue on yearly basis or twice a year.

#### **Item No 3103: BS SE Programme - Revision of Curriculum (Appendage 3103)**

6. The following amendments were proposed by HOD (SE), BUIC for approval:

- a. **For:**

#	Course Code	Pre-Requisite	Course Title	Total Credit Hours	Theory	Lab
1	None	CSC 110	Computing Fundamentals	2	2	0

**Read:**

#	Course Code	Pre-Requisite	Course Title	Total Credit Hours	Theory	Lab
1	None	CSC 110	Computing Fundamentals	3	2	1

b. **For:**

“BS SE Programme - Revision of Curriculum”

**Read:**

“BSE Programme - Revision of Curriculum”

**Decision 32(3103)**

7. Amendment as proposed approved.

**Item No 3104: BS CE Programme - Revision of Curriculum (Appendage 3104)**

8. The following amendments were proposed by HOD (CE), BUIC for approval:

a. **For:**

#	Course Code	Pre-Requisite	Course Title	Total Credit Hours	Theory	Lab
4	EEN 313	GSC 220	Signals and Systems	4	3	1

**Read:**

#	Course Code	Pre-Requisite	Course Title	Total Credit Hours	Theory	Lab
4	EEN 313	None	Signals and Systems	4	3	1

b. **For:** “BS CE Programme - Revision of Curriculum”

**Read:** “BCE Programme - Revision of Curriculum”

c. **For:** CEN 459 Real Time Systems (appendage 3104)

**Read:** CEN 461 Real Time Systems (appendage 3104)

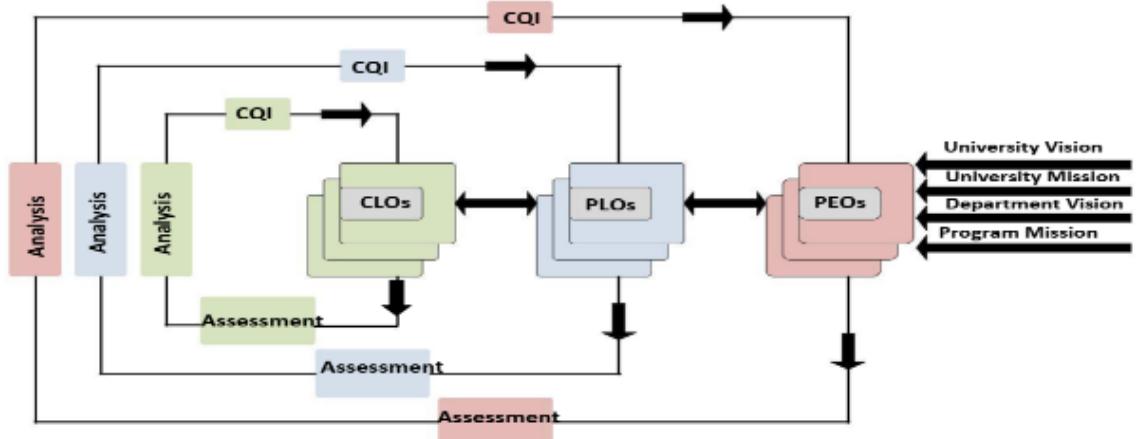
**Decision 32(3104)**

9. Amendment as proposed approved.

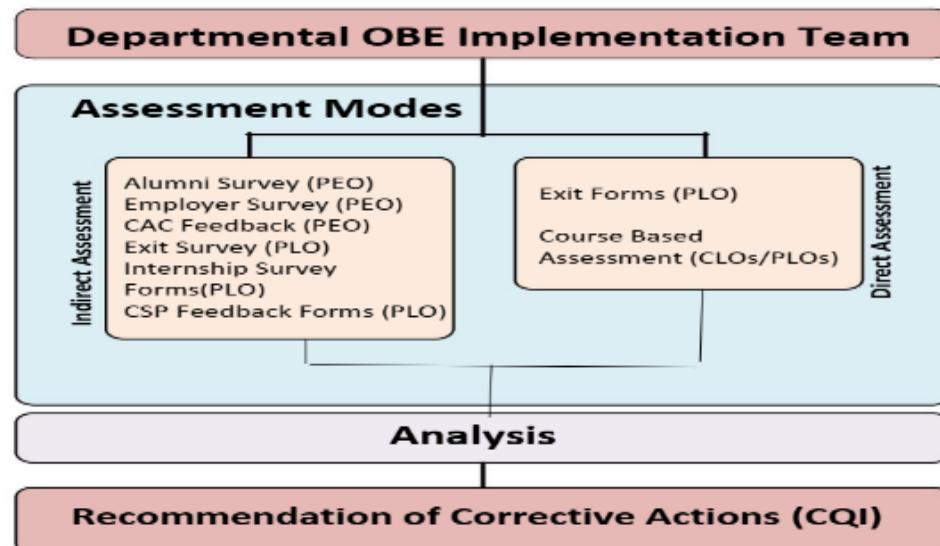
**Item No 3118: Figures 1, 2 and 3 (Appendage 3118)**

10. Dean (ES) pointed out that following figures were missing in appendage 3118 of minutes of 31<sup>st</sup> of ACM; these may be added:

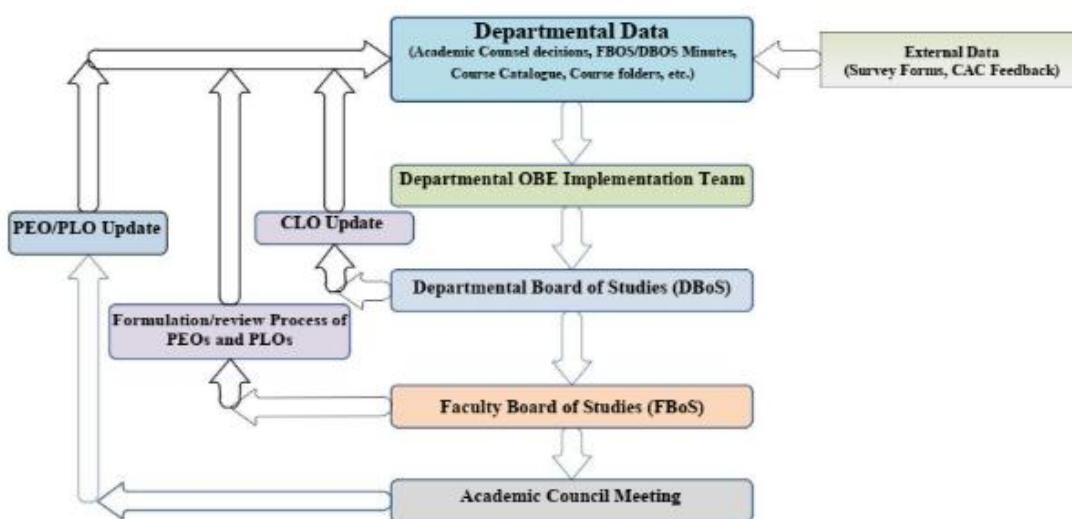
**Figure 1: OBE Implementation Model for Engineering Department**



**Figure 2: Functioning of Departmental OBE Implementation Team**



**Figure 3: CQI Cycle for Reviewing Process of PEOs, PLOs and CLOs**



**Decision 32(3118)**

11. Addition of figures 1, 2 and 3 at appropriate places in MoM of 31<sup>st</sup> ACM approved.
12. After approval of the above mentioned amendments minutes of the 31<sup>th</sup> ACM were tabled for confirmation. All members of ACM on the VLC endorsed the minutes upon which the Council confirmed the minutes.

**Decision**

13. Minutes of the 31<sup>th</sup> ACM held on 17<sup>th</sup> & 18<sup>th</sup> April 2018 along with above stated amendments confirmed.

**Review Items**

**Item 2009: Indigenous PG Programmes (MPhil & PhD) in Basic Health Sciences at BUMDC, Commencement of**

Responsibility: Registrar

**Decision of the 31st ACM**

14. After prolonged discussion, the Council resolved that:

- a. The Council showed satisfaction on all three MPhil programmes, in Anatomy, Pathology and Pharmacology and found running smoothly.
- b. Cases for MPhil programmes in Biochemistry and Physiology be pursued with Govt and HEC for obtaining early NOC.
- c. Point (a) be dropped and Point (b) to remain on agenda and progress be reported.

**Progress Reported**

15. Cases of MPhil (Bio-Chemistry) and MPhil (Physiology) are pending with PMDC for approval. Once it is approved, these cases will be forwarded for NOC to HEC (Higher Education Commission), Islamabad.

**Decision 32(2009)**

16. The Chair showed concern for delay in pursuing MPhil Bio-Chemistry and MPhil Physiology cases with PMDC. Dean Health Sciences pointed out deficiencies of animal house and Lab equipment (Power Lab, Vitalograph and EMG Machine) at BUMDC as per PMDC standards.

17. After prolonged discussion, the Council resolved that:

- a. Dean HS to pursue and expedite the cases of MPhil programs of Biochemistry and Physiology with PMDC for early approval.
- b. Existing lab equipment be used by MPhil students for optimum utilization of already available resources at BUMDC.
- c. DG BUMDC to evaluate alternate options for Animal House away from the College. Facilities of Animal House of Pakistan Army (known as Defence Veterinary Hospital) located near BUMDC may also be explored.

18. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean HS	DG BUMDC
<b>Statutory Documents affected:</b>		-

**Item 2234: Bahria University Lahore Campus - Progress Report**

Responsibility: DLC, Dean IPP

**Decision of the 31st ACM**

19. After prolonged discussion and overviewing the progress of BULC including development works for new campus, the Council resolved that:

- a. 5% Waiver in Admission Criteria for BBA programme approved for the Fall 2018 admissions intake.
- b. Psychology Department at BULC approved.
- c. Launch of 4 years BS (Psychology) programme at BULC approved wef Fall-2018 intake as per existing roadmap of BUIC and IPP.
- d. BS (Psychology) at BULC to be initially restricted to once a year intake.
- e. Point to remain on agenda and progress be reported.

**Progress Reported**

20. Director BULC reported the following progress:

- a. 5% Waiver in Admission Criteria availed by BBA candidates in Fall 2018 intake.
- b. 10.5% of BBA students availed waiver in Fall 2018 intake
- c. Department of Psychology established at BULC.
- d. 5% waiver for BS (Psychology) was approved by the competent authority on file.
- e. 15% of BS Psychology students availed waiver in Fall 2018
- f. Total 13 students inducted in BS (Psychology) in Fall 2018.
- g. Civil Works: Total 101 Kanals land has been purchased till now.
- h. M/S G 3 Engineering has been selected as Consultant for detail planning of new Campus.

**Decision 32 (2234)**

21. Council showed satisfaction over start of BS Psychology program at BULC. After detailed discussion, the Council approved the following:

- a. Ratification of 5% waiver in academic eligibility criteria to BS Psychology program during Fall 2018 intake.
- b. 5% waiver in marks to BBA and BS Psychology students in admission eligibility criteria is approved for next one year wef Spring 2019.
- c. Dropping of point regarding progress of civil works of new BU Campus at Lahore from this forum as it is on agenda of BoG.
- d. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director BULC Director Admissions	Director BULC
<b>Statutory Documents affected:</b> Prospectus		

**Item 2331: Audit Documentation & Reporting in the Faculty of Management Sciences, Status of**

Responsibility: Dean M&SS

**Decision of the 31st ACM**

22. Point to remain on agenda and progress be reported.

**Progress Reported**

23. Dean (M&SS) reported the following progress:

- a. NBEAC accreditation visit of Karachi Campus was carried out from 8-10 May 2018.
- b. Prior to NBEAC visit, self-academic audit and mock academic audit were conducted as per BU Quality Assurance Manual.
- c. BUKC appointed NBEAC Coordinator at MS Department who will ensure collection and maintenance of performance data from the notified Performance Centers.

**Decision 32 (2331)**

24. The Chair showed satisfaction on the progress. Point dropped.

**Item 2334: BBA and MBA Programmes - Heuristic and Flipped Classroom methods of Teaching and Evaluation**

Responsibility: Registrar, Dean M&SS

**Decision of the 31st ACM**

25. A committee is to be constituted to further deliberate this issue including requirements for all three campuses and put up report in two months: The composition of the committee will be as under:

- (1) Dean M&SS Head
- (2) All HODs (MS)
- (3) Dir LDC

26. Point to remain on agenda and progress be reported.

**Progress Reported**

27. Dean M&SS reported progress through a comprehensive presentation on Heuristic, Flipped classroom methods, and its adoption at Bahria University. He shared few limitations faced during implementation of flipped methodology i.e. large size of class, limited IT support, lack of faculty training etc.

**Decision 32 (2334)**

28. The Council appreciated the idea of introducing new teaching methods at Bahria University. After prolonged discussion on implementation of Heuristic methods and Flipped class room method, the Council approved following:

- a. Initially, Flipped class teaching methodology to be restricted to the class with small strength like Ph.D and MS/MPhil etc.
- b. Faculty members to be trained by the LDC in adopting modern teaching techniques. Accordingly, LDC to present detailed progress report covering its implementation and monitoring methodology during every ACM.
- c. All classrooms at all campuses to be converted into smart classrooms gradually.
- d. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	DLDC, Heads of all Campuses	Director LDC
<b>Statutory Documents affected:</b>	-	

- Item 2432: MS Supply Chain Management at BUKC - Progress**  
**Item 2619: MS in HRM & Organizational Psychology at BUKC - Progress**  
**Item 2620: MS in Risk Management at BUKC - Progress**

Responsibility: Registrar

**Decision of the 31st ACM**

29. a. Case to be followed up with HEC for Item 2619.  
 b. Efforts to be continued to hire relevant faculty.  
 c. Points to remain on agenda and progress be reported.

**Progress Reported**

30. Due to shortage of relevant Ph.D. faculty members, NOC cases were not further processed at HEC level. Karachi Campus has been putting efforts for hiring relevant Ph.D. faculty members.

**Decision 32 (2432, 2619 & 2620)**

31. After detailed deliberation, the Council approved the following:

- a. All three items of MS Programs (SCM, HRM, Organization Psychology and Risk Management) of BUKC were referred back to FBOS Management and Social Sciences for further review and thorough evaluation of their financial feasibility, expected intake if these programs are launched and availability of relevant Ph.D. faculty.
- b. Launch proposal of these MS programs be taken up as fresh agenda item in next ACM if FBOS recommended so.
- c. Point to remain on agenda and progress be reported about the outcome of FBOS.

Action Required	Action by	Responsibility of
Implementation of the Decision	HOD (MS) BUKC	Dean M&SS
<b>Statutory Documents affected:</b>	-	

**Item 2449: BUMDC Dental Section - Progress Report**

Responsibility: DG BUMDC

**Decision of the 31st ACM**

32. Point to remain on agenda and progress be reported.

**Progress Reported**

33. Comprehensive inspection of Dental Section was conducted by PMDC on 09<sup>th</sup> April 2018. Objections raised by PMDC team are being resolved and PMDC to conduct the re-inspection after completion of civil works and installation of equipment.

**Decision 32 (2449)**

34. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Principal Dental Section	DG BUMDC
<b>Statutory Documents affected:</b>	-	

**Item 2519: PhD in Management Sciences at BULC - Progress**

Responsibility: Registrar

**Decision of the 31st ACM**

35. Point to remain on agenda and progress be reported.

**Progress Reported**

36. NOC issued from HEC. Four scholars admitted in PhD (MS) in Fall 2018 semester.

**Decision 32 (2519)**

37. Point dropped.

**Item 2616: MS Mathematics at BUKC - Progress**

Responsibility: Registrar

**Decision of the 31st ACM**

38. Point to remain on agenda and progress be reported.

**Progress Reported**

39. Six students have been admitted in Fall-2018 semester.

**Decision 32 (2616)**

40. The Council resolved that:

- a. Efforts be made to further enhance the student's intake in MS (Mathematics) at BUKC. Further, Ph.D faculty in Mathematics at BUKC be encouraged to publish research papers in journals of international repute.
- b. Point dropped.

**Item 2643: Grooming Students, Framework for**

Responsibility: Dean IPP, Dean M&SS, Dean ES & Dir Admissions

**Decision of the 31st ACM**

41. The Council resolved that:

- a. Islamic values be included in grooming frame work of the students and emphasis be given to make them good human beings.
- b. Course contents of Grooming programme courses may be incorporated in all possible courses of Bahria University.
- c. LDC is to co-ordinate on training of Graduating students for the three Campuses and issue detailed instructions.
- d. Point to remain on agenda and progress be reported.

### **Progress Reported**

42. The committee was constituted by Registrar, consisting of Dean (M&SS), Dean (ES) and Dean IPP. The committee prepared a comprehensive report and submitted to Registrar. Dean IPP presented salients of the report. The committee strongly recommended that apart from the Islamic Studies course taught to all undergraduate students, separate training programs may also be organized once in a month or per semester. Dean IPP recommended the following training modules to be conducted in all campuses through guest lectures on regular basis:

- a. Talk on Akhlaaq and mannerism using Islamic model.
- b. Effective communication skills using religious model.
- c. Prophetic model of parenting.
- d. Islamic values ethics and core personality characteristic.
- e. Understanding feelings of safety and trust.

### **Decision 32 (2643)**

43. After detailed deliberation, the Council approved following:

- a. Director LDC is to workout implementation strategy covering all aspects for grooming the students in consultation with Deans and Director Campuses.
- b. Director Campuses and HODs are to facilitate and provide support for successful execution of training organized by LDC. Director LDC is to prepare and promulgate guest lectures calendar for grooming students and same is to be made part of CSP. HODs shall execute this guest speaker calendar properly. LDC shall also include training modules based on every day life Islamic role models into the training program for faculty members to be conducted every Semester.
- c. Deans and LDC are to prepare an implementation plan spread over all semesters.
- d. All campuses are to arrange extra curricular activities for the students like seminars, motivational lectures, declamation contests and debates etc that contain and reflect everyday life Islamic role models. Scholars of good repute also be invited to interact with students.
- e. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	All Deans Director LDC Heads of all Campuses	Director LDC
<b>Statutory Documents affected:</b>	-	

### **Item 2709: MS Islamic Banking & Finance at BUIC - Progress**

Responsibility: HOD (MS) BUIC

### **Decision of the 31st ACM**

44. Point to remain on agenda and progress be reported.

**Progress Reported**

45. It is a new programme, started in Spring 2018. Eight (08) students were admitted in Spring 2018 and five (05) students have been admitted in Fall 2018.

**Decision 32 (2709)**

46. Extensive measures be taken by the MS department to increase intake in this program and progress be viewed in next ACM. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	HOD (MS) BUIC	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 2817: MBA Pharmaceutics and Health Management - Progress**

Responsibility: DKC

**Decision of the 31st ACM**

47. Program be advertised again. Point to remain on agenda and progress be reported.

**Progress Reported**

48. Program was advertised as weekened program in Fall 2018. 15 students have been admitted in Fall 2018 semester.

**Decision 32 (2817)**

49. Point dropped.

**Item 2820: PhD Mathematics at BUIC - Progress**

Responsibility: DIC

**Decision of the 31st ACM**

50. The Council resolved that:

- a. Department of Mathematics to be established by Spring-2019 at BUIC.
- b. Status of PhD programme be updated in next ACM.
- c. Point to remain on agenda and progress be reported.

**Progress Reported**

51. PhD Mathematics was launched in Spring 2018. Currently, only 4 PhD schollars have been enrolled in Ph.D (Maths) Program.

**Decision 32 (2820)**

52. The Chair appreciated research output of Mathematics faculty members. After detailed deliberation, the Council approved to constitute following committee to chalk out market

analysis and feasibility for launching the BS Mathematics, increase in Ph.D faculty strength in Mathematics and establishing separate department of mathematics at BUIC:

- a. Dean (ES)
- b. HOD (CS), BUIC
- c. Prof. Dr. Muhammad Ramzan, CS Department, BUIC

53. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	HOD (CS) BUIC Registrar for Notification	Dean ES
<b>Statutory Documents affected:</b> -		

### **Item 2832: International Accreditation of MS Department roadmap of BU**

Responsibility: Registrar, Dean M&SS

#### **Decision of the 31st ACM**

54. The Council resolved that:

- a. Point dropped for collaboration with ABE UK.
- b. Efforts be made to explore the options of AACSB International Accreditation of MS Departments. For the purpose, a committee comprising of following is to be constituted:
  - i. Dean M&SS
  - ii. All HODs MS
  - iii. DAA
  - iv. DQA
  - v. DIO

55. Point to remain on agenda and progress on point (b) be reported.

#### **Progress Reported**

56. HOD (MS), BUIC presented progress report. He explained the process of AACSB International Accreditation based on his recent visit to USA for participation in AACSB Conference. The following measures have been taken to apply for international accreditation:

- a. Prof. Dr. Mushtaq Ahmad has been appointed as a focal person from the department.
- b. Accreditation Cell has been established at BUIC.
- c. Visit of team to IBA Sukkur and LUMS, Lahore is to be scheduled in consultation with Dean (M&SS).
- d. Professor from Valparaiso University, USA will visit BUIC as mentor for accreditation.

**Decision 32 (2832)**

57. After detailed deliberation, the Chair showed satisfaction over the till date progress and approved following:

- a. Expedite process of application for accreditation to AACSB latest by December 2018.
- b. Measures be taken to fulfill requirements of AACSB accreditation on top priority.
- c. Visit of mentor from Valparaiso University, USA be planned on appropriate dates.
- d. A delegation led by Dr. Hafiz Mustaq to visit the LUMS and Sukkur IBA to discuss with them the AACSB eligibility application process.
- e. Point dropped from this forum as it is an agenda of BoG as well.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean M&SS HOD (MS) BUIC Dr Hafiz Mushtaq BUIC Director IO	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 3002: BS Media Studies - Review of Curriculum**

Responsibility: Dean M&SS

**Decision of the 31st ACM**

58. The Council resolved that:

- a. Revised Curriculum of BS Media Studies as placed at Appendage 3002 (page 54) approved wef Fall-2018 intake.
- b. Road Map to follow the existing Specializations of BS Media Studies.
- c. Bilingual Teaching and examinations not approved.
- d. Point to remain on agenda and progress be reported.

**Progress Reported**

59. Curriculum has been implemented as approved by the ACM wef Fall 2018 semester and changes have been incorporated in the prospectus and unified course codes book.

**Decision 32 (3002)**

60. Point dropped.

**Item 3004: BS (SCM) at PN School of Logistics & Management (PNSLM) - Review of Curriculum**

Responsibility: Dean M&SS

**Decision of the 31st ACM**

61. Point to remain on agenda and progress be reported.

**Progress Reported**

62. Academic-Audit standards prepared by Dean (MS&SS) have been sent to PN School of Logistics for self academic audit through Registrar Office. Self-academic audit report has been received at Registrar office. QA Directorate will conduct detail Academic Mock-Audit of the program in consultation with Dean (M&SS) in the month of November, 2018.

**Decision 32 (3004)**

63. The Council approved following measures:

- a. Conduct of Academic Mock-Audit to identify deficiencies in the BS (SCM) program in terms of NBEAC standards according to the provisions of the BU Academic Audit Manual including reviewing its curriculum and determining its alignment with the HEC guidelines
- b. Explore possibility for induction of civilian students into the program.
- c. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean M&SS Director QA	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 3014: LLM in International and Maritime Laws - Launch Proposal**

Responsibility: Registrar

**Decision of the 31st ACM**

64. Case be pursued with HEC for obtaining NOC. Point to remain on agenda and progress be reported.

**Progress Reported**

65. NOC has been issued by HEC on 25<sup>th</sup> September, 2018 and this program will now commence wef. Spring 2019 semester.

**Decision 32 (3014)**

66. The Council approved the followings:

- a. Launch of LLM in International and Maritime Laws at BUIC approved wef Spring 2019.
- b. All efforts be made at appropriate level for its marketing/advertisement in print and social media for successful launch of the program.
- c. To fulfill all the requirements raised by the HOD Law including additional advertisements to attract large number of students.
- d. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dir Admissions, HOD (Law) BUIC	HOD Law BUIC
<b>Statutory Documents affected:</b> -		

**Item 3017: MS Economics at BUIC - Launch Proposal**

Responsibility: Registrar

**Decision of the 31st ACM**

67. Case be pursued with HEC for obtaining NOC for MS Economics. Point to remain on agenda and progress be reported.

**Progress Reported**

68. QA Directorate has pursued NOC case of MS Economics at HEC. Case is still with Academic Directorate of HEC for further review from subject experts.

**Decision 32 (3017)**

69. After taking feedback from various stake holders, the Council resolved that:

- a. Case be referred back to FBOS (M&SS) for revision of this programme's duration i.e. from 1.5 year to 2.0 year. Same is to be presented as a fresh agenda point in the next ACM containing 2-years roadmap.
- b. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean M&SS	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 3021: MS Data Science - Launch Proposal**

Responsibility: Registrar

**Decision of the 31st ACM**

70. Point to remain on agenda and progress be reported.

**Progress Reported**

71. MS Data Science program was approved in 30th ACM and case for NOC to HEC was forwarded. Subject experts of HEC sent observations on curriculum which were deliberated in FBOS of Engineering Sciences. Changes suggested by FBOS were approved on file by Honourable Rector. Case for NOC was re-submitted to HEC and HEC issued NOC in July 2018. Changes in curriculum have been included as separate agenda item No. 3222 for ratification.

72. 27 students out of 70 candidates have been admitted in this program wef. Fall 2018 Semester.

**Decision 32 (3021)**

73. The Council appreciated successful launch of MS Data Science program. Point dropped.

**Item 3025: LLB at BUKC - Launch Proposal**

Responsibility: Dean M&SS

**Decision of the 31st ACM**

74. Point to remain on agenda and progress be reported.

**Progress Reported**

75. The process of seeking full recognition of LLB program at the BUIC and arranging the PBC visit is under process. Once these two steps are completed, initiative for the LLB program at the BUKC will be undertaken.

**Decision 32 (3025)**

76. The Council resolved that launch proposal of LLB at BUKC be initiated only after successful LLB programme at BUIC has been finally regularized by the Pakistan Bar Council. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean M&SS	Dean M&SS
<b>Statutory Documents affected:</b>	-	

**Item 3026: PhD in International Relations - Launch Proposal**

Responsibility: Registrar

**Decision of the 31st ACM**

77. Point to remain on agenda and progress be reported.

**Progress Reported**

78. NOC was issued by HEC for launch of Ph.D. in International Relations.

**Decision 32 (3026)**

79. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Admissions HOD (H&SS) BUIC	HOD (H&SS) BUIC
<b>Statutory Documents affected:</b>	-	

<b>Item 3028: IT-based Solution to reduce Submission Time of Final Examination Results</b>
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Responsibility: Registrar, Dean ES
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**Decision of the 31st ACM**

80. After a long discussion, the Council resolved that there should be a mechanism to align the system of whole university through technology. For the purpose, a committee is to be constituted which will submit its report in one month and mandate of the committee will include:

- a. Single platform/Common software for use by all the campuses and the Exam Directorate BUHO for overall reduction in final examinations results submission time.
- b. To make examination system fool proof and secure.
- c. Office Automation system to be used for administrative purpose.

81. The committee is to be constituted of the following:

- a. Dean ES
- b. DE
- c. DIT
- d. DQA
- e. DD Academics (BUIC, BUKC, BULC)
- f. 1 x FM

82. Point to remain on agenda and progress be reported.

**Progress Reported**

83. Registrar constituted the Committee.

84. The committee prepared report and Dean (ES) presented recommendations before the house.

**Decision 32 (3028)**

85. After detailed discussion on the recommendations of the committee, the Council approved report of the committee as placed at Appendage 32 (3028) (page 73). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations Director IT	Director IT
<b>Statutory Documents affected:</b> -		

**Item 3113: BBA program - Introduction of Optional Final Year Project (FYP)**

Responsibility: Dean M&SS

**Decision of the 31st ACM**

86. Inclusion of 3 credit hour Project in BBA Final Semester programme as an Elective course approved in the Old road map as an option to Specialization VI course and in the new Road map as a University Elective.

87. Maximum three students can be enrolled for one BBA project.

88. Honorarium for the Faculty Members per project will be as under:

- a. For Faculty Rs. 8,000/-
- b. For Each Examiner Rs. 1,000/-

89. Point to remain on agenda and progress be reported.

**Progress Reported**

90. The decision has been implemented wef Fall 2018 semester in all campuses.

**Decision 32 (3113)**

91. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director BUKC Director BUIC Director BULC	Director Finance
<b>Statutory Documents affected:</b> -		

**Item 3116: BBA program - Inclusion of 3-CR Chinese Language Elective**

Responsibility: Dean M&SS, DE

**Decision of the 31st ACM**

92. Inclusion of 3-CR Chinese Language as University Elective in BBA Program approved.  
Point to remain on agenda and progress reported.

**Progress Reported**

93. Road map of BBA program has been updated in BU's prospectus and course is included in Unified Course Codes Book.

**Decision 32 (3116)**

94. Pointed dropped.

**Item 3117: Chinese Language (Certificate and Diploma) - Launch Proposal**

Responsibility: DKC, Dir LDC

**Decision of the 31st ACM**

95. Launch of Chinese Language (Certificate and Diploma) at BUKC wef Fall 2018 approved. Point to remain on agenda and progress reported.

**Progress Reported**

96. Program has been launched wef Fall 2018 semester at Karachi Campus. Four students admitted in this program.

**Decision 32 (3117)**

97. Make all efforts to improve intake in Chines Language Certificate program. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director BUKC Director LDC HOD (H&SS) BUKC	Director BUKC
<b>Statutory Documents affected:</b> -		

**Item 3122: BS Sociology at BUIC - Launch Proposal**

Responsibility: DIC

**Decision of the 31st ACM**

98. After a long discussion, the Council resolved that programme need further working prior to start; pended the case and directed to resubmit it during next ACM.

99. Point to remain on agenda and progress reported.

**Progress Reported**

100. The proposal was re-submitted and deliberated before the FBOS on 11 September 2018. Keeping in view of infra-structure constraint, the department decided to withdraw the point and proposal for launch of BS (Sociology) will be re-submitted after availability of infra-structure requirements in next ACM meeting.

**Decision 32 (3122)**

101. The Council approved proposal of HOD (H&SS) to withdraw BS (Sociology) from ACM agenda. Point dropped.

**Item 3123: BS Economics at BUKC - Launch Proposal**

Responsibility: DKC, DE

**Decision of the 31st ACM**

102. Launch of BS Economics at BUKC (H&SS Department) approved wef Fall 2018. Approved road map is placed at appendage 3123 (page 197).

103. Point to remain on agenda and progress reported.

**Progress Reported**

104. Program was launched wef Fall 2018 semester and 15 students admitted in the program. Road map of the program has been included in the Unified Course Codes Book.

**Decision 32 (3123)**

105. The Council showed concern over swift changes in program titles from BS (Economics) to BS (Economics and Finance) and the curriculum itself approved only in the previous academic Council meeting i.e. 31<sup>st</sup> ACM. The chair directed that, in future, a detailed deliberation on curriculum and other matters be carried out prior to initiating the new programs. He also directed to revise the roadmap of new programs only after laps of minimum one year.

106. After detailed discussion, the Council approved changes in the title of BS (Economics) to BS (Economics and Finance) alongwith its road map as attached as a fresh agenda item 3212. Point dropped.

**Item 3124: BS Maritime Business & Management at BUKC - Launch Proposal**

Responsibility: DKC, Dean M&SS

**Decision of the 31st ACM**

107. The Council resolved that:

- a. Launch of BS Maritime Business & Management approved as per roadmap placed at appendage 3124 (page 233) wef Fall 2018.
- b. Point to remain on agenda and progress be reported.

**Progress Reported**

108. Program was launched wef Fall 2018. 21 students joined the class. In light of the studies and workshops conducted on maritime, the curriculum has been changed. Recommendations of FBOS were processed for approval on file and it has been included in this agenda documents as a fresh agenda item No.3211 for ratification of this ACM.

**Decision 32 (3124)**

109. The Council resolved that:

Minutes of the 32<sup>nd</sup> ACM

- a. Changes in curriculum and road-map of BS (Maritime Business and Management) as approved on file by the Competent Authority ratified. Revised curriculum is placed as a fresh agenda item No.3211 of this ACM.
- b. Point dropped from this position.

Action Required	Action by	Responsibility of
Implementation of the Decision	HOD (H&SS) BUKC	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 3125: MS Maritime Affairs at BUKC - Launch Proposal**

Responsibility: DKC, Dean M&SS

**Decision of the 31st ACM**

110. The Council resolved that:

- a. Launch of MS Maritime Affairs approved as per roadmap placed at appendage 3125 (page 248) wef Fall 2018.
- b. Point to remain on agenda and progress be reported.

**Progress Reported**

111. The title of MS Maritime Affairs is being changed as MS (Maritime Port & Shipping Management). Changes in title and curriculum have been approved by the competent authority in anticipation of the approval of ACM on file. This case is included in the regular agenda item No. 3213 of this ACM for ratification.

**Decision 32 (3125)**

112. The Council resolved that:

- a. Changes of title of MS (Maritime Affairs) program to MS (Maritime Port & Shipping Management) and, accordingly, its curriculum approved on file by competent authority ratified against fresh agenda item No.3213 of this ACM.
- b. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	HOD(H&SS) BUKC	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 3126: MS Maritime Trade and Logistics at BUKC - Launch Proposal**

Responsibility: DKC, Dean M&SS

**Decision of the 31st ACM**

113. The Council resolved that:

- a. Launch of MS Maritime Trade and Logistics approved as per roadmap placed at appendage 3126 (page 259) wef Spring 2019 subject to NOC from HEC.

- b. Point to remain on agenda and progress be reported.

**Progress Reported**

114. The MS Maritime Trade & Logistics curriculum previously approved by the ACM was partially amended following the recommendations by the experts. Changes in curriculum have been approved by the competent authority in anticipation of the approval of ACM on file. This case is included in the regular agenda item No. 3214 of this ACM for ratification.

**Decision 32 (3126)**

115. The Council resolved that:

- a. Changes in curriculum and road-map of MS Maritime Trade & Logistics approved on file by the Competent Authority is ratified against fresh agenda item No.3214 of this ACM.
- b. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	HOD(H&SS) BUKC	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 3127: MS Peace, Conflict & Development Studies at BUIC - Launch Proposal**

Responsibility: Registrar, DIC

**Decision of the 31st ACM**

116. a. Launch of MS Peace, Conflict & Development Studies approved as per roadmap placed at appendage 3127 (page 270) subject to NOC from HEC wef Spring 2019.  
 b. Point to remain on agenda and progress be reported.

**Progress Reported**

117. Case is being processed by the concerned department for HEC approval.

**Decision 32 (3127)**

118. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director PGP Director BUIC HOD (H&SS) BUIC	Registrar
<b>Statutory Documents affected:</b> -		

**Item 3130: MS Management Sciences at BULC - Launch Proposal**

Responsibility: Registrar, DLC

**Decision of the 31st ACM**

119. a. The Council approved to launch MS Management Sciences at BULC as per BUIC roadmap subject to NOC from HEC wef Spring 2019.  
 b. Point to remain on agenda and progress reported.

**Progress Reported**

120. The case of NOC of MS Management Sciences, BULC has been forwarded to HEC in the last week of September 2018. Case is with Academic Directorate of HEC for subject expert review.

**Decision 32 (3130)**

121. The Council resolved that the case be pursued with HEC for its approval. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director PGP Director BULC HOD (MS) BULC	Registrar

**Item 3131: Trimester MBA Programmes at BUKC – Conversion to Bi-Semester**

Responsibility: Dean M&SS

**Decision of the 31st ACM**

122. The Council approved that Trimester MBA Programmes at BUKC be Converted to Bi-Semester from Fall-2018 intake. Point to remain on agenda and progress reported.

**Progress Reported**

123. The decision is implemented accordingly from Fall 2018. Weakened program has already been converted to Bi-semester and the program is being offered in synchronization with other programs of Bi-semester.

**Decision 32 (3131)**

124. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean M&SS	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 3132: UG Programmes in Engineering & Computer Science - Duration of Final Exam**

Responsibility: DE, DIC, DLC, DKC

**Decision of the 31st ACM**

125. The Council approved the increase in the duration of Final Exam to 2½ hrs for all UG programmes in the Engineering & Computer Sciences departments wef Spring 2018. Point to remain on the agenda and progress to be reported.

**Progress Reported**

126. In compliance with 31st ACM decision, all final examinations of 2 ½ hours duration of all undergraduate programs of Faculty of Engineering Sciences in all campuses have been implemented wef Spring 2018 semester.

**Decision 32 (3132)**

127. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations	Director Examinations
<b>Statutory Documents affected:</b> -		

**Item 3137: Common Examination Paper for Multiple Sections taught by Different Teachers - Rules Review**

Responsibility: Dir ORIC

**Decision of the 31st ACM**

128. After detailed deliberations, the Council resolved that in depth study should be carried out prior taking its decision. The Council referred the matter to be taken up by the Dean's Committee.

129. HOD MS KC to suggest the changes required in Common Examination Paper policy to the Secretary of the Dean's Committee.

130. Point to remain on agenda and progress be reported.

**Progress Reported**

131. The Item was tabled in the Third Deans' Committee Meeting. Following decision regarding the item has been taken in the meeting:

- a. The Status Quo i.e. common examination paper for multiple sections taught by different teachers shall be maintained. Furthermore, comprehensive peer review of the question paper shall be done by the cluster head and endorsed by the respective Head of Department in order to ensure achievement of minimum standard.

- b. Comprehensive analysis of results shall be undertaken by each department to evaluate and initiate corrective action plan and shall be tabled for candid discussion at respective Faculty Board of Studies.

**Decision 32 (3137)**

132. After prolonged discussion, the council decided:
- a. The status quo shall be maintained for common paper examination.
  - b. Furthermore, it was also clarified that common examination paper of a course taught by multiple teachers to various sections shall be program specific. For example common paper of Principles of Marketing taught to the BBA students shall be restricted to BBA program only and shall not be extended to BS (A&F) program. Rather, BS (A&F) shall have its own common paper for this course.
  - c. Comprehensive analysis of results shall be undertaken by each department to evaluate and initiate corrective action plan and shall be tabled for candid discussion at respective Faculty Board of Studies. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	All Deans Director Examinations	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 3138: Business School at BUKC - Creation from Existing MS Department**

Responsibility: Registrar, Dean M&SS

**Decision of the 31st ACM**

133. The Council resolved that a Committee may be constituted to further deliberate the establishment of Business School's at BUIC and BUKC. The committee is to include:

- a. Dean M&SS
- b. HODs MS of BUIC and BUKC
- c. DD Academics BUIC and BUKC
- d. Manager Accounts BUIC and BUKC
- e. Manager Accounts BUHO

134. Point to remain on agenda and progress be reported.

**Progress Reported**

135. Dean (M&SS) presented detail recommendations of the committee. He apprised the house to establish Business School at BUIC and BUKC through different steps/phases.

**Decision 32 (3138)**

136. After detailed deliberations, the Council resolved that:

- a. As a first step towards establishing BU Business Schools, split of MS Department at BUIC into two departments approved; i.e Department of Business Studies and Department of Management Studies wef Spring 2019.

- b. Implementation modalities and distribution of existing resources are to be worked out/processed by DG BUIC.
- c. Committee of relevant stake holders under DG BUIC will also carry out a detailed study and recommend its way forward for the establishment of Bahria Business School.

137. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	DG BUIC, Director BUIC HOD(MS) BUIC	DG BUIC
<b>Statutory Documents affected:</b> -		

**Item 3141: Approval of Curriculum, Course Code, Road Map, Academic Examination Rules BS (Nursing) Four Years Semester based program at Pakistan Navy Nursing College (PNNC) - PNS SHIFA Karachi**

Responsibility: DG BUM&DC, Registrar, DE, DA

**Decision of the 31st ACM**

138. After prolonged discussion, the Council resolved that:

- a. BS Nursing 4 Years program based on HEC/Pakistan Nursing Council 2011 Curriculum, Course Code, Road Map, Examination Rules of BS Nursing Four Years Semester based program at Pakistan Navy Nursing College (PNNC) PNS SHIFA Karachi are placed at appendage 3141 (attached as supplementary booklet) approved from 2018 Intake.
- b. Examinations based on semester system from 2018 Intake to be conducted by PNNC.
- c. Dean HS is to monitor Academic and Examination activities of PNNC.
- d. BS Nursing 4 Years program based on HEC/Pakistan Nursing Council Curriculum 2011, Course Code, Road Map, Examination Rules of BS Nursing Four Years programme for the batches of 2014 to 2017 (four batches) based on hybrid system approved.
- e. Annual Examinations conducted by Bahria University for the Four batches of BS Nursing 2014 to 2017 approved.
- f. Deficient courses of the first batch of BS Nursing admitted in 2014 in PNNC, to complete the BS Nursing programme as per HEC Curriculum 2011 by taking extra courses to be conducted by PNNC.
- g. Committee to be formed to see the potential of expanding admission to civilian students in BS Nursing programme.
- h. The Committee is to study the potential and having additional classrooms in PNNC to accommodate intake of more than 25 students.
- i. DG BUMDC Head

- ii. Dean HS
- iii. OIC PNNC
- iv. DHS
- v. DKC

**Progress Reported**

139. Representative of Vice Principal PN Nursing College briefed the house about implementation of approved curriculum.

**Decision 32 (3141)**

140. The chair showed concern over non-participation of Vice Principal, PN Nursing College in the meeting. After long deliberation, the Council resolved that:

- a. Vice Principal PN Nursing College is to make necessary preparation needed to fulfill requirements of Pakistan Nursing Council accreditation for at least 30 students.
- b. Well-defined Plan be prepared for induction of civilian students in PN Nursing College.
- c. Conduct of inspection of Pakistan Nursing Council for accreditation before Convocation.
- d. Director Examinations is to issue final transcript/degree to nursing graduates subject to successful accreditation by Pakistan Nursing Council.
- e. DG HS is to write letter to NHQ for preparation of PN Nursing College for accreditation visit of Pakistan Nursing Council.
- f. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Exams Dean HS Director HS Vice Principal/OIC PNNC	DG HS
<b>Statutory Documents affected:</b> -		

**New Items****Item 3201: Establishment of Medical Education and Counselling Department (DME) at BUMDC, Karachi**

Sponsors: Principal BUMDC

Referral Authority: FBOS HS

**Summary of the Case**

141. As per observation raised by PMDC Committee with reference to the last visit dated 9<sup>th</sup> April 2018, there is no Medical Education and Counselling Department with full time faculty. Agenda was deliberated in DBOS and FBOS dated 27-08-18 and 29-08-18 respectively. Recommendations of FBOS were presented by Dean HS for approval of ACM.

**Decision 3201**

142. The Council resolved that:

- a. Establishment of Medical Education and Counselling Department (DME) at BUMDC, Karachi is approved.
- b. Department is to be managed within available resources including faculty and infrastructure.
- d. In case of any pressing requirement arises, it may be processed for approval.
- e. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean HS	DG BUMDC
<b>Statutory Documents affected:</b> -		

**Item 3202: Establishment of Department of Family Medicine at BUMDC, Karachi**

Sponsors: Dean HS

Referral Authority: FBOS HS

**Summary of the Case**

143. As per PMDC reference regarding the above mentioned subject to Establish Department of Family Medicine. Agenda was deliberated in DBOS and FBOS dated 27-08-18 and 29-08-18 respectively. Recommendations of FBOS were presented by Dean HS for approval of ACM.

**Decision 3202**

144. The Council resolved that:

- a. Establishment of Department of Family Medicine at BUMDC, Karachi is approved.
- b. Department is to be managed within available resources including faculty and infrastructure.

c. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean HS	DG BUMDC
<b>Statutory Documents affected:</b> -		

### **Item 3203: BS TV Broadcasting Program at BUIC- Launch Proposal**

Sponsors: HOD (Media Studies) BUIC

Referral Authority: FBOS M&SS

#### **Summary of the Case**

145. Launch of BS TV Broadcasting Program at BUIC was proposed by HOD (Media Studies), BUIC. Road-map, Curriculum and Feasibility of the program was deliberated in FBOS meeting of Faculty of Management and Social Sciences. FBOS recommended launch of BS TV Broadcasting program at BUIC subject to the availability of class rooms and laboratory resources.

#### **Decision 3203**

146. HOD (Media Studies) presented the launch of new undergraduate program titled “BS TV and Broadcasting” along with detailed road-map, course outlines and feasibility study.

147. After discussions, the Council approved launch of BS TV Broadcasting program at BUIC wef Fall 2019 as per its road-map and course outlines placed at appendage 3203 (page 76).

148. Point is to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	HOD (Media Studies) BUIC	Director BUIC
<b>Statutory Documents affected:</b> -		

### **Item 3204: MS English (Applied Linguistics) at BUKC - Launch Proposal**

Sponsors: HOD (H&SS) BUKC

Referral Authority: FBOS M&SS

#### **Summary of the Case**

149. Launch of MS English (Applied Linguistics) Program at BUKC was proposed by HOD (H&SS), BUKC. Road-map, Curriculum and Feasibility of the program was deliberated in FBOS meeting of Faculty of Management and Social Sciences. FBOS recommended launch of MS

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English (Applied Linguistics) Program at BUKC subject to NOC from HEC wef Fall 2019 for approval of ACM.

### **Decision 3204**

150. After deliberating all pros and cons, the Council decided not to launch this programme for the time being. Point dropped.

### **Item 3205: PhD Program in Geo-Physics at BUIC- Launch Proposal**

Sponsors: HOD (E&ES) BUIC

Referral Authority: FBOS ES

#### **Summary of the Case**

151. Launch of Ph.D Program in Geo-Physics at BUIC was proposed by HOD (E&ES), BUIC. Road-map, Curriculum and Feasibility of the program was deliberated in FBOS meeting of Faculty Engineering Sciences. FBOS recommended launch of Ph.D Program in Geo-Physics at BUIC subject to NOC from HEC wef Fall 2019 for approval of ACM.

### **Decision 3205**

152. The Council approved Ph.D. Geo-Physics program at Bahria University, Islamabad Campus wef Fall 2019 semester subject to issuance of NOC from HEC. Approved roadmap and curriculum is placed at Appendix 3205 (page 146).

153. Point is to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director BUIC HOD (E&ES) BUIC	Registrar

**Statutory Documents affected:** -

### **Item 3206: MBBS program - Launch Proposal at Proposed BUMDC Islamabad**

Sponsors: DHS/Dean HS

Referral Authority: FBOS HS

#### **Summary of the Case**

154. DHS/Dean HS suggested launch of MBBS program at (proposed BUMDC at Islamabad). Launch of MBBS program at (proposed BUM&DC Islamabad) was deliberated in FBOS meeting of Faculty of Health Sciences. FBOS recommended launch of MBBS Program subject to the approval of PMDC and availability of infrastructure and other resources.

### **Decision 3206**

155. After a prolonged discussion the Council resolved that:

- a. Principle approval accorded to launch of MBBS programme at proposed campus of BUMDC Islamabad subject to availability of infrastructure and other resources.

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- b. Launch proposal of this programme be presented in next ACM with its full details covering its financial model as well.
- c. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean HS Director HS	DG HS
<b>Statutory Documents affected:</b> -		

**Item 3207: MBA Pharmaceuticals and Health Management Program at BUIC- Launch Proposal**

Sponsors: DHS/Dean HS

Referral Authority: FBOS HS

**Summary of the Case**

156. Launch of MBA Pharmaceuticals and Health Management program at BUIC was proposed by DHS/Dean HS. Launch of MBA Pharmaceuticals and Health Management program at BUIC was deliberated in FBOS meeting of Faculty Health Sciences. FBOS recommended launch of MBA Pharmaceuticals and Health Management program at BUIC as weekend program wef Fall 2019.

**Decision 3207**

157. During discussion, it revealed that Dean M&SS was not taken in the loop while taking initiative for this program since the program being an MBA can only be run under the Management Sciences department. Accordingly, the Council urged to relook into the matter and initiate the program from the Management Sciences department platform.

158. The point is referred to FBOS (M&SS) for its evaluation and putting up in next ACM as fresh agenda item. Point dropped from this position.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean M&SS Director HS HOD (MS) BUIC	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 3208: Review of Vision, Mission and Objectives of Humanities and Social Sciences Department, BUKC**

Sponsors: HOD (H&SS) BUKC

Referral Authority: FBOS M&SS

**Summary of the Case**

159. HODs (H&SS), BUKC and BUIC reviewed Vision, Mission and Objectives of H&SS department for alignment with the Strategic Plan of BU.

160. Vision, Mission and Objectives of department were deliberated in FBOS meeting of Faculty of M&SS.

**Decision 3208**

161. The Council approved Vision, Mission and Objectives of H&SS department placed at appendage 3208 (page 166). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	HOD (H&SS) BUIC HOD (H&SS) BUKC	Dean M&SS
<b>Statutory Documents affected:</b> Prospectus		

**Item 3209: Review of Course Codes of DPT, BS MLT, BS (Nursing) and M Phil Programs**

Sponsors: Dean HS

Referral Authority: FBOS HS

**Summary of the Case**

162. Course codes of the following programs were deliberated/discussed in DBOS and FBOS as per PM&DC and HEC guidelines:

- a. DPT
- b. BS MLT
- c. BS Nursing
- d. MPhil Programs

163. Recommendations of FBOS of Faculty of Health Sciences were presented in front of house.

**Decision 3209**

164. The Council resolved that course codes of DPT, BS MLT, BS Nursing, MPhil Anatomy, MPhil Pathology and MPhil Pharmacology as placed at appendage 3209 (Page 167) are approved. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations Dean HS	Director Examinations
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus of BUMDC		

**Item 3210: Review of Curriculum of MBBS and BDS of BUMDC, Karachi**

Sponsors: Principals BUMDC

Referral Authority: FBOS HS

**Summary of the Case**

165. The curriculum integration of MBBS and BDS programmes is reviewed according to new PMDC guidelines and deliberated/discussed in the meeting of DBOS and FBOS of Faculty of HS.

166. FBOS of HS recommended revised curriculum of MBBS and BDS to Academic Council for approval.

**Decision 3210**

167. The Council approved revised curriculum of MBBS and BDS placed at appendage 3210 (attached as a Supplementary Document). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Principals BUMDC Director Examinations	Dean HS
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3211: Review of Curriculum BS (Maritime Business and Management) - BUKC**

Sponsors: HOD (H&amp;SS) BUKC

Referral Authority: FBOS M&amp;SS

**Summary of the Case**

168. Launch of BS (Maritime Business and Management) program was approved in the 31st meeting of ACM. After approval, the curriculum and roadmap were discussed with foreign and local educational and corporate experts who proposed changes in the approved curriculm. Changes proposed by the experts were further deliberated and discussed in DBOS and subsequently in FBOS of M&SS meetings which endorsed those changes and forwarded for final approval by the competent authority.

169. Changes recommended by FBOS were approved on file by competent authority. Recommendations of FBOS regarding changes in curriculum were presented to the house for ratification.

**Decision 3211**

170. The Council ratified the revised curriculum of BS (Maritime Business and Management) placed at appendage 3211 (page 193).

171. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HOD (H&SS) BUKC	HOD (H&SS) BUKC
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3212: Review of Title and Curriculum - BS (Economics) - BUKC**

Sponsors: HOD (H&amp;SS) BUKC

Referral Authority: FBOS M&amp;SS

**Summary of the Case**

172. ACM approved launch of BS (Economics) program in its 31st meeting wef Fall 2018 semester. Intake of Fall 2018 admission was not that encouraging.

173. On the recommendation of HOD (H&SS), FBOS of M&SS constituted a committee of experts from academia and corporate sector to review the program title and its curriculum and present its recommendations in next FBOS meeting.

174. The committee presented its recommendations in FBOS meeting. FBOS of M&SS endorsed recommendations of the committee for approval of ACM.

**Decision 3212**

175. The Council approved new title of the program as BS (Economics and Finance) for BUKC only along with revised curriculum placed at appendage 3212 (page 197 ) wef Fall 2018. The Council did not approve revised fee structure for this program.

176. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HOD (H&SS) BUKC	Dean M&SS
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3213: Review of Title and Roadmap of MS (Maritime Affairs) - BUKC**

Sponsors: HOD (H&amp;SS) BUKC

Referral Authority: FBOS M&amp;SS

**Summary of the Case**

177. The Council approved launch of MS (Maritime Affairs) program in its 31st meeting. After approval, the program title, roadmap and curriculum was discussed with foreign and local experts from academia and corporate. The experts proposed change of the title of the program from MS (Maritime Affairs) to MS (Maritime Ports & Shipping Management) and, accordingly, suggested a changed curriculum as well.

178. DBOS of H&SS department and FBOS of M&SS deliberated recommendations of foreign and local experts regarding change of title and curriculum in its meetings. FBOS endorsed changes in program title, roadmap and curriculum.

179. The competent authority approved revised program title as “MS (Maritime Port and Shipping Management”), roadmap and curriculum endorsed by FBOS on file. HOD (H&SS) presented revision in program title, roadmap and curriculum to the house for ratification.

**Decision 3213**

180. The Council ratified approval of the Competent Authority regarding changes in program title as “MS (Maritime Ports and Shipping Management)”, and its road-map and curriculum as placed at Appendage 3213 (page 201).

181. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean M&SS Director Examinations Director PGP HOD (H&SS) BUKC	Registrar
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3214: Review of Roadmap of MS (Maritime Trade and Logistics) - BUKC**

Sponsors: HOD (H&SS) BUKC

Referral Authority: FBOS M&SS

**Summary of the Case**

182. The Council approved launch of MS (Maritime Trade and Logistics) program at Bahria University, Karachi campus in its 31st meeting. After approval, HOD (H&SS) discussed program roadmap and curriculum was discussed with foreign and local experts from academia and corporate. The experts proposed changes in the curriculum of the program.

183. DBOS of H&SS department and FBOS of M&SS deliberated recommendations of foreign and local experts regarding changes in curriculum in its meetings. FBOS endorsed revised roadmap and curriculum of MS (Maritime Trade and Logistics).

184. HOD (H&SS) processed case on file for approval of competent authority. The competent authority approved revised program curriculum endorsed by FBOS on file. HOD (H&SS) presented revision in, program roadmap and curriculum to the house for ratification.

**Decision 3214**

185. The Council ratified approval of the Competent Authority regarding changes in road-map and curriculum of MS (Maritime Trade and Logistics) placed at Appendage 3214 (page 204).

186. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean M&SS Director Examinations Director PGP HOD (H&SS) BUKC	Registrar
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3215: Review of Courses Title of Certificate and Diploma of Chinese Language Programs - BUKC**

Sponsors: HOD (H&SS) BUKC

Referral Authority: FBOS M&SS

**Summary of the Case**

187. The Council approved launch of Chinese language programs (Certificate and Diploma) in its 31<sup>st</sup> meeting wef Fall 2018. After launch of the program, faculty member of Chinese language (Chinese origion) proposed changes in the title of few courses.

188. FBOS deliberated on proposed changes in its meeting and endorsed the proposed changes in the courses title and referred the matter for approval of Academic Council

**Decision 3215**

189. The Council approved changes in the title of Chinese Courses (Certificate and Diploma) placed at Appendage 3215 (page 207). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HOD (H&SS) BUKC	Director BUKC
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3216: Review Eligibility Criteria for BS English - BUKC**

Sponsors: HOD (H&SS) BUKC

Referral Authority: FBOS M&SS

**Summary of the Case**

190. Launch of BS (English) program was approved in the 30th meeting of ACM. Admission eligibility criteria including 55% marks in the subject of English at HSSC or equivalent were also approved in the 30<sup>th</sup> ACM. Due to low trend in BS (English) admission, changes in admission eligibility criteria from 55% to 50% in English subject were proposed and presented to FBOS of M&SS. FBOS endorsed the proposal and referred the matter for approval by the competent authority.

191. HOD (H&SS) processed recommendations of FBOS of M&SS for approval of competent authority. Competent authority approved reduction in English subject marks from 55% to 50% in English subject at HSSC or equivalent as admission eligibility criteria on file. HOD (H&SS) presented revision in eligibility criteria to the house for ratification.

**Decision 3216**

192. The Council ratified approval of the Competent Authority regarding changes in admission eligibility criteria from 55% to 50% marks in English subject at HSSC or equivalent level. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Admissions HOD (H&SS) BUKC	Director BUKC
<b>Statutory Documents affected:</b> Admission Policy and Prospectus		

**Item 3217: Change of Format Postgraduate Diploma (Logistics & Port Management) from Trimester to Bi-Semester - BUKC**

Sponsors: HOD (H&SS) BUKC

Referral Authority: FBOS M&SS

**Summary of the Case**

193. Postgraduate Diploma (Logistics and Ports Management) was being conducted until last semester through trimester format as weekend program at BUKC. However, format of the PGD had to be changed to bi-semester w.e.f Fall 2018 as per HEC guidelines and approval of ACM in its 31<sup>st</sup> meeting.

194. Accordingly, HOD (H&SS) BUKC proposed change in the roadmap and curriculum of the program in accordance with the bi-semester format and presented it in FBOS of M&SS. Changes endorsed by FBOS were presented to the house for approval. In order to fit the new curriculum in the bi-semester format the number of courses of the program had to be reduced to 10 from 11. Accordingly, the course of Business Communication had to be deleted from the curriculum since it was already making a duplicate course in the presence of Business English course.

195. Format were converted to bi-semester w.e.f Fall 2018 as per HEC guidelines and approval of ACM in its 31<sup>st</sup> meeting.

**Decision 3217**

196. The Council approved changes in curriculum placed at Appendage 3217 (page 209). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HOD (H&SS) BUKC	Director BUKC
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3218: Revision of Curriculum - MS (Software Engineering) – BUIC & BUKC**

Sponsors: HOD (SE) BUIC

Referral Authority: FBOS ES

**Summary of the Case**

197. Revised curriculum of MS (Software Engineering) was published by HEC in 2018. A committee was constituted by FBOS of ES to review curriculum of MS (Software Engineering) for alignment with HEC published MS (SE) Curriculum-2018. Committee presented changes in the 17<sup>th</sup> meeting of FBOS of ES. After detailed deliberation, FBOS endorsed changes recommended by the committee.

198. HOD (SE) presented revised road-map and curriculum of MS (Software Engineering) endorsed by FBOS of Faculty of ES for approval of ACM.

**Decision 3218**

199. The Council approved revised road-map and curriculum of MS (Software Engineering) wef Spring 2019 placed at Appendage 3218 (page 211). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HODs (SE) BUIC & BUKC	Dean ES
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3219: Revision of MS (Engineering Management) Roadmap - BUIC**

Sponsors: HOD (SE) BUIC

Referral Authority: FBOS ES

**Summary of the Case**

200. Bahria University launched MS (Engineering Management) Program at Islamabad campus in the Software Engineering department in Spring 2016.

201. A committee was constituted by FBOS of ES to review curriculum of MS (Engineering Management) to review the following:-

- a. The course codes for the core courses of the program to 500 level.
- b. Addition of elective courses in two sub-domains.
- c. Review of course offering in the initial two semesters.

202. Committee presented changes in the 17<sup>th</sup> meeting of FBOS of ES. After detailed deliberation, FBOS endorsed changes recommended by the committee.

203. HOD (SE) presented revised road-map and curriculum of MS (Engineering Management) endorsed by FBOS of Faculty of ES for approval of ACM.

**Decision 3219**

204. The Council approved revised road-map and curriculum of MS (Engineering Management) wef Spring 2019 placed at Appendage 3219 (page 238). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HOD (SE) BUIC	Dean ES
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3220: Revision of Curriculum - MS (CS) Program at All Campuses**

Sponsors: HOD (CS) BUIC

Referral Authority: FBOS ES

**Summary of the Case**

205. A committee was constituted by Dean ES to review curriculum of MS (Computer Science). Committee presented the following changes in the 17<sup>th</sup> meeting of FBOS of Engineering Sciences:-

- a. The eligibility criteria for the program is updated with inclusion of pre-requisite or deficiency courses
- b. Increase in number of 4 core courses from 2-4 in revised MSCS program.
- c. Total degree credit hours are revised from 33 to 30.
- d. Course on Deep Learning is added to the list of electives.

206. Changes recommended by the committee were deliberated in the meeting of FBOS of Engineering Sciences and FBOS endorsed changes in MS (Computer Science) curriculum and referred the matter to Academic Council for approval.

**Decision 3220**

207. The Council approved revised curriculum of MS (Computer Science) wef Spring 2019 placed at Appendage 3220 (page 263). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HODs (CS) BUIC, BUKC & BULC	Dean ES
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3221: Revision of Curriculum - MS Information Security Program - BUIC**

Sponsors: HOD (CS) BUIC

Referral Authority: FBOS ES

**Summary of the Case**

208. A committee was constituted by HOD (CS), BUIC to align the roadmap/curriculum of the MS (Information Security) program with the latest HEC guidelines published in Spring 2018.

209. In this regard, the committee reviewed the existing curriculum of MS (Information Security) and recommended the following changes to FBOS of Engineering Sciences:-

- a. Number of core courses reduced from 5 to 4 in the revised MS (Information Security) program curriculum.
- a. Total program credit hours are reduced to 30 from 33 in the revised curriculum.
- b. Course on Block Chain Technology is added to the list of electives.
- c. Addition of more electives to avoid frequent changes in roadmap.

210. FBOS of Engineering Sciences recommended changes in roadmap and curriculum of MS (Information Security) for approval of ACM.

**Decision 3221**

211. The Council approved recommendations of FBOS of Engineering Sciences in the roadmap and curriculum of MS (Information Security) program wef Spring 2019 placed at Appendage 3221 (page 296). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HOD (CS) BUIC	Dean ES
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3222: Review of Road Map - MS Data Science - BUIC**

Sponsors: HOD (CS) BUIC

Referral Authority: FBOS ES

**Summary of the Case**

212. Launch of MS Data Sciences was approved in 30<sup>th</sup> meeting of ACM wef Fall 2018 semester. Case for NOC was forwarded to HEC and subject experts of HEC suggested minor changes in curriculum and eligibility criteria.

213. Dean ES constituted the committee to review changes suggested by HEC in curriculum and eligibility criteria. Committee reviewed changes suggested by HEC experts and presented recommendations in 16<sup>th</sup> FBOS meeting of Engineering Sciences.

214. FBOS of Engineering Sciences endorsed changes in eligibility criteria and curriculum of MS Data Science. Recommendations of FBOS was approved by competent authority on file.

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215. BU re-submitted case to HEC for NOC and HEC issued NOC for launch of MS Data Science wef Fall 2018 semester. HOD (CS) presented revised curriculum and eligibility criteria approved by the competent authority for ratification of Academic Council.

**Decision 3222**

216. The Council ratified approval of the Competent Authority on file regarding revised roadmap, curriculum and eligibility criteria of MS (Data Science) program wef Fall 2018 placed at Appendage 3222 (page 314). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HOD (CS) BUIC	Dean ES
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3223: Review of Roadmap - BEE 2018 – BUIC & BUKC**

Sponsors: HOD (EE) BUIC

Referral Authority: FBOS ES

**Summary of the Case**

217. New revised curriculum of BEE was published by HEC in 2018. A committee of HOD (EE), BUKC and HOD (EE), BUIC was constituted by Dean ES to review curriculum of BEE for alignment with the revised HEC curriculum.

218. Committee presented changes in the 17<sup>th</sup> meeting of FBOS of ES. After deliberation FBOS endorsed changes in roadmap of BEE program. HOD (EE), BUIC presented revised roadmap of BEE program endorsed by FBOS for approval of Academic Council.

**Decision 3223**

219. The Council approved revised roadmap of BEE program wef Fall 2018 on the recommendations of FBOS of Engineering Sciences placed at Appendage 3223 (page 329). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HOD (EE) BUIC & BUKC	Dean ES
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3224: Policy for Registration & Completion of Deficiency Courses in MS Degree Programs of Engineering & Computer Science Departments – Faculty of Engineering Sciences**

Sponsors: Dean ES

Referral Authority: FBOS ES

**Summary of the Case**

220. The domains in Faculty of Engineering Sciences are overlapping and there are many commonalities in the BS curriculum of Engineering and Computer Science departments of Bahria University.

221. Bahria University follows eligibility criteria for admission as per guidelines of regulatory/accreditation bodies' in all MS Programs of Engineering and Computer Science departments. Due to commonalities, the applicants are eligible for admission in the relevant programs.

222. Deficiency courses were identified for candidates who are applying for admission in all MS programs of Engineering and Computer Science departments of Bahria University from overlapping domain during 17<sup>th</sup> meeting of FBOS. Deficiency courses and methodology to be adopted by candidates at the time of admission were endorsed by FBOS of Engineering Sciences.

223. Dean Engineering Sciences presented recommendations of FBOS of Engineering sciences regarding deficiency courses and methodology to be adopted by candidates for approval of Academic Council.

**Decision 3224**

224. The Council approved recommendations of FBOS of Engineering Sciences regarding deficiency courses and methodology for admission to all MS programs of Engineering and Computer Science department of Bahria University to be adopted by candidates wef Spring 19 as placed at Appendage 3224 (page 343). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Admissions Director IT Director PGP All HODs of Engineering and CS	Dean ES

**Statutory Documents affected:** Admission Policy

**Item 3225 Review of Course Code - BS Media Studies - BUKC**

Sponsors: HOD (Media Studies) BUKC

Referral Authority: FBOS M&amp;SS

**Summary of the Case**

225. The Department of Media Studies was advised by the Academic Council to develop course codes for the BS curriculum and MS Electives courses approved in its 31st ACM.

226. The course codes for both programs were and endorsed by FBOS of M&SS to Academic Council for approval.

**Decision 3225**

227. The Council approved course codes of BS Media Studies on the recommendations of FBOS of M&SS placed at Appendage 3225 (page 344). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HOD (Media Studies) BUIC & BUKC	Dean M&SS
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3226: Review of Road Map - LLM International and Maritime Laws - BUIC**

Sponsors: HOD (Law) BUIC

Referral Authority: FBOS M&amp;SS

**Summary of the Case**

228. Launch of LLM International and Maritime Laws was approved in 31st ACM. Bahria University forwarded the case for NOC to HEC. Subject experts of HEC suggested minor changes in curriculum. Changes suggested by experts were deliberated in 20<sup>th</sup> Special FBOS meeting and endorsed for approval of competent authority.

229. Changes in curriculum endorsed by FBOS were approved by competent authority on file. NOC case was re-submitted to HEC and NOC was issued by HEC to launch program wef Spring 2019.

230. HOD (Law) presented changes in curriculum approved on file by competent authority for ratification by Academic Council.

**Decision 3226**

231. The Council ratified approval of the Competent Authority regarding revised curriculum of LLM (International and Maritime Laws) placed at Appendage 3226 (page 348). Point dropped.

**Item 3227: Addition of Elective Courses in BS Psychology**

Sponsors: HOD (IPP) BUKC

Referral Authority: FBOS PP

**Summary of the Case**

232. BS Psychology program is running simultaneously in IPP Karachi, BUIC and BULC. Curriculum review is a process to bring improvement in program. BS Psychology road-map and curriculum were reviewed in FBOS of Faculty of Professional Psychology.

233. FBOS of faculty of Professional Psychology recommended the following additional elective courses for approval of ACM:

- a. IPP 450 Islamic Approaches to Psychology and Psychotherapy
- b. MPY 439 Maritime Psychology

**Decision 3227**

234. The Council approved the following elective courses for BS (Psychology) as placed at appendage 3227 (page 352):

- a. IPP 450 Islamic Approaches to Psychology and Psychotherapy
- b. MPY 439 Maritime Psychology

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations All HODs (PP)	Dean & Director IPP

**Statutory Documents affected:** Unified Course Codes Book and Prospectus

**Item 3228: Review of Admission Eligibility Criteria of MBA 1.5 Years Program by Allowing Graduates of BS (Accounts & Finance) Program - BUKC**

Sponsors: HOD (MS) BUKC

Referral Authority: FBOS M&amp;SS

**Summary of the Case**

235. Bahria University is running BS (Accounts & Finance) program at BUKC and BUIC and its first two batches are to be graduated in Fall 2018 at BUIC and in Spring 2019 at BUKC.

236. BS (A&F) graduates may seek admission in the MBA program of Bahria University. This program is a four year degree program that ends up in 16 year relevant education in terms of HEC requirement for admission to the MBA program.

237. HOD (MS), BUKC presented case of eligibility of BS (Accounts and Finance) graduates to FBOS of faculty of M&SS for admission to MBA 1.5 year program of BU. FBOS endorsed eligibility of graduates of this program to MBA 1.5 year for approval of Academic Council.

**Decision 3228**

238. The Council approved BS (Accounts and Finance) graduates being eligible for admission to MBA 1.5 year program of Bahria University. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Admissions Director Examinations All HODs (MS)	Dean M&SS
<b>Statutory Documents affected:</b> Admission Policy and Prospectus		

**Item 3229: Change of format of MBA (Pharmaceutical & Health Management) 2.0 Years Weekend Trimester to Bi-semester - BUKC**

Sponsors: HOD (MS) BUKC

Referral Authority: FBOS M&SS

**Summary of the Case**

239. MBA (Pharmaceutical & Health Management) 2.0 year was being conducted until last semester through trimester format at the weekend at the BUKC. As per HEC instructions, trimester format of all programs have been seized.

240. Changes in roadmap of MBA (Pharmaceutical and Health Management) 2.0 year program on the format of bi-semester were presented by HOD (MS), BUKC and deliberated in FBOS of faculty of M&SS.

241. FBOS of faculty of M&SS recommended changes in the roadmap on bi-semester format for approval of Academic Council.

**Decision 3229**

242. The Council approved the revised roadmap on the recommendations of FBOS of M&SS as placed at Appendix 3229 (page 356). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HOD (MS) BUKC & BUIC	Dean M&SS
<b>Statutory Documents affected:</b> Unified Course Codes Book, Prospectus		

**Item 3230: Change of format of MBA (Logistic and Maritime Management) and EMBA (Logistics & Port Management) Weekend from Trimester to Bi-semester - BUKC**

Sponsors: HOD (MS) BUKC

Referral Authority: FBOS M&amp;SS

**Summary of the Case**

243. MBA (Logistic and Maritime Management) 2.0 year and 3.5 year programs and EMBA (Logistics & Port Management) program were being conducted until last semester through trimester format at the weekend at BUKC. As per HEC instructions, Trimester format of MBA (Logistics and Port Management) programs and EMBA programs had ceased to be held at BUKC.

244. Accordingly changes in roadmap of MBA (Logistic and Maritime Management) 2.0 year and 3.5 year programs and EMBA (Logistics & Port Management) on the format of bi-semester were required to be made.

245. Roadmaps of MBA (Logistic and Maritime Management) 2.0 years and 3.5 years programs were converted into bi-semester program without deletion of any course. However, while converting the EMBA (Logistics & Port Management) program roadmap to bi-semester format to total number of credit hours of the program was required to be reduced from 69 to 60. For that purpose following three courses were deleted from the old roadmap:

- a. Organizational Behaviour
- b. Marketing Management
- c. International Business Analysis

246. HOD(MS)KC presented the matter to FBOS of faculty of M&SS for deliberation. FBOS endorsed changes in roadmap and curricula of these programs. HOD(MS)KC submitted the case on file to competent authority for approval. Approval was granted.

247. Now HOD(MS)KC has brought the matter before the ACM for ratification.

**Decision 3230**

248. The Council ratified the approved changes in roadmap and curriculum of MBA (Logistics & Maritime Management) 3.5Y and 2.0Y programs and EMBA (Logistics & Port Management) as placed at Appendage 3230 (page 358). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	HOD (MS) BUKC	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 3231: Re-Ratification of curriculum BS (Accounts & Finance) Program as per BU-ICAP MOU**

Sponsors: HOD (MS) BUKC

Referral Authority: FBOS M&amp;SS

**Summary of the Case**

249. BS (Accounting & Finance) program was approved in 23<sup>rd</sup> ACM vide Agenda Item 2304. Curriculum of the program was published in the BU prospectus for the year 2015-16.

250. MOU between BU and ICAP was signed for transfer of credit hours/exemption of courses for the benefits of BU graduates.

251. Curriculum and Roadmap of BS(A&F) were revised as per MOU requirements and approved on file from competent authority.

252. Later, the curriculum was passed through the statutory process and was got ratified by the 24<sup>th</sup> ACM vide Agenda item No.2408. But it happened so that new curriculum approved by the Rector BU on file and ratified by the 24<sup>th</sup> ACM was not placed in Annexure at page 146 of the 24<sup>th</sup> ACM rather copy of a presentation delivered by the sponsor before the ACM was placed in the Annexure. Minutes of the 25<sup>th</sup> ACM which recorded implementation progress on the matter also mentioned placing the ratified curriculum on page 201 of the minutes but inadvertently the revised curriculum again could not be incorporated into the minutes. The file on which the curriculum was approved by the Rector BU has also not been traceable since then.

253. But contrary to all these omissions, revised curriculum got printed in the 2016-17, a document in force since then.

254. Besides, the term “Exemption of the courses” for students migrating from BU to ICAP and vice versa given in the MOU signed between BU and ICAP is being taken narrowly in terms of BU Academic Rules rather than using it in broader sense as taken by the ICAP. If taken from the view of ICAP, the term “Exemption” actually means “Transfer of Credit” as defined in the BU Academic Rules. ICAP has been using the term “Exemption” in MOUs with all universities which actually means transfer of credit.

255. HOD(MS)KC has proposed the following:

- a. The revised curriculum contained in the BU prospectus be incorporated in the MoM of 24th ACM as a corrigendum, OR the revised curriculum be re-ratified.
- b. The term “Exemption” used in the BU-ICAP MOU be taken tantamount to transfer of credits defined under the BU Academic Rules.

**Decision 3231**

256. After long discussion, the Council approved the following on the recommendation of Dean (MS):

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- a. Revised roadmap of BS (A&F) re-ratified with retrospective effect as placed at Appendage 3231 (Page 364) ex-post facto wef 24<sup>th</sup> ACM.
- b. “Exemption of courses” term used in MOU of ICAP and BU be interpreted as transfer of credit hours. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations HOD (MS) BUIC & BUKC	Dean M&SS
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3232: Approval of revised Curriculum of MS (MS)**

Sponsors: HOD (MS) BUKC

Referral Authority: FBOS M&SS

**Summary of the Case**

257. MS (Management Sciences) Program was processed by the MS (BUKC) department and got approved by the 26<sup>th</sup> ACM (Item 2511). Later, the program was sent to HEC for approval on 17 May 2016, vide BUHO letter no. RBU/348/NCEAC/246. However, HEC suggested certain changes in the road map through letter No. 1-9/2016/QAD-NOC/HEC/BU/815 dated 27 September 2016. The roadmap was reviewed accordingly and submitted to the head office on 14<sup>th</sup> October 2016 for resubmitting to the HEC for approval. HEC approved the MSMS program on the basis of reviewed road map on June 9 2017. The same roadmap is being followed in both campuses since then.

258. HOD (MS)KC placed the revised curriculum before the FBOS which endorsed it and referred the matter to ACM for approval with retrospective effect.

**Decision 3232**

259. The Council approved recommendations of FBOS regarding revised curriculum of MS (MS) with retrospective effect as placed at Appendage 3232 (page 369). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations All HODs (MS)	Dean M&SS
<b>Statutory Documents affected:</b> Unified Course Codes Book and Prospectus		

**Item 3233: Review of Curriculum of MBA 2.0 Years**

Sponsors: HOD (MS) BUKC

Referral Authority: FBOS M&SS

**Summary of the Case**

260. As per existing road map of MBA 2.0Y program, courses “Methods in Business Research” (MBR) and “Dissertation-1” are both being taught in semester-3.

261. HOD (MS), BUKC presented proposal in FBOS of M&SS that “Methods in Business Research” should be taught prior to teaching “Dissertation-1” so students become well familiar with the research methods before starting research proposal development in “Dissertation-1”. FBOS of M&SS deliberated on this issue and endorsed recommendations of HOD (MS), BUKC for approval of Academic Council

**Decision 3233**

262. The Council approved recommendations of FBOS of M&SS as mentioned below and dropped the point.

- a. Course “Method in Business Research” be shifted to second semester.
- b. Course “Economics” be shifted to third semester.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations All HODs (MS)	Dean M&SS

**Statutory Documents affected:** Unified Course Codes Book and Prospectus.

**Item 3234: Addition of Elective Course “Entrepreneurial Growth” in MBA (Supply Chain Management)**

Sponsors: HOD (MS) BUIC

Referral Authority: FBOS M&SS

**Summary of the Case**

263. The new road map of MBA program was approved in 26<sup>th</sup> ACM vide Item No 2206. However, due to typo, “Entrepreneurial Growth” course was missed in the list of elective courses of Supply Chain Management and the course was already offered to the MBA students.

264. HOD (MS), BUIC presented the case in FBOS of M&SS for discussion and deliberation. FBOS of M&SS endorsed the proposal of HOD (MS), BUIC to include course title “Entrepreneurial Growth” in the roadmap of MBA with retrospective effect for approval of Academic Council.

**Decision 3234**

265. The Council approved addition of course title “Entrepreneurial Growth” as an elective course in MBA program with retrospective effect at placed at appendage 3234 (page 370). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations All HODs (MS)	Dean M&SS

**Statutory Documents affected:** Unified Course Codes Book and Prospectus

**Item 3235: Review of Grade - Improvement Policy of Summer Semester**

Sponsors: HOD (MS) BUIC

Referral Authority: FBOS M&amp;SS

**Summary of the Case**

266. HOD (MS), BUIC recommended the following changes in summer session rules through FBOS of M&SS:

- a. All grades lower than grade "B" should be allowed to register for grade improvement.
- b. Capping of grade "B" may be removed and students should be graded based on their actual performance.

**Decision 3235**

267. The Council did not approve proposal regarding removing capping of grade "B" in summer session. However, the Council approved proposal of allowing students to repeat courses with grade less than "B" (including B-) for improvement. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	All Director Campuses Director AA	Director Examinations
<b>Statutory Documents affected:</b> Academic Rules, Students Handbook		

**Item 3236: Resolution of Ambiguity in Session as Printed on Degree**

Sponsors: DE

Referral Authority: File No. BU-DE/2018/181

**Summary of the Case**

268. Director Examination presented the ambiguity created by mentioning session of the program on degree. To remove this ambiguity, it was recommended that the following two options for printing session on degree for deliberation and approval of Academic Council:

**Option-1** "Timeframe of award of degree may be shown in terms of "Year of Completion", and not the specific programme starting & completion years".

OR

**Option-2** "Semester (Spring/ Fall) be mentioned with the year of session i.e. for session 2012 -2015; it should be written as Spring 2012 - Fall 2015".

**Decision 3236**

269. After long deliberation, the Council approved constitution of the following committee to submit recommendations for approval of the Competent Authority:

- a. DG, Islamabad Campus
- b. All Deans
- c. Director Examinations
- d. Assistant Registrar (Degree & Record)

270. Point is to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	All committee members Registrar for Notification	Director Examinations
<b>Statutory Documents affected:</b>	-	

### **Item 3237: Correction in Relative Criteria of D+ Grade**

Sponsors: DE

Referral Authority: File No. BU-DE/2018/186

#### **Summary of the Case**

271. Exams results grading was approved in 30<sup>th</sup> ACM but the lower limit of D+ grade contained therein was erroneously overlapped with D as mentioned below:

Grade	Grade Point	LL%	UL%
D+	1.33	≥ 54	< 57
D	1.00	≥ 50	< 53

272. The following changes for correction in lower limit range of Grade D+ has been approved by honourable Rector on file:

Grade	Grade Point	LL%	UL%
D+	1.33	≥ 53	< 57

273. Corrections approved by honourable Rector were presented by Director Exam for ratification of Academic Council.

#### **Decision 3237**

274. The Council ratified approval of the Competent Authority for the following:

Grade	Grade Point	LL%	UL%
D+	1.33	≥ 53	< 57

275. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations Director Academics	Director Examinations
<b>Statutory Documents affected:</b>	Academic Rules	

**Item 3238: Standardization of BU Transcripts as Per HEC Guideline**

Sponsors: DE

Referral Authority: File No. BU-DE/2018/142

**Summary of the Case**

276. In order to ensure compliance of HEC guidelines, existing format of Transcripts has been revised and approved by honorable Rector on file, which requires ACM ratification. Revised format of BU Transcripts, in compliance of HEC guidelines was presented by Director Examination for ratification of Academic Council.

**Decision 3238**

277. The Council ratified approval of the Competent Authority as attached appendage 3238 (page 371). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations	Director Examinations
<b>Statutory Documents affected:</b> -		

**Item 3239: Standardization of Programme Title on Degrees & Transcripts**

Sponsors: DE

Referral Authority: File No. BU-DE/2018/181

**Summary of the Case**

278. Various degrees and transcripts titles of degree programs of Bahria University are non-standardized due to dissimilarities in contents and writing style, which is in variance to HEC requirements of standardized titles. Director Exam presented proposal regarding standardization of program title on degrees and transcripts for approval of Academic Council.

**Decision 3239**

279. After long deliberation, the Council approved constitution of the following Committee to submit recommendations for approval of the Competent Authority:

- a. DG, Islamabad Campus
- b. All Deans
- c. Director Exam
- d. Assistant Registrar, Degree

280. Point to remain on agenda and progress be reported.

Action Required	Action by	Responsibility of
Implementation of the Decision	All Committee members Registrar for Notification	Director Examinations
<b>Statutory Documents affected:</b>		

**Item 3240: Review of Faculty Teaching Workload - Courses of 2 Credit Hours**

Sponsors: HOD (H&amp;SS) BUKC

Referral Authority: FBOS M&amp;SS

**Summary of the Case**

281. As per existing rules, the following teaching load policy for a regular faculty are defined in Academic Rules:

- a. For Engineering Sciences faculty member: 9-12 contact hours
- b. For Non-Engineering faculty member: 4 course/12 credit hours

282. HOD (H&SS), BUKC proposed review in number of classes/sections of the courses of 2 credit hours worth to be taught by the faculty members i.e. Pakistan Studies and Islamic Studies. He proposed reduction of number of classes/sections of such courses from 6 to 4 to be taught by a faculty member at one time. He was of the opinion that teaching six classes of a subject causes extra burden on faculty members in the form of going more frequently to the classes, dealing with higher number of students, marking larger number of papers, quizzes and assignments etc. This extra burden needs to be compensated by reducing the number of courses from 6 to 4. Proposal of HOD (H&SS) was endorsed by FBOS of M&SS for approval of Academic Council.

**Decision 3240**

283. The Council did not approve the proposal regarding reduction in number of classes/sections from 6 to 4 of the courses of 2 credit hours worth to be taught by the faculty members. Status quo be maintained. The chair directed to ensure implementation of 12 credit hours/contact hours teaching load irrespective of number of classes/section in all campuses. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director all Campuses HOD (H&SS) BUKC HOD (H&SS) BUIC	Dean M&SS

**Statutory Documents affected:****Item 3241: Honours and Award to Weekend students at BUKC moving from Trimester to Bi-semester**

Sponsors: HOD (MS) BUKC

Referral Authority: Dean Committee

**Summary of the Case**

284. All MBA programs being offered at the weekend at the BUKC have been shifted from trimester to bi-semester format of delivery wef Fall 2018. Accordingly, normal course load for the existing students of these programs has also moved from 12 credit hours to 15 credit hours per semester.

285. Dean (M&SS) presented case of graduates converted from trimester to bi-semester format of education to remain eligible for Honors and Awards despite change in their roadmaps and number of courses taken after moving from trimester to bi-semester format.

#### **Decision 3241**

286. The Council approved proposal of Dean M&SS regarding eligibility of students for Honors and Awards despite change in their roadmaps and number of courses taken after moving from trimester to bi-semester format. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations Dean M&SS	Director Examinations
<b>Statutory Documents affected:</b> -		

#### **Item 3242: Registration of Failed Courses – Mandatory Registration of Failed Courses First Alongwith Other Courses**

Sponsors: HOD (MS) BUKC

Referral Authority: FBOS M&SS

#### **Summary of the Case**

287. It is observed that most of the students placed on probation/chance prefer to register in the new courses instead of registration of failed courses of their previous semester(s).

288. Due to non-clearance of failed courses, their CGPA remains below the required level and their recovery from probation/chance suffers.

289. Dean (M&SS) presented proposal to ACM that the students placed on probation/chance should be required to get registered in the failed courses first while taking their standard course load per semester until those courses are cleared.

#### **Decision 3242**

290. After long deliberation, the Council resolved that:

- a. Proposal of mandatory registration of failed courses by the students placed on probation/chance is not approved. However counselling be extended to them regarding registration of appropriate courses at department level prior to online semester/summer registration.
- b. Campus Management System must show alert/warning/guideline message for non-registration of failed /low graded courses through online registration module. The HODs or some senior faculty members deputed by the HODs shall also provide special advice to probation/chance students regarding registration of their courses.

c. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	All HODs	Director IT
<b>Statutory Documents affected:</b> -		

**Item 3243: Issuance of EMBA Degree to Spring 2004 Entry on the basis of Completion of 48 Credit Hours**

Sponsors: DE

Referral Authority: File No. BUDE/2017/664

**Summary of the Case**

291. The EMBA programme was launched through advertisement as EMBA (48 CHs) degree program. This program was later on converted to 72 CHs regular MBA programme and option for MBA regular program was given to enrolled students in EMBA.

292. The students who opted and completed 72 CHs regular MBA program were issued transcript and degree and those who did not opt for were issued EMBA transcripts only.

293. One student (Mr. Noman Masood of BUIC) pleaded his case by approaching the HEC for award of EMBA degree of 48 CHs along with transcript. HEC has communicated no objection to Bahria University for issuance of EMBA degree of 48 CHs along with transcript.

294. Director exam presented the case and recommended to issue degree of EMBA (48 CHs) program to the following students for approval of Academic Council:

S.No	Reg No	Name	Campus
a.	6560	Imran Akram	BUIC
b.	6562	Salah-ud-Din Khattak	BUIC
c.	6573	Habib Ur Rehman	BUIC
d.	6590	Noman Masood	BUIC
e.	6572	Zaman Khan	BUIC
f.	6682	Muhammad Bilal Khan	BUKC
g.	6680	Asif Iqbal	BUKC
h.	6587	Sheikh Muhammad Saad Ullah	BUKC

**Decision 3243**

295. The Council approved recommendations of Director Exams regarding issuance of EMBA degree of 48 credit hours along with final transcript to all students who successfully completed this program with 48 credit hours. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations	Director Examinations
<b>Statutory Documents affected:</b> -		

**Item 3244: Permission to the MBA students to take Elective Courses across the Morning/Evening and Weekend Programs**

Sponsors: HOD (MS) BUKC

Referral Authority: Dean Committee

**Summary of the Case**

296. All MBA programs being offered at the weekend at BUKC have been shifted from trimester to bi-semester format of delivery wef Fall 2018. Dean (M&SS) presented the case for permission to the MBA students to get registered in elective courses in any MBA program i.e. morning/evening and weekend, for approval of Academic Council.

**Decision 3244**

297. The Council approved the proposal of allowing registration of elective courses to MBA students in all program i.e. across morning/evening and weekend. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	HOD (MS) BUKC	Dean M&SS
<b>Statutory Documents affected:</b> -		

**Item 3245: Procedural & Financial Changes to Attract International Students**

Sponsors: DIO

Referral Authority: On file

**Summary of the Case**

298. Recruitment of International Students is in line with the Strategic Plan of Bahria University to meet the strategic goal of Excellence in Global Reach. A committee of the following members was constituted by the competent authority to recommend measures to be taken to increase the recruitment of international students.

- a. Prof. Dr. M. Najam ul Islam, Dean Engineering Sciences
- b. Prof. Dr. Faisal Aftab, HoD Management Sciences
- c. Mr. M. Rizwan Aamir, Director IT
- d. Mr. M Awais Mehmood, Director International Office

299. Director International Office presented the case regarding international students admission policy for approval of Academic Council.

**Decision 3245**

300. The Council approved policy regarding international students admission at Bahria University recommended by the Committee placed at Appendix 3245 (page 373). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Admissions Director IT	Director IO
<b>Statutory Documents affected:</b> Admissions Policy		

**Item 3246: Approval for BSCS Road Map for Fall 2014 Intake**

Sponsors: HOD (CS) BUKC

Referral Authority: On File

**Summary of the Case**

301. Revised road-map and curriculum of BS (CS) was approved in 22<sup>nd</sup> ACM. As per decision of ACM, implementation of this revision was effective from Fall 2014 intake. CS department of BUKC implemented the revised road-map wef. Spring 2015 intake instead of Fall 2014 intake.

302. HOD (CS), BUKC recommended through Dean (ES) to approve old road map for students of Fall 2014 intake instead of revised roadmap approved in 22<sup>nd</sup> ACM. Case was approved on file by competent authority.

303. HOD (CS) presented the case for ratification of Academic Council.

**Decision 3246**

304. The Council ratified approval of the Competent Authority regarding Fall 2014 intake roadmap (BSCS) placed at Appendix 3246 (page 375). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean ES HOD (CS) BUKC	Director Examinations

**Statutory Documents affected:** Unified Course Codes Book

**Item 3247: Approval of BSIT Road Map for Spring 2017 - Spring 2018 Intake**

Sponsors: HOD (CS) BUKC

Referral Authority: On File

**Summary of the Case**

305. Revised road-map and curriculum of BSIT was approved in 27th ACM. As per decision of ACM, implementation of this revision was effective from Spring 2017 intake. CS Department BUKC implemented the revised roadmap approved in 27<sup>th</sup> ACM wef. Fall 2018 intake instead of Spring 2017 intake.

306. HOD (CS) recommended the following through Dean (ES) for approval of competent authority on file:

- a. To consider BSIT roadmap(old) approved in 23<sup>rd</sup> ACM for Spring 2017.
- b. To consider BSIT revised roadmap (new) approved in 27<sup>th</sup> ACM for Fall 2017 and Spring 2018 Intakes through courses adjustment in different semesters.

307. Recommendations of HOD (CS), BUKC was approved on file by competent authority.

308. HOD (CS), BUKC presented the case for ratification of Academic Council.

**Decision 3247**

309. The Council ratified approval of the Competent Authority regarding implementation of roadmap as placed at Appendage 3247 (page 379). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean ES Director Examinations HOD (CS) BUKC	Director Examinations
<b>Statutory Documents affected:</b> Unified Course Codes Book.		

**Item 3248: Mentioning sub-specialization on transcript of MPhil Pathology**

Sponsors: Dean HS

Referral Authority: FBOS HS

**Summary of the Case**

310. MPhil Pathology was approved in 30<sup>th</sup> meeting of ACM and NOC was issued by HEC to launch this program at BUMDC. It is the requirement of PMDC that specialty is to be mentioned on the front of the transcript. But in Pathology as sub-specialties are also present therefore these should also be mentioned on the transcript & enrolment cards of students.

311. BUMDC through its FBOS is now suggesting to print the following sub-specialties of Pathology under the main subject; on transcript as well as Enrollment card of students:

- a. Histopathology
- b. Microbiology

**Decision 3248**

312. The Council approved sub-specializations “Histopathology” and “Microbiology” in MPhil Pathology program to be printed on transcript as well as on students’ enrollment card. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean HS	Director Examinations
<b>Statutory Documents affected:</b> Prospectus		

**Item 3249: SOP - Postgraduate FCPS residents (FCPS-R), BUMDC**

Sponsors: Dean HS

Referral Authority: FBOS HS

**Summary of the Case**

313. Draft SOP for Postgraduate FCPS Residents (FCPS-R) along with template for contract between FCPS Residents and Bahria University was deliberated and discussed in the FBOS meeting HS. FBOS of HS endorsed draft SOP and template for contract for approval of ACM

314. BUMDC presented recommendations of FBOS for approval of Academic Council.

**Decision 3249**

315. The Council approved recommendations of FBOS of HS regarding SOP and template for contract placed at Appendix 3249 (page 387). Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Dean HS	Dean HS
<b>Statutory Documents affected:</b>	-	

**Item 3250: Extension of activity based assessment of the Oral Communication Course to BS programs in all departments in M&SS Faculty**

Sponsors: Dean M&SS

Referral Authority: FBOS M & SS

**Summary of the Case**

316. The 40 Marks activity based assessment of the Oral Communication course in final examination was approved in 26<sup>th</sup> ACM meeting for Management Sciences Department, BUKC only wef. Spring 2016.

317. This activity based assessment of the Oral Communication course was extended to all Departments of Management Sciences in all campuses approved in 27<sup>th</sup> ACM meeting.

318. Extension of this activity bases assessment of the Oral Communication in final exam to all departments of Faculty of M&SS was discussed and deliberation in the FBOS of M&SS. FBOS of M&SS endorsed this extension to all departments of faculty of M&SS and referred the matter to ACM for approval.

319. Dean (M&SS) presented recommendations of FBOS for approval of Academic Council.

**Decision 3250**

320. After detailed deliberations, the Council approved extension of the activity based assessment of the Oral Communication in final exam to all departments of Faculty of M&SS and Faculty of Professional Psychology. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	All HODs (H&SS) All HODs (MS) HOD (Law) All HODs (Media) All HODs (PP)	Director Examinations
<b>Statutory Documents affected:</b>	Examination Rules	

**Item 3251: Issuance of Joint Transcript to Shifa College of Nursing Graduates with BU Degree**

Sponsors: DE

Referral Authority: On File

**Summary of the Case**

321. Shifa College of Nursing (SCN), Islamabad was affiliated with Bahria University from 2008 till 2013. Admissions of SCN students and semester-based exams were undertaken by SCN, while registration process and award of degrees upon qualifying 2 x Professional Exams (2nd Year & Final Year) were undertaken by BU. Final Transcripts issued by BU to graduating students comprised of results of 2 x Professional Exams only, while semester exams results were covered through SCN-issued transcripts. No implication was encountered for this mechanism during the period of affiliation of SCN with BU (2008-2013).

322. In 2017, HEC refused verification of BU degrees issued to SCN graduates for want of complete transcript, covering all the semesters, along with observations on course curriculum being in variance to HEC Curriculum 2006 for BS (Nursing). To resolve the matter, SCN prepared a transcript for semester based exams results with BU logo and issued the same to relevant graduates, without intimation to/ consent of BU. Upon query from HEC, BU refused to own the semester-based exams results transcripts with BU logo due absence of its prior consent. Meanwhile, 2 x SCN graduates approached the IHC for verification of their degrees by HEC.

323. HEC called all stake holders (SCN, BU, PNC) in Aug 18 to resolve the matter. BU proposed a joint transcript containing results of semester-based as well as 2 x professional exams, while SCN and PNC asked for one-time waiver of variance in curriculum. HEC asked all stake holders to resolve the matter with utmost priority for early issuance of complete transcripts to affected graduates, to enable verification of their degrees. BU (Exams Dte) subsequently formulated a joint transcript with consent of SCN and forwarded the same to HEC for observations (if any). HEC has in turn reiterated the variance with its 2006 curriculum, which is being resolved by SCN through one-time waiver. As regards joint transcript formulated by BU, HEC has conveyed that it would verify transcripts on the basis of genuineness and observance of all codal formalities

324. Director Exams presented the case of issuance of Joint transcript to Shifa College of Nursing Graduates for approval of Academic Council.

**Decision 3251**

325. The Council approved recommendation of Director Exams regarding issuance of joint transcript as placed at Appendage 3251 (page 395) to Shifa College of Nursing Graduates holding BU degree, for the period of affiliation of college with BU; subject to resolution of HEC observations on curriculum violations by Shifa Nursing College and other academic issues from HEC. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations	Director Examinations
<b>Statutory Documents affected:</b> -		

**Item 3252: Issuance of Final Transcript to CTE Graduates with BU Degrees/Diplomas**

Sponsors: DE

Referral Authority: On File

**Summary of the Case**

326. College of Teacher Education (CTE) was affiliated with BU from 2008 till 2013 for award of B.Ed degrees and Diploma of Primary Teaching. During this period, the College prepared 3 sets of question papers for the final exams by itself, had the final papers selected by BU, conducted the exams and forwarded the results to BU for approval, which in turn awarded degrees/ diplomas to eligible graduates. However, the transcripts were issued by CTE under its own letterhead and with its own signing authority. A graduate of CTE has now approached the BU for the award of BU Transcript, as HEC is not attesting her degree without the same.

327. BU has similar mechanism of examinations with PNSL, and may hence issue the final transcripts based on the results submitted by CTE and approved by BU.

328. Director Exams presented the case of issuance of FINAL transcript to CTE Graduates for the period of its affiliation with BU (2008-2013) for approval of Academic Council.

**Decision 3251**

329. The Council approved recommendation of Director Exams regarding issuance of final transcript CTE Graduates holding BU degrees/diplomas, for the period of affiliation of CTE with BU. Point dropped.

Action Required	Action by	Responsibility of
Implementation of the Decision	Director Examinations	Director Examinations
<b>Statutory Documents affected:</b> -		

**Closing the Meeting**

330. The Secretary drew the attention of the House to the following timeline for follow-up actions and the next ACM:

1 <sup>st</sup> Progress Report on the Action Items of the 32 <sup>nd</sup> ACM:	2 <sup>nd</sup> January 2019
2 <sup>nd</sup> Progress Report on the Action Items of the 32 <sup>nd</sup> ACM:	4 <sup>th</sup> March 2019
Dead line for Agenda Items for the 33 <sup>rd</sup> ACM:	4 <sup>th</sup> March 2019
Schedule of 33 <sup>rd</sup> ACM:	2 <sup>nd</sup> & 3 <sup>rd</sup> April 2019

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331. The Chair thanked the house for participation in the proceeding and expressed his satisfaction tht all decisions made during the ACM would be beneficial for improvement in academics and research domain of Bahria University.

**Fazal Wahab**

Secy to the Council

Dated: 27 November 2018

## **Appendage 32(3028)**

### **Report of Committee on IT-based Solution to reduce Submission Time of Final Examination Results**

#### **A. Single platform / Common Software for use by all the campuses and the Exam Directorate BUHO for overall reduction in final examinations results submission time**

1. In order to save time and enhance transparency, common software/single platform for all CUs and Exams Directorate BUHO shall be adopted.
2. The current version of Exam module of Campus Management System (CMS) was implemented in October-November 2016 i.e. during Fall 2016 semester at all CUs.
3. The module shall be updated in 02 steps. The Result compilation (GPA, CGPA and Remarks calculation) be undertaken for Fall 2016-onward batches.
  - a. Provisional result / transcripts (unofficial transcript on plain paper) are to be prepared from CMS through this updated module for Fall 2016-onward batches wef. Fall 2018 result.
  - b. With effect from Fall'2019, all provisional results as well as unofficial transcripts shall be declared / issued through this module of CMS. After achieving maturity of this module, features/functionalities related to handling transfer of credit/exemption cases/inter-campuses transfers will be introduced.
4. The final transcripts are to be issued for all batches by Exams Dte by using their existing system as well as this updated examination module of CMS.
5. In order to compute GPA, CGPA, Remarks and to create reports related to Interim/Final transcripts, the requisite information from Exams Dte has been provided to IT Dte (in Sep 2018):
6. By 01 December, the IT directorate shall send the result (of the last 2 years) to the Exam directorate of all batches Fall'2016 onwards (comprising of calculated GPA, CGPA and Remarks) for verification and feedback.
7. In case of discrepancy, Exams Dte is to resolve the same by taking IT Dte and respective campus in loop by 01 January 2019.
8. The result for Fall'2018 (for all intakes Fall'16 onwards) shall be declared using this updated examination module of CMS.

#### **B. Make Examination System Fool Proof & Secure**

Following practice shall be followed to increase the security of Examination system:

1. FM enter/save the result; the result may be revised till final submission.
2. The results shall be submitted through Electronic Signatures.
3. The Faculty member shall submit the result by clicking on “Submit to HoD” button. The result shall be automatically locked and can't be changed after “Submit to HoD” without approved procedure given at para 5.
4. HoD shall submit the result to CU Exam Department by clicking the button “Submit to Campus” for all the courses in the department.

5. In case of result correction/revision is required, it needs to be approved by Director CU in consultation with DG campus. Director CU will “unlock” the particular result (for whole class or for individual - as per requirement), and then the Exams dept (campus) can revise the result respectively. It is pertinent to mention that this activity can only be performed if the results have not yet been forwarded to Exams Dte BUHO.
6. CU Exams departments are to forward the result to Exam Directorate BUHO on a certain date/time by clicking on “Submit to Exams Dte”. After this, nobody is authorized to make any corrections/changes in the results except the Exam Directorate of the university.
7. After forwarding to BUHO Exams, if a result needs to be revised, then approval from Director & DG campus is to be forwarded to Exams Dte of BUHO to make necessary amendments in the result by authorized person only.
8. For late result submissions by FMs due to any reason, the results shall be forwarded to Exam directorate of BUHO through DG, Director Campus, Exam Department of Campus and concerned HOD.
9. For transparency, emails are to be generated automatically by system whenever a result is updated after “Submit to HoD” operation (in any of the above-mentioned scenarios). Email shall be addressed to respective FM, HoD, Director Campus, Director Exam and concerned Dean.
10. Furthermore, if any change of result in Result Database is made (on backend by IT personnel or any other person), email shall be generated addressed to FM, HoD, Director Campus, Director IT, Director Examination and concerned Dean.
11. The result database shall have backup at virtual machines and at different geographical locations of Bahria University (Islamabad Campus, Lahore Campus and Karachi Campus).

**C. Office Automation System (E-Office)**

1. Office automation (E-Office) plays an important role in getting the optimum utilization of resources and increasing the efficiency of an organization. As per directions of the competent authority and ACM decision, it has been planned to adopt the E-office to get rid of manual case file processing. Manual Case file processing system has following drawbacks:
  - a. No file tracking at a single point
  - b. More time taking
  - c. Wastage of Human resource for mobilizing the file among offices
  - d. Risk of damaging the physical file
  - e. Forging of previous minutes
  - f. Chances of changing the previous minutes
  - g. More space required to store the physical files
  - h. No record of old files for reference & history purposes
  - i. More time spent in searching the file
  - j. No backups in case of physical file
  - k. Process gets halted in case an official is off-campus
2. Development options through Outsourcing (Option-1) and indigenous (in-house) (Option-2) were thoroughly deliberated during IT brief to the Honorable Rector and Option-2 was approved.

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3. Team of 04 persons comprised of 01 Senior Programmer-Team Lead, 02 Software Developers and 01 QA has been hired and working has been started.

**BS TV BROADCASTING PROGRAM - LAUNCH ROPOSAL**

<b>A. ACADEMIC DETAILS</b>	
1	<b>Faculty/Department:</b> Department of Media Studies, Bahria University, Islamabad Campus (BUIC)
2	<b>Name of the Programme:</b> 4-year BS Television Broadcasting
3	<b>Mission of the Programme:</b> To equip the students with the latest learning and practical skills enabling them to become professional broadcast practitioners
4	<b>Objectives of the Programme:</b> The main objectives of the program are: <ol style="list-style-type: none"> <li>1. To provide students with an advanced knowledge of, and critical awareness regarding, concepts and theoretical approaches in the study of television production</li> <li>2. To develop an understanding of the history, structures and current practices of the television industry, including the primary genres, and the critical skills to present analysis and evaluation in written and spoken forms.</li> <li>3. to enable students to explore and reflect on the practical implications of working in television broadcasting</li> <li>4. To build an understanding of appropriate methodologies for further research in television studies.</li> </ol>
5	<b>Outcomes of the Programme:</b> The program will be taught with the help of qualified faculties and practitioners from the media industry with the intention of providing students with an education that equips them with the appropriate knowledge and skills required for TV industry. The degree has considerable technical support in the form of experts from TV industry for programs production, editing, writing and presentation; and conceptual explanation in the form of intensive, scholastic and thematic lectures with the help of experienced and qualified faculty. The students will be: <ol style="list-style-type: none"> <li>1. Able to handle any type of visual communication including news, documentaries, dramas, music videos, interviews, talk shows, and educational programs.</li> <li>2. Equipped with the requisite skills of all major aspects of video production such as direction, set design, camera work and editing.</li> <li>3. Able to develop skills, judgment and confidence in each production related phases.</li> <li>4. Able to critically evaluate any video production.</li> </ol>
6	<b>Rationale for the Programme:</b> Mass Communication is a growing phenomenon with greater public interest. The introduction of high tech has revolutionized the field of mass communication. Media have great influence on viewers' daily lives. The proliferation of television channels has transformed the social landscape of the society and have added to the accessibility of information at large, which helped in enhancing awareness amongst the masses on important social and political issues globally.

	<p>In Pakistan, the situation is no different; there is a rapid growth of media channels. The liberal media policy for the last five to ten years has turned the media industry into mushroom growth of private television in the country. Currently, skilled manpower is the main requirement for the growing media industry in Pakistan. The growth and development of this robust industry largely depends on the capacity to produce trained professionals.</p> <p>In this scenario, there is a serious need to have media based educational training at the university level to tailor with the market needs and equip students with requisite academic expertise and professional skills of the television industry.</p> <p>There are about 50 working television channels and the about same numbers are in process. Furthermore, there are many production houses actively producing programs for the running channels in the country. It is presumed that more than 5000 persons are attached with this profession, but they are not in position to meet the day to day targets, which are also increasing day by day. Catering to this demand, it is the foremost priority of TV channels to increase the number of human resource. But on the other hand, there is shortage of properly educated persons in this field. As there are no proper institutions in the Islamabad/Rawalpindi and the PTV Academy is busy in training its own staff. Therefore, City University Peshawar can take a lead in building professional manpower in the field of TV production. Keeping in view the above-mentioned facts, we are confident to attract large number of students for TV production program.</p> <p>The significance of training in television has increased manifolds throughout the world and in Pakistan. Other universities in the country have already taken the initiative to offer the Master's program in television broadcasting. They got their Radio and TV studios built with the help of HEC. The constructed of multipurpose building for Radio/TV studios to impart practical training to students will be required.</p>
7	<p><b>Brief Description of the Programme:</b>            Department of Media Studies is offering a 4 years BS degree in Television Broadcasting. The BS in Television Broadcasting offers a solid academic and professionally relevant training in theory and methods for development studies. It is designed for those wishing to start or continue their professional careers in the area of development. In the MS program you learn about the most recent theories and debates. You will also learn to apply this knowledge to practical issues of development and social change. The students will be offered course work worth 24 credit hours followed by a dissertation worth 6 credit hours.</p>
8	<p><b>Duration:</b> 4-Years ( 8 Semesters)  <b>Total Credit Hours=</b> 130 hrs+2 hrs Internship= 132 credit hours</p>
9	<p><b>Venue(s): On Site/Off Site/Both On &amp; Off Site (Tick one; if Off Site, give details)</b>            Department of Media Studies, Bahria University, Islamabad Campus, Shangrilla Road Islamabad.</p>
10	<p><b>Programme Scheduling Format:</b>  <b>Morning</b>  <b>Bi-Semester</b></p>
11	<b>Proposed Date of Commencement:</b> Fall 2019
12	<b>Mode of Study/Examination:</b> Semester System
13	<b>Additional Faculty Member(s) Required:</b> ( <i>Indicate if there is a requirement for</i>

	<i>additional faculty members, fulltime/visiting, along with qualifications.) Two additional Ph.D. faculty members will be required in Television Broadcasting/Screen Studies/film Studies</i>
14	<b>Additional Skilled-Worker(s) Required:</b> <i>(Indicate if there is a requirement for additional Skilled Staff, fulltime/part-time, along with their qualifications/skill sets.) Already available</i>
15	<b>Additional Classroom(s) required:</b> <i>(The requirement is to include the number of classrooms and their capacities.) Initially Two, later one additional class room in 3<sup>rd</sup> semester (Total Three)</i>
16	<b>Additional Requirement for Laboratories:</b> <i>(The requirement is to include the number of laboratories, their equipment and their capacities.) 6 NLEs, 4 videos Cameras</i>
17	<b>Additional Requirement for Books, Subscriptions, Memberships to Online Research Sites/ Repositories:</b> <b>Need to purchase relevant books for the central Library</b>
18	<b>Minimum Entry Level:</b> 12 years (FA/FSc or equivalent)
19	<b>Admission Criteria:</b> As per BU Policy
20	<b>Additional/Different Examination Requirement</b> <i>(Indicate if there will be any examination requirement, additional to or different from the BU Academic Rules or Examination Policy in vogue). As per BU Policy</i>
21	<b>Number of Admissions Expected for First Intake:</b> 45-50 students
22	<b>Number of Admissions Planned/Expected for Subsequent Intakes:</b> 10 % increase every semester as per availability of space
23	<b>Referred by:</b> <i>(delete which is inapplicable)</i> <b>FBOS:</b> held on 11 <sup>th</sup> September, 2018
24	<b>Complete Plan of Studies, inclusive of complete Roadmap:</b> <i>(Attach as Annex 'A')</i> Attached
25	<b>Course Outlines, Descriptions, Pre-Requisites &amp; Readings (Compulsory &amp; Recommended)</b> <i>(Attach as Annex 'B')</i> Attached

**B. FINANCIAL DETAILS**

1	<b>Source of Funding:</b> BU: Fully
2	<b>Degree Duration:</b> <u>Annual or Semester System:</u> Semester: Minimum 8 semesters (4 years) <b>Total Number of Credit Hours: 132</b>
3	<b>Expected fee to be charged based on Cost &amp; Benefits Analysis:</b> <i>(show working)</i> Fee rate per credit hour: Rs. 4700
4	<b>Expected Number of students for 1<sup>st</sup> &amp; 2<sup>nd</sup> Intakes:</b> 45-45 students
5	<b>Expected Earning from first two Intakes (B5):</b> <i>(Show working)</i> $112,600 \times 45 \text{ (1}^{\text{st}} \text{ intake)} + 112,600 \times 45 \text{ (2}^{\text{nd}} \text{ intake)} = 5,067,000 + 5,067,000 = 9.09 \text{ Million}$
6	<b>Expected Earnings for the Next Five Years (B6):</b> <i>(show working)</i> $14,166,000 + 30,294,000 + 46,422,000 + 62,550,000 + 78,678,000 = 232,110,000$
7	<b>Total Estimated Salaries of all Additional Human Resources per annum (B7):</b> <i>(Show working)</i> <b>Salary of 2 Permanent Lecturers (70,000 Per Month)+ 3 Visiting Faculty ( 18000 Per Month) x 12 = 2,328,000</b>
8	<b>Cost of Additional Laboratory Equipment/Tools (B8):</b> <i>(show working)</i> Nil
9	<b>Cost of Additional Classrooms (B9):</b> <i>(Include furniture, technical aids etc)</i> Nil
10	<b>Cost of Additional Books, Subscription &amp; Memberships to on-line Sites/Repositories (B10):</b> <i>(show details)</i> 0.1 Million/annum

11	<b>Off-Site rental Expenses and Cost of other Fixtures (B11): (Show details) Nil</b>
12	<b>Miscellaneous Expenses required for Starting the Program (B12):</b> <ul style="list-style-type: none"> <li>- Advertisement:</li> <li>- Printing &amp; Stationery:</li> <li>- Admin Cost:</li> </ul> Any other - <b>Total: 0.2 million</b>
13	<b>Annual Recurring Expenditures in Subsequent Years (B13):</b> <ul style="list-style-type: none"> <li>- Salaries:</li> <li>- Rentals:</li> <li>- Subscriptions/Memberships:</li> <li>- Advertisements:</li> <li>- Printing &amp; Stationery:</li> <li>- Admin Cost</li> </ul> Any other - <b>Total: 2,268,000/=</b>
14	<b>Total Cost of the Programme (B14): [Add B(7) to B(12)]</b> $B(7) + B(12) = 1.96 \text{ million} + 0.2 \text{ million} = 2,628,000$
15	<b>Net Cost of the Programme (B15): [Subtract B(1) from B(14)]</b> $B(14) - B(1) = 2,628,000 - 0 = 2,628,000/=$
16	<b>Net Earnings in First Year (B16: [Subtract B(15) from B(5)]</b> $B(5) - B(15) = 2.288 \text{ million} - 2.16 \text{ Million} = 6,471,000/=$

**Bahria University, Islamabad**

Campus: ISLAMABAD  
 Department: MEDIA STUDIES  
 Program Title: TV Broadcasting  
 Program Level: BS  
 Total Duration of Program: 04 YEARS  
 Total Number of semesters: 08

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		ENG 111	Functional English-I	3 CH	✓	
2		MTB 101	Computer Skill for Media	3 CH	✓	
3		MTB 102	Intro to Media	3 CH	✓	
4		MTB 103	Journalistic Language	3 CH	✓	✓
5		PAK 101	Pakistan Studies	2 CH	✓	
6			Elective *1.1	3 CH	✓	
<b>Total Credit Hours in Semester-1</b>				<b>17</b>		

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		ENG 113	English-II(Writing & Presentation Skills)	3 CH	✓	✓
2		MTB 106	Introduction to Digital Media	3 CH	✓	✓
3		MTB 107	News Writing & Reporting	3 CH	✓	✓
4		MAT 205	Statistics	3 CH	✓	✓
5		ISL 103	Islamic Studies (Ethics)	2 CH	✓	
6			Elective *1.2	3 CH	✓	✓
<b>Total Credit Hours in Semester-2</b>				17		

**Semester-3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTB 201	Media Law and Ethics	3 CH	✓	
2		MTB 202	Theories of Mass Communication-I	3 CH	✓	
3		MED 206	Current Affairs	3 CH	✓	
4		PRM 648	Intercultural Communication	3 CH	✓	
5		ENG 105	Communication Skills (English-III)	3 CH	✓	✓
6			Elective*1.3	3 CH	✓	✓
<b>Total Credit Hours in Semester-3</b>				18		

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTB 206	Advertising & Public Relation	3 CH	✓	✓
2		MTB 207	Theories of Communication II	3 CH	✓	
3		MTB 209	Evolution of Television	3 CH	✓	
4		MTB 210	Media Management & Marketing	3 CH	✓	
5			Elective*1.4	3 CH	✓	✓
<b>Total Credit Hours in Semester-4</b>				15		

**Semester-5**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTB 301	TV script Writing	3 CH	✓	✓
2		MTB 302	Process & Effects of Communication	3 CH	✓	
3		MTB 303	TV Camera Operation	3 CH	✓	✓
4		MTB 304	Television Lighting System	3 CH	✓	✓
5		MTB 305	Data Journalism	3 CH	✓	✓
6			Elective*2.1	3 CH	✓	✓
<b>Total Credit Hours in Semester-5</b>				<b>18</b>		

**Semester-6**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTB 307	Programme Production	3 CH	✓	✓
2		MTB 308	Television and Society	3 CH	✓	
3		MTB 309	TV News Production & Presentation	3 CH	✓	✓
4		MTB 311	Media and Social Psychology	3 CH	✓	
5		MTB 312	Set Designing	3 CH	✓	✓
6			Elective*2.2	3 CH	✓	✓
<b>Total Credit Hours in Semester-6</b>				<b>18</b>		

**Semester-7**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTB 401	TV Studio & Floor Management	3 CH	✓	✓
2		MTB 402	Documentary Production	3 CH	✓	✓
3		MTB 403	Drama Production	3 CH	✓	✓
4		MTB 404	TV and Globalization	3 CH	✓	✓
5			Elective*2.3	3 CH	✓	✓
<b>Total Credit Hours in Semester-7</b>				<b>15</b>		

**Semester-8**

<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1		MTB 406	Post Production	3 CH	✓	✓
2		MTB 407	TV Sound System	3 CH	✓	✓
3		MTB 408	Research Methods in Mass Studies	3 CH	✓	✓
4		MTB 409	Research Project/Final Project	3 CH		✓
<b>Total Credit Hours in Semester-8</b>				<b>12</b>		

**List of Elective Courses**

<b>S. No</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1		MTB 104	Mass Media in Pakistan*1.1	3		
2		MTB 105	Online Journalism*1.1	3		
3		MTB 203	Development Support Communication*1.2	3		
4		MTB 110	Social Psychology*1.2	3		
5		MTB 208	Comparing Media Systems*1.3	3		
6		MTB 209	International Media Regulations*1.3	3		
7		MTB 210	Writing for the Internet*1.4	3		
8		MTB 211	Photojournalism*1.4	3		
9		MTB 306	3D Animation*2.1	3		
10		MTB 310	Television Commercial (TVC)*2.1	3		
11		MTB 405	Television program Analysis (Seminar)*2.2	3		
12		MTB 410	Media Semiotics*2.2	3		
13		MTB 411	Introduction to Film Making and Analysis*2.3	3		
14		MTB 412	Electronic News Gathering (ENG)*2.3	3		
15		MTB 413	Music Video Creation (MVC)*2.3	3		

## **Mandatory Internship - 2Credit hrs**

## **Eligibility for Internship**

Internship support shall be available to the undergraduate program students who have earned a minimum of 90 credits. In other way, the students who have completed five semesters of their program shall be eligible to undertake internship.

## Program Details

## Courses

Courses outlines of the proposed program have been prepared in consultation with experts in the field. All the courses outlines are attached for consideration.

## **Television program Analysis (Seminar)      3- Credit hrs**

There will be a 10-day Seminar on Television Program Analysis. The seminar will provide students with an opportunity to interact with relevant experts regarding different communication issues. In the seminar, students will present their projects prepared in consultation with their teachers. Students' presentation will be mandatory. The project presentation will be followed by discussions. Each day, the seminar will be presided over by an eminent expert in the area or the teacher concerned. There will be 100 marks to be divided between students' project (50 marks), presentation (30 marks) and students' overall participation/discussion in the seminar (20 marks).

Students will be required to do mandatory Research Project of 3-credit hrs under the supervision of a qualified advisor. There will be an intensive Synopsis orientation workshop for selection of a research topic and synopsis writing in the 4<sup>th</sup> semester. Research Project will be evaluated by an external expert. Student will also appear before a viva-voce committee to defend his/her dissertation.

**Internship 2-Credit hrs**

A six weeks internship in a professionally accredited TV Channel or Production house is a prerequisite for the degree. Students will be required to submit an internship report detailing with proof the work done during the two-month internship period and duly signed by the competent authority of organization where the student is working as an internee. The internship will have 100 marks, 75 marks for internship report and 25 marks for internship viva-voce examination. The viva-voce examination will be based on students' performance in the internship.

## **Mode of Studies**

This scheme of study is a full-time face to face 4-year BS in TV Production to be studied over a four-year period. To complete the program successfully, students must gain a total of 132-credit hour course work, practical, seminar, internship and research project.

### **Teaching requirements**

Highly qualified faculty, experienced professionals and guest speakers with particular expertise will be the feature of this degree program. Visits of students to TV channel will be a regular aspect. The degree will insist throughout on flexible skills – team working, adaptability, independent-working – which will be required in further career development.

### **Assessment**

Student will be assessed through assignments, quizzes, seminar discussion, projects, exams, internship, and Project/ thesis's viva-voce.

### **Details of Courses**

#### **COMPUTER SKILLS FOR MASS COMMUNICATION - 3-Credit hrs**

##### **Objectives:**

This course is aimed at introducing the students to computer technology and techniques with the view to acquaint them with its use in Print and electronic Media. It focuses on the use of various software a journalist can use while practicing journalism (print/television/radio) in daily routine.

##### **Course Contents**

1. Introduction to Computer (Hardware/Software)
2. Internet basics (Internet Connectivity, IP Settings, Installation of
3. Programs, Window Installation, Internet Securities, File formats (for Audio & Video).
4. In-Page Basics (Urdu Composing and Page Making)
5. Adobe Page Maker basics (Creating layouts for Newspaper and Magazines)
6. Adobe Photoshop basics (Basic still image/Picture editing)
7. Coral Draw Basics (Page and image making and designing)
8. Adobe Audition Basics (Basic Audio Editing for Radio)
9. Adobe Premier Basics (Basic Video Editing for
10. Television/Documentary/Short Film etc...)
11. Macromedia Flash Basics (Basic creation of Flash Images, Flash Picture Gallery and Flash Video for web and other formats)

##### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

##### **Recommended Books:**

1. Michael S. Toot. (2003). Master Visually Office.
2. Laurie Ulrich, Laurie Ulrich. (2003). How to do everything with Microsoft Office 2003
3. Curtis Frye. Microsoft Office 2003 Step by Step. Online Training Solutions Inc.,
4. Michelle Perkins Beginner's Guide to Adobe Photoshop
5. Deke McClelland, Galen Fott. Photoshop Elements 3 for Dummies

6. Jan Kabil. Adobe Photoshop Elements 2 Complete Course
7. Carla Rose. Sams Teach Yourself: Adobe Photoshop CS 2 in 24 Hours, First Edition.
8. Carla Rose. Sams Teach Yourself: Adobe (R) Photoshop (R) in 24 Hours.
9. Steve Bain. CorelDraw (R) 11: the Official Guide by Steve Bain.
10. Rosanna Yeung. Macro media Flash MX 2004 Hands-On Training
11. Phillip Kerman. Sams Teach Yourself: Macromedia Flash MX 2004 in 24 Hours.
12. Adobe Page Maker 7.0 Classroom in a Book. Adobe Creative Team.
13. Adobe PageMaker 7. Against the Clock.
14. Gordon Woolf. Publication Production using Page maker: A guide to using Adobe Page Maker 7 for the production of newspapers, newsletters, magazines and other formatted.
15. Donna L. Baker. Adobe Premiere 6.5 Complete Course
16. Christopher Callahan. A Journalist's Guide to the Internet: The Net as a Reporting Tool.  
2nd Edition
17. Frank Bass: The Associated Press Guide to Internet Research and Reporting
18. Rogers Cadenhead, Mark E. Walker. How to Use the Internet

### **Introduction to Media Studies - 3 Credit Hrs**

#### **Course Description**

Introduction to Media Studies is designed for students who have grown up in a rapidly changing global multimedia environment and want to become more literate and critical consumers and producers of media. Through comparative and historical lens, the course defines "media" broadly as including oral, print, performance, photographic, broadcast, cinematic, and digital cultural forms and practices. The course looks at the functions of media, the history of transformations in media and the institutions that help define media's place in society.

During the semester we explore different theoretical perspectives on the role of media in influencing our social values, political beliefs, identities and behaviors as well as working with different forms of media production. The class will analyze specific media texts (such as film and net-based media). In addition to producing critical writing for the course (non-fiction essay and research papers), students will organize in work groups to produce a media project to be presented at the end of the semester.

#### **Course Objectives**

The objective of this course is twofold. The first is to provide a critical introduction to the study of media in contemporary, historical, and comparative contexts. The second is to introduce the discipline of media studies and the types of analyses and methodologies associated with it.

This course will discuss basic media concepts, media issues, media debates and it aims knowledge and skills that will enable students to understand & use media effectively and responsibly. Through analyzing the forms and messages of a variety of media works and audiences responses to them, and through creating their own media works, students will develop critical thinking skills, aesthetic and ethical judgment, and skills in viewing, representing, listening, speaking, reading, and writing.

This course is a prerequisite for advanced courses in Media Studies. The course also introduces various ways of thinking about media issues such as media ownership, control and regulation; and audiences.

## **Course Outcomes**

Students will be able to:

1. Develop greater awareness of how language and perceptions affect communication and recognize verbal and non-verbal barriers to effective communication
2. Explain the impact of culture on communication.
3. Explain how news is gathered and presented in newspapers, on television, and in electronic media.
4. Explain how print, television, and online news media are structured as businesses and how profit motive may affect news presentation.
5. Analyze how a weekly news magazine is organized keeping in view the
6. Controversial news images and ethical issues that may arise from their publication.
7. Analyze the impact of Radio, Television and Newspaper on society.
8. Recognize ethical issues in communication practice
9. Discuss various media from the perspectives of audience, text and industry;
10. Recognize the huge diversity of media texts
11. Analyze arguments about media institutions and regulations from a number of perspectives.

## **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

## **Course Content**

### **WEEK 1**

- What is communication and its Types
- Elements in the Communication process,
- Types of Communication,
- Effective Communication,
- Barriers to effective Communication

### **WEEK 2**

- An Introduction of Mass Media.
- Functions of Media
- Evolution of Media

### **WEEK 3**

- Newspaper & Printing Press

### **WEEK 4**

- Radio

### **WEEK 5**

- Television

### **WEEK 6**

- 4 eras of mass media theories

### **WEEK 7**

News:

- Journalism Traditions
- Concept of News

- Personal Values in News

#### **WEEK 8**

- News:
- Variable Affecting News
- Confidential Sources
- Journalism Trends

#### **WEEK 9**

- Motion Picture
- Significance of Movies

#### **WEEK 10**

- Internet
- Influence of the internet
- Internet Origin
- The World Wide Web

#### **WEEK 11**

- Internet
- Reshaping the internet
- Internet Future and effects

#### **WEEK 12**

- An Introduction to Public Relations
- Tactics used in Public Relations

#### **WEEK 13**

- An introduction to Advertising

#### **WEEK 14**

- Citizen journalism

#### **WEEK 15**

- Discussion: Regional & Global Media
- Role of PEMRA

#### **WEEK 16**

- Presentations and discussions

#### **Recommended Books**

1. John Vivian (9<sup>th</sup> Edition) The Media Of Mass Communication
2. Marris, Paul & Thornham, Sue. Media Studies (a reader). (2nd Ed). NY University Press.
3. Durham, Gigi Meenakshi & Kellner, M. Douglas. (2006). Media & Cultural Studies. Blackwell Publishing.
4. Kolker, Robert. (2009). Media Studies and Introduction. (3rd Ed). Willey Blackwell.
5. Taylor, Lisa& Willis, Andrew. (2000) Media Studies. Blackwell Publishers Ltd
6. Cybercollege.com

#### **JOURNALISTIC LANGUAGE (English & Urdu) - 3 Credit Hrs**

#### **Objective**

The course has been designed to enable students to uses journalistic language both English and Urdu in writing and editing news stories.

#### **Course Contents**

1. Introduction to journalistic writing

2. Difference between journalistic, common and literary writing
3. Writing for newspapers, radio, TV and online media
4. Difference between writing for print and electronic media
5. Common technologies used in journalism
6. Translation of Urdu to English news stories.

#### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

#### **Recommended Books:**

1. Dr. Ahsan Akhtar Naz, Subaftic Zimadoryan Muqadra Qaum Zabar (Natinal Language 1998, Islamabad.
2. Javed Jabbar, Qazi Faiz Isa, Mass Media Laws and Regulation in Pakistan
2. Dr. Naz, Sahbafti Ikhlaqiat, Azeem Academi Urdu Bazar, Lahore. Centre, Urdu Bazar, Lahore.
3. Dr. Muhammad Wasim Akbar, Zarae Iblagh aur Islam Nomani Kutab khana, Urdu Bazaar Lahore.
4. AIOU (2016) Journalistic Language, AIOU Press, Islamabad

### **MASS MEDIA IN PAKISTAN** - **3-Credit Hours**

#### **Objectives:**

This course is designed to study the role of Muslim Press in the Sub-continent with reference to the work of eminent Muslim journalists, and its role during freedom movement and struggle for Pakistan. It is further designed to help students to have a look on the evolution of print and electronic media in Pakistan from the beginning till date, with reference to their problems and prospects.

#### **Course Contents:**

1. Historical Background (a) Growth of the Press in the sub-continent. (b) Role of Sir Syed Ahmed Khan, Moulana Hasrat Mohani, Moulana Muhammad Ali Johar, Moulana Abul Kalam Azad and Zafar Ali Khan. (c) Press and the Pakistan Movement.
2. History and Development of Press (a) Press since independence. (b) Major Developments of Press in Pakistan (c) Major problems and prospects of Press in Pakistan (d) Progressive writer's movement
3. Government and Press (a) Government Press relations
4. Electronic Media in Pakistan (a) Brief introduction to media in Pakistan (b) Growth & expansion of Radio, Television and Film In Pakistan 26 (c) Growth of Cable television and its cultural and ethical dimensions. (d) Rise and Fall of film in Pakistan (e) Electronic Media in Private Sector. FM radio And Satellite Television. (f) Online Journalism: Development and future prospects
5. News Agencies (a) Development of News Agencies. (b) Expansion, Working, Organizational, Structure and Future perspective in Pakistan. (c) Development of visual news agencies
6. Growth of regional press in Pakistan
7. Influence of foreign media in Pakistan
8. Emerging trends in journalism

**Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

Recommended Books:

1. Khurshid Abdus Salam, Journalism in Pakistan, United Publishers, Lahore.
2. Lent J.A., Newspapers in Asia.
3. Majeed Nizami, Press in Pakistan, Department of Political Science, University of the Punjab, Lahore.
4. Hasan Mehdi, Mass Media in Pakistan.
5. French David and Richard Micheal (2000), Television in Contemporary Asia, SAGE Publication International, UK.
6. Aziz Yousaf (2003), Prospect & Promotion of Electronic Media in Pakistan.
7. Sh. Mughees uddin (1981), ABC of Radio Journalism.
8. Niazi, Zamir, Press in Chains

**ONLINE JOURNALISM**

**Objectives:**

This course covers the comparative picture of traditional Journalism with web journalism with the emphasis on web is the future of Journalism and role and responsibilities of press and the journalists are changing. It tells the students how writing for web is different from print and broadcast. Students will learn news story structure for the web with inverted pyramid and other elements of stories. Students will closely examine the world of newspapers online before putting learned skill into practice. Along with aesthetic elements required for web, the students will know what technical requirements for the web are. Theoretical Perspective of Mass Media

1. What is Web Journalism
2. Scope of online journalism
3. How the web is replacing other media
4. Where web stands amongst New Media
5. Web is the Future of Journalism
6. Characteristics of web journalism Discussion:
7. Writing for print, broadcast and web; Content, style and structure
8. Characteristics of online news
9. Aesthetic elements for web
10. Contents for News website: News stories, features & blogs
11. Headline/ lead & summary writing for web
12. News story structure: Inverted pyramid & 5Ws
13. Writing lively and tightly
14. Editing web text
15. Introduction to Blogs
16. Writing Blogs
17. Writing for twitter
18. Scanning, Surfing and Skimming

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended Books:**

1. Journalism in the Digital Age, John Herbert, Focal Press Oxford, 2000.
2. Introduction to Mass Communication, Agee, Ault, 12th ed., Longman, 1997.
3. Understanding Mass Communication, Defleur, Dennis, Houghton Mifflin, N.Y, 1998.
4. Media Impact, Shirley Biagi, Wadsworth, 1999.
5. Media of Mass Communication, John Vivian, 1999.
6. Dynamics of Mass Communication, Dominic 6th ed.

## **INTRODUCTION TO DIGITAL MEDIA - 3-Credit Hrs.**

### **Course Objective**

The overall aims of this course are to introduce students to skills of digital media tools in context to its emergence with media science. It also aims to introduce key concepts and social platforms that have changed the media scenario that it's used to be. Using the representation of the virtual community as a focus, students will be introduced to ideas of the collective resourcing, user defined contents, Web 2.0, media production and reporting in social media.

### **Out Comes**

### **Course Content**

- Emerging Media Trends
- Media and Technology
- How emerging technologies can change Journalism
- Backpack Journalist
- Citizen Journalist
- Online Community
- News as conversation
- New Media: Emerging mediums of information (cell phone, web mediums)
- Cell phone evolution and Social Media (1-G to 4-G)
- Social Media Evolution
- Social Media Ethics (Rules are in the flux)
- Introduction to social media website (Google +, Facebook etc...)
- Social Media Skills for Journalists
- Blogs for Marketing and Advertising
- Trolls & 1-9-90 Rule
- Vod-casting basics
- Pod-casting basics
- How one increases its social networking
- Social Media Marketing
- Introduction to Micro Blogging
- Twitter for Journalist
- Social Media Marketing Strategies
- How one can use Facebook/Twitter/Blogs for effective Marketing

- Future Trends and developments in Social Media 41
- Social Media as an alternative public sphere

#### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

#### **Recommended Books:**

1. Journalism in the Digital Age, John Herbert, Focal Press Oxford, 2000.
2. Introduction to Mass Communication, Agee, Ault, 12th ed., Longman, 1997.
3. Understanding Mass Communication, Defleur, Dennis, Houghton Mifflin, N.Y, 1998.
4. Media Impact, Shirley Biagi, Wadsworth, 1999.
5. Media of Mass Communication, John Vivian, 1999.
6. Dynamics of Mass Communication, Dominic 6th ed.

### **REPORTING & NEWS WRITING- 3 Credit hrs**

#### **Course Description**

This course would enable students to identify a possible news story; where to gather information from, and how to put the collected information into a formal story format. The course is also intended to apprise the students of the significance of 'news' as a basic component of newspaper, and role of a reporter with reference to his/her professional qualities, duties, responsibilities, skills and working conditions.

#### **Objectives of the Course**

This course is geared towards enabling the students to:

1. Understand what it is like to be a news reporter and writer and acquire an understanding of news practices in the mass media
2. See the drama of reporting come alive; to kindle excitement in them while painting a realistic picture through emphasis on real reports and stories, which serve as instructional models
3. Organise, interpret, and judge events according to news value for an audience
4. Learn news-gathering strategies while researching and writing concise news articles

<b>Week</b>	<b>Issues of Discussion</b>	<b>Mandatory readings</b>
1.	Topic: What is News? Subtopics: What makes a story newsworthy? Types of News. Where the News Comes From?	Handbook of Independent Journalism, Deborah Potter
2.	Topic: What is News? Subtopics: The Journalist's Role. Objectivity and Fairness. News Providers	Handbook of Independent Journalism, Deborah Potter
3.	Topic: Getting the Story Subtopics: Five W's and an H. Observation. Research. Sources	Handbook of Independent Journalism, Deborah Potter
4.	Topic: Getting the Story Subtopics: Interviews. Ground Rules Getting it Right	Handbook of Independent Journalism, Deborah Potter

5.	Topic: Telling the Story Subtopics: Focus. Writing. Leads. Story Structure	Handbook of Independent Journalism, Deborah Potter
6.	Topic: Telling the Story Subtopics: Endings. Attribution. Quotes and Sound Bites. Numbers	Handbook of Independent Journalism, Deborah Potter
7.	Topics: Editing the Story Subtopics: Newspaper Jobs Broadcast Jobs. The Editor's Role. Copy Editing	Handbook of Independent Journalism, Deborah Potter
8.	Topic: Editing the Story Subtopics: Coaching. Headlines, Captions, and Teases Graphics and Visuals. Supervising	Handbook of Independent Journalism, Deborah Potter
9.	Topic: Broadcast and Online Subtopics: Broadcast Story Forms and Terms. Broadcast Writing Sound. Pictures	Handbook of Independent Journalism, Deborah Potter
10.	Topic: Broadcast and Online Subtopics: Newscasts. Online News. Online Story Forms. Online Writing	Handbook of Independent Journalism, Deborah Potter
11.	Topics: Specialised Journalism Subtopics: Beating Reporting Skills. Government and Politics. Business and Economics	Handbook of Independent Journalism, Deborah Potter
12.	Topics: Specialised Journalism Subtopics: Health, Science, and the Environment Police and Courts. Sports. Questions Reporters Should Ask About Polls	Handbook of Independent Journalism, Deborah Potter
13.	Topic: TV News Reporting Urdu News Reporting for TV	
14.	Topic: Radio News Reporting Urdu News Reporting for Radio	
15.	Topic: News Writing For TV Urdu News Writing for TV	
16.	Topic: News Writing for Radio Urdu News Writing for Radio	

**Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended Readings**

1. News Reporting and Writing, The Missouri Group: Brooks, Brian S.,
2. Kennedy, George, Moen, Daryl R., Ranly, Don
3. St Martin's Press, New York
4. Feature Writing: A Practical Introduction
5. Pape, Susan and Featherstone, Sue
6. Sage Publications (2006)
7. Writing and Reporting News: A Coaching Method
8. Rich, Carole
9. Thomson Wadsworth

### **STATISTICS - 3-Credit Hrs.**

#### **Course Description**

The course aims to promote the belief that Statistics is important for scientific research and to motivate the students an intrinsic interest in statistical thinking.

#### **Objectives**

Course will enable students to explain the basic understanding of statistics and its usage in their research projects.

What is Statistics? Definition of Statistics, Population, sample Descriptive and inferential Statistics, Observations, Data, Discrete and continuous variables, Errors of measurement, Significant digits, Rounding of a Number, Collection of primary and secondary data, Sources, Editing of Data. Exercises.

Presentation of Data Introduction, basic principles of classification and Tabulation, Constructing of a frequency distribution, Relative and Cumulative frequency distribution, Diagrams, Graphs and their Construction, Bar charts, Pie chart, Histogram, Frequency polygon and Frequency curve, Cumulative Frequency Polygon or Ogive, Histogram, Ogive for Discrete Variable. Types of frequency curves. Exercises.

Measures of Central Tendency Introduction, Different types of Averages, Quantiles, The Mode, Empirical Relation between Mean, Median and mode, Relative Merits and Demerits of various Averages. Properties of Good Average, Boxand Whisker Plot, Stem and Leaf Display, definition of outliers and their detection. Exercises.

Measures of Dispersion Introduction, Absolute and relative measures, Range, The semilInterquartile Range, The Mean Deviation, The Variance and standard viation, Change of origin and scale, Interpretation of the standard Deviation, Coefficient of variation, Properties of variance and standard Deviation, Standardized variables, Moments and Moments ratios. Exercises.

Unit 5.

Probability and Probability Distributions. Discrete and continuous distributions: Binomial, Poisson and Normal Distribution. Exercises

Unit 6.

Sampling and Sampling Distributions Introduction, sample design and sampling frame, bias, sampling and non-sampling errors, sampling with and without replacement, probability and non-probability sampling, Sampling distributions for single mean and proportion, Difference of means and proportions. Exercises.

Hypothesis Testing Introduction, Statistical problem, null and alternative hypothesis, Type-I and Type-II errors, level of significance, Test statistics, acceptance and rejection regions, general procedure for testing of hypothesis. Exercises.

Testing of Hypothesis- Single Population Introduction, testing of hypothesis and confidence interval about the population mean and proportion for small and large samples, Exercises

Testing of Hypotheses-Two or more Populations Introduction, Testing of hypothesis and confidence intervals about the difference of population means and proportions for small and large samples, Analysis of Variance and ANOVA Table. Exercises

Testing of Hypothesis-Independence of Attributes Introduction, Contingency Tables, Testing of hypothesis about the Independence of attributes. Exercises.

Regression and Correlation Introduction, cause and effect relationships, examples, simple line regression, estimation of parameters and their interpretation r and R2 Correlation. Co efficient of linear correlation, its estimation and interpretation. Multiple regression and interpretation of its parameters. Examples

#### **Assessment Criteria**

Mid-Term            25Marks

Quizzes            15Marks

Assignment        20Marks

Final Term        40Marks

#### **Recommended Books:**

1. Walpole, R. E.1982. "Introduction to Statistics", 3 rd Ed., Macmillan Publishing Co., Inc. New York.
2. Muhammad, F. 2005. "Statistical Methods and Data Analysis", Kitab Markaz, Bhawana, Bazar Faisalabad.

#### **MEDIA LAWS AND ETHICS - 3-credit hrs**

#### **Objectives**

This course will enable the students to:

1. Discuss the ethical aspects of mass communication.
2. Analyse the theoretical aspects of media laws and ethics.

#### **Course Details**

#### **Ethics and Morality in Modern Perspective**

1. Introduction to ethical foundations
2. Code of ethics in journalism
3. Pros and cons of ethics in journalism
4. Society for professional journalist code of ethics
5. Morality and media
6. Making ethical decisions
7. Coverage of politics and ethical issues

#### **Privacy in Media**

1. Issues of privacy and media
2. Privacy laws and media
3. Protection of Public Rights

4. Public interest issues and privacy
5. Privacy practice in Pakistan

### **International Media Laws and Ethics**

1. International media laws and ethics
2. International media freedom and privacy
3. International intellectual property law
4. Other area relating to int. laws and ethics

### **Web Journalism Ethics**

1. Ethical Issues of Web Journalism
2. Web Plagiarism
3. Web Self-Production
4. Minimizing harm and Being accountable

### **Media Ethics: Islamic Perspective in Islamic countries**

1. Media code of ethics in Islam
2. Role of Muslim Media journalism
3. OIC code of ethics for Media
4. Pakistan Experience

### **Media Code of Ethics for Women and Children**

1. Portrayal of women in Electronic and Print media
2. Women as consumers of media
3. Women's influence on media content as media audience
4. Children's portrayal as victims
5. Media coverage of children and ethical issues

### **Media ethics and laws in Pakistan**

1. Pakistan media laws
2. RPPO
3. Defamation
4. Contempt of court and new contempt law in Pakistan
5. Radio Licensing
6. Satellite TV Licensing
7. Landing Rights Licensing

### **Ethics in Print Media**

1. Ethics in print media
2. Accuracy and fairness
3. Issues of Objectivity

4. Printing of Photo
5. Placement of Stories

### **Ethics in Public Relations and advertising**

1. Approaches and application of Public Relation ethics
2. Developing public relations ethics
3. Public Relations and Corporate Speech
4. Public Relations Ethics in Pakistan
5. Ethics and art of advertising
6. Advertising and self regulation
7. Advertising and public demands
8. Ethical issues of advertising in Pakistan

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Suggested Readings:**

1. Bart Pattyn (2005). Media Ethics: Opening Social Dialogue Edited by
2. Kurt Huston (2004). Media Ethics: Cases and Moral Reasoning (4<sup>th</sup> ed.). New York: Longman Publishers, Inc
3. Louise Alvin (2003). Ethics in Media Communications: Cases and controversies Canada.
4. William. Cleve. Mathews (2002). Ethics for the Media: The Ethics of Persuasion. New York, Longman.

## **THEORIES OF MASS COMMUNICATION - 3-Credit hrs**

### **Objectives:**

This course has been designed to enable students to have better insight into the concepts and effects of media on individual and society. On the completion of this course, students will be able to adopt media theories in the construction of message for various media outlets.

### **Course details**

#### **Mass communication theory**

1. Evolution and Development

#### **Normative theories of Mass Media**

1. The Authoritarian press
2. The Libertarian press
3. Social Responsibility press
4. The Communist press
5. Developmental Theory

#### **Theories and effects of Communication-1**

1. The bullet press Approach

2. Uses and Gratification Approach
3. Agenda setting, framing, priming, etc.
4. The Gate keeping Techniques
5. Cultivation hypothesis

### Theories and effects of Communication-11

1. Media Hegemony
2. Spiral of Silence
3. Diffusion of Innovation
4. Social Learning theory
5. Knowledge gap hypothesis

### Theories of Perception and attitude

1. Assumption and perception
2. Cultural expectation and perception
3. Motivation and perception
4. Attitude and perception
5. Techniques of persuasion
6. The concept of attitude and attitude change
7. Credibility and its sources
8. Fear Appeal
9. Inoculation theory

### Theories of persuasion

1. Techniques of persuasion
2. Theories and techniques of Rumors
3. Theories and techniques of Slogans

### Social Psychology and Media

1. Theories of selectivity
2. Psychoanalytic theory
3. Behavioral view

### Assessment Criteria

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### Books Recommended

1. Chaffee, Steven H. 2000. Mass Communication Uses and Effects, 3rd ed. MacGrow Hill, New York.
2. Joseph R. Mominick. 2004. The Dynamics of Mass Communication, 5thEd. Mac Graw Hill, Inc. New York.
3. Werner J. Severin & James W. Tankard, Jr. 2003. Communication Theories: Origins, and Uses in the Mass Media, 3rd. ed. Longman Group Ltd. London.

4. James Curran, Michael Gurevitch. 2000. Mass Media and Society, 3rd. ed. St. Martin Press Inc. New York.
5. Mac Quill. 2003. Theories of Communication, 2nd ed. Longman Group Ltd. London.
6. Philip Rayner. 2003. Mass Media Studies: An Essential Introduction Rutledge, New York.
7. Defleur Melvin L. 1999. Theories of Mass Communication, 3<sup>rd</sup> ed. David McKay Co. New York.
8. Joseph, Dominic. 2004. Mass Media Research 4th ed. Wadsworth Publishing Company, Belmont, California.
9. Dennis Everett, Marshall John. 2003. Media Debates. 2nd ed. Longman Publisher, New York.

### **DEVELOPMENT SUPPORT COMMUNICATION 3-Credit Hour**

#### **Course Objective**

**This course has been designed to:**

1. Make student understand about the dynamic of communication for development.
2. Apply the practice of development journalism in print and electronic media.
3. Explain the requirement of launching campaign for making people aware on social issues for societal development.

#### **Evolution of Development Support Communication**

1. Growth of term “Development”
2. Philosophy of development support communication
3. Needs of development support communication
4. Difference between communication, development communication, development support communication and development journalism
5. Factors for successful development support communication

#### **Models of Development Support Communication**

Dominant Paradigm for Development

Alternative Model of Development

#### **Development Support Communication**

#### **And Change in the Social Setting**

1. Strategies for introducing change
2. Sources of change
3. Types of change
4. Change of social values and beliefs.
5. Power of influence
6. Social stratification
7. Obstacles to change
8. Reducing resistance to change

#### **Problems of Development Support Communication**

1. Financial constraints
2. Unqualified practitioners
3. State owned media

4. Environmental factors affecting development communication
  - i. Political environment
  - ii. Economic environment
  - iii. Socio-cultural environment
  - iv. Administrative and organizational Environment

### **Using Mass Media for Development Support Communication**

<b>Print Media</b>	<b>Broadcast Media</b>
1. Newspaper	1. Radio
2. News Letters	2. Television
3. Folders, Leaflets and Pamphlets	4. Fact Sheet

<b>Non- broadcast Media</b>	<b>Static Media</b>
1. Exhibits and displays	1. Motion pictures
2. Posters	2. Exhibits and Displays
3. Slides and film strips	
4. Overhead transparencies	

### **Evaluation the Dsc Programme**

1. Evaluation in DSC
2. Elements of Evaluation
3. Reasons of Evaluation
4. Types of Evaluation
5. Monitoring and Evaluation
6. Steps of Evaluation
7. Evaluation Plan
8. Criteria for Evaluation
9. Design for Evaluation Studies
10. Conduct of the Evaluation.

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **CURRENT AFFAIRS - 3 Credit Hrs**

#### **Objectives:**

This course is designed to provide the students an insight of event sand affairs taking place in and around Pakistan. Understanding national and international affairs is indispensable for persons working for media. This course is planned to enlighten and enable the students to analyze events with proper perspective.

#### **Course Contents:**

1. Basics of Pakistan's Foreign Policy and Pakistan's relations with other countries – India, Afghanistan, Iran, China and US, SAARC, ASEAN,

2. Contemporary issues political instability, Governance Issues, Health, Education, Water, Population, Gender, Human rights, Poverty etc.
3. Elements of national power: geography, ideology, natural resources, education, economy etc. International Affairs:
  1. Shift in balance of power: end of bipolar system and its implications
  2. The United Nations and its current role in conflict resolution.
  3. Muslim World, issues and problems, Role of OIC
4. Issues and problems faced by contemporary World:
  - a. Geo Political Status of Pakistan;
  - b. Regional Arrangements three case studies European Union, ASEAN, and SAARC.
  - c. Middle East issues
  - d. Kashmir Dispute
  - e. Nuclear issues
  - f. War against terrorism and its different dimensions
  - g. WTO and its implication and impact.
  - h. environmental and water issues
  - i. energy crisis

#### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

#### **Recommended Books:**

1. Safdar Mahmood (2006-2007). International Affairs. 2nd Edition. Jahangir Printers, Lahore, Pakistan.
2. Ken Booth & Tim Dunne. (2002). Worlds in Collision Terror and the Future of Global Order. Palgrave Macmillan.
3. Noam Chomsky (1997). World Orders Old and New. Pluto Press. USA
4. Aeron Davis. (2007). The Mediation of Power. Routledge Taylor and Francis Group
5. Saiyyad Muhammad, Saleem Moini. (1995). International Law. Pakistan Writer's Co-operative Society Karachi, Lahore.
6. Dr. Safdar Mehmood. (2000). International Affairs. Jang Publishers. Lahore

### **INTERCULTURAL COMMUNICATION - 3 Credit Hrs**

#### **Course description & objectives:**

This course introduces communication between people from different cultures. Course content focuses on the application of theory and research to intercultural communication.

#### **Course outcomes**

Students will be able to:

- Articulate the concepts, domains, and dimensions of culture and intercultural communication.
- Apply interpretive and/or critical methods to the study of cultural acts and artifacts.
- Reflexively examine global issues, power dynamics, and social inequities including diverse cultural experiences, perceptions, and behaviors.
- Employ effectively and appropriately intercultural communication skills with sensitivity and empathy.
- Demonstrate presentation skills in professional and social contexts.

#### **Assessment Criteria**

Mid-Term            25Marks

Quizzes            15Marks

Assignment        20Marks

Final Term        40Marks

#### **Course Content**

##### **WEEK 1**

###### **Foundations of Intercultural communication**

- Why Study Intercultural communication
- Imperatives of Intercultural communication

##### **WEEK 2**

- History of the study of Intercultural communication
- Early Development

##### **WEEK 3**

- Three Approaches to studying Intercultural communication
- Case Study

##### **WEEK 4**

- Culture, Communication, Context, and Power

##### **WEEK 5**

- Identity and Intercultural Communication
- Case Study

##### **WEEK 6**

- Nonverbal Codes and cultural Space

##### **WEEK 7**

- Pakistan's culture and sub cultures: Identifying the roots
- Case Study

##### **WEEK 8**

- Pakistan: issues of national integration

##### **WEEK 9**

- Stereotyping
- Case Study

##### **WEEK 10**

- Globalization and culture Imperialism

##### **WEEK 11**

- Popular culture and intercultural communication: A case study of Pakistan

**WEEK 12**

- Culture, Communications and conflict

**WEEK 13**

- Cultural and personal shaped perceptions
- Problems of national solidarity

**WEEK 14**

- Intercultural Communication flow in media

**WEEK 15**

- Contraflow in Global Media
- Case studies

**WEEK 16**

- Presentations and discussions

**Recommended books**

1. Thussu, D. (2006). *International communication: Continuity and change*. Bloomsbury Academic.
2. Martin, J. N., & Nakayama, T. K. (2010). Intercultural communication in contexts.
3. Jalibi, J. (1984). *Pakistan: the identity of culture*. Royal Book Company.
4. Kovalainen, N., & Keisala, K. (2012). The role of shared foreign language in intercultural communication: A case of working environments. *International Journal of Humanities and Social Science*, 2(20), 52-72.
5. Bennett, M. J. (1998). Intercultural communication: A current perspective. *Basic concepts of intercultural communication: Selected readings*, 1-34.

**ADVERTISING & PUBLIC RELATIONS - 3-Credit Hrs.**

**Objectives:**

This course is designed to introduce students to the principles and techniques of advertising and public relations as currently practiced. Emphasis will be on the public relations and advertising processes and such activities that bring out student's problem-solving approach and creativity in message construction.

**Course Content: Advertising**

- Evolution and Development of Advertising
- Advertising Definition, Function and Scope
- Types of Advertising, Techniques of Advertising
- Principle of Successful Advertising
- Merits and Demerits of Advertising
- Macro and Micro economic impact of Advertising
- Socio-economic role of advertising
- Advertising agency and its structure
- Role of advertising association of Pakistan
- Develop of Advertising Campaign
- Practice Advertising Campaign Public Relations

### **Public Relations**

- Definition, Nature, Scope and history
- Pub lies of PR
- Process of PR (Research, Planning PR Campaigns 42 execution and evaluation)
- Tools and Products of PR (Spoken tactics, written, Visual and new media)
- Government and Private Organizations PR
- PR in different sectors
- Responsibilities and qualities of PRO
- Comparative analysis of publicity, Propaganda, adv, PR
- Community, Corporation on-Profit organization-POL org Practical: PR Campaign

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended Books:**

1. Centre, H. Allen, Cutlip. M. Scott, "Effective Public Relations". New Jersey" Prentice Hall Inc.1978
2. Chandan, S J. et al. "Essentials of Advertising", New Delhi, Bombay, Oxford & IBH Publishing Co. Pvt.Ltd.1990
3. Jefkins, Frank. Long Acre, "Public Relations for Marketing Management", London: Pitman Publishing1991.
4. Jefkins, Frank, Long Acre, "Public Relations", London: Publishing, 1991
5. Jefkins, Frank, "Advertising: Made Simple", Calcutta; Rupa Co.1982

## **THEORIES OF COMMUNICATION II - 3-Credit Hrs.**

### **Objectives:**

The course aims to promote students critical and analytical approaches towards understanding of mass communication theories. It also aims to prepare them for further inquiry into the field of Mass communication.

### **Course Contents:**

#### **Emergence of critical and cultural theories of mass communication**

- Frankfurt school
- Political economy Media and audiences: theories about the role of media in everyday life
- Uses and gratification
- Framing and frame analysis Theories of media and culture and society
- Agenda setting
- Knowledge gap
- Spiral of silence
- Media dependency theory

- Cultivation theory

#### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

#### **Recommended Books:**

1. Chaffee, Steven H. 2000. Mass Communication Uses and Effects 3rded. MacGraw-Hill, New York.
2. Joseph R. Mominick. 2004. The Dynamics of Mass Inc. New York
3. Werner J. Severin & James W. Tankard, Jr. 2003. Communication Theories: Origins and uses in the Mass Media, 3rded. Longman Group Ltd. London
4. James Curran, Michael Gurevitch.2000. Mass Media and Society, 3 rd ed. St. Martin Press Inc. New York.
5. Mac Quill. 2003.Theories of Communication, 2<sup>nd</sup> ed. Longman Group Ltd. London.
6. Philip Rayner. 2003. Mass Media Studies: An Essential Introduction Rutledge, New York.
7. Defiler MelvinL.1999. Theories of Mass Communication,3<sup>rd</sup> ed. David McKay Co. New York.
8. Joseph, Dominic. 2004. Mass Media Research 4<sup>th</sup> ed. Wadsworth Publishing Company, Belmont, California.
9. Dennis Everett, Marshall John.2003. Media Debates 2nded. Longman Publisher New York.

## **PHOTO JOURNALISM**

**3 Credit Hrs**

#### **Course Description**

#### **WEEK 1**

##### Introduction

- Basics Photojournalism Responsibilities
- Photojournalism, TV and the Future

#### **WEEK 2**

##### Photojournalism Basics:

- Candid Basics
- Documentary Photography
- Street Photography
- Technical Issues
- Legal Considerations
- Celebrity Photography

#### **WEEK 3**

- Secret Photography
- Paparazzi
- Subminiature Photography
- Closed Circuit Television

- Fake Security Camera

#### **WEEK 4**

Critical Areas in Photojournalism

- Photojournalism as Profession
- News Assignments
- Photojournalism Historical Perspective
- Rights to Privacy

#### **WEEK 5**

Major Concerns of Photojournalists

- Covering Dangerous Assignments
- Readers Concerns
- The National Press Photographers Association

#### **WEEK 6**

- The Making of a Photojournalist
- What makes a photojournalist different from a photographer?

#### **WEEK 7**

- World Famous Photojournalists

#### **WEEK 8**

Objectivity In Photojournalism

- Photo Truth
- Photo Manipulation in the Pre-digital Era
- The Digital Media

#### **WEEK 9**

Guest Speaker (a professional photojournalist)

#### **WEEK 10**

Citizen Journalism

- What is it?
- What's good about it?
- What's bad about it?
- The websites
- Tools

#### **WEEK 11**

Press code and Editorial policy (Guest speaker)

#### **WEEK 12**

Case Studies

#### **WEEK 13**

Final project submission

#### **WEEK 14**

Exhibition

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **EVOLUTION OF TELEVISION**

**3-Credit Hrs**

### **Objectives**

After Studying this course, students will be able to:

1. Elaborate historical developments of TV in the world as well as in Pakistan.
2. Elaborate the use of technology in TV and its impact on society.

### **Course Details**

#### **History of Television**

1. Origin of Television
2. Early TV Broadcasts
3. Black and White TV
4. Colour TV
5. Television in the Cold War
6. Early Television Programs

#### **History and Development of TV in Pakistan**

1. The Beginning
2. Developmental Stages
3. Early TV Programs
4. State Broadcast
5. Cable TV Channel
6. Satellite TV
7. TV and Freedom in Pakistan

#### **World TV Broadcast Channels**

1. The BBC
2. The CNN
3. The Fox TV
4. The CNW
5. The Indian TV
6. Others

#### **Cultural Impact of TV**

1. Cultural Imperialism and TV
2. Global Television and National Identity
3. Television impact on economic and politics
4. Television and Hybridization

### **TV Dependency and Ownership**

1. TV Audience
2. The Nation-State and Television
3. The State-Owned Television
4. Dependency and Ownership
5. National TV Conglomerates and Competition

### **Television Technology**

1. Satellites
  - a. From Cross-Border Spill over to Direct
  - b. Satellite Broadcasting
  - c. Satellite TV at Global, Regional, and National Levels
  - d. Cable and Satellite TV Relative to Broadcast TV
  - e. Geography, Language, and Other Barriers to Satellite or Cable TV
2. Micro Waves Broadcasting
3. Cable Television
4. TV Technology, Access, and Choice
5. Economic Capital and Access to Television Technologies

### **The Evolution of TV News Production**

1. Historical Background
2. Developmental stages of TV News
3. Satellite TV News
4. Live News
5. Headline News
6. Breaking News
7. Current affairs programs
8. Weather and Sports News

### **Television Industry**

1. Sociology of TV Industry
2. Jobs in TV Channel
3. Audience's Needs Gratification
4. Competition
5. Commercialism
6. Job requirements

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended Books**

- Patricia Holland (2007). *The Television Handbook*. Routledge, London.
- Steve R. Cartwright (2003). *Pre – Production Planning of Video Film and Multimedia*, Focal Press, Oxford.

**Media Management and Marketing - 3 Credit hrs****COURSE DESCRIPTION**

This course is designed for students who have grown up in a rapidly changing global multimedia environment and want to become more literate and critical consumers and producers of media. Through comparative and historical lens, the course defines "media" broadly as including oral, print, performance, photographic, broadcast, cinematic, and digital cultural forms and practices. The course looks at the functions of media, the history of transformations in media and the institutions that help define media's place in society.

During the semester we explore different theoretical perspectives on the role of media in influencing our social values, political beliefs, identities and behaviours as well as working with different forms of media production. The class will analyse specific media texts (such as film and net-based media). In addition to producing critical writing for the course (non-fiction essay and research papers), students will organize in work groups to produce a media project to be presented at the end of the semester.

**COURSE OBJECTIVES**

The objective of this course is twofold. The first is to provide a critical introduction to the study of media in contemporary, historical, and comparative contexts. The second is to introduce the discipline of media studies and the types of analyses and methodologies associated with it.

This course will discuss basic media concepts, media issues, media debates and it aims knowledge and skills that will enable students to understand & use media effectively and responsibly. Through analysing the forms and messages of a variety of media works and audiences responses to them, and through creating their own media works, students will develop critical thinking skills, aesthetic and ethical judgment, and skills in viewing, representing, listening, speaking, reading, and writing. This course is a prerequisite for advanced courses in Media Studies. The course also introduces various ways of thinking about media issues such as media ownership, control and regulation; and audiences.

**Assessment Evaluation**

Quiz:	15%
Assignments & presentation:	20%
Mid Term Exams:	25%
Final Term Exams:	40%

Week 1	Introduction to Media Management
Week 2	Managerial Decision Making
Week 3	Leadership and Workforce
Week 4	Motivation
Week 5	Management of Global Media Organization

Week 6	Innovation and the Future
Week 7	Law, Regulation and Ethics
Week 8	Quiz, Discussion and Presentation
<b>Mid Terms</b>	
Week 9	Introduction to Media Marketing
Week 10	Planning
Week 11	Market Analysis
Week 12	Basics of Research
Week 13	Marketing and Research
Week 14	Making Sense of It All: Managing Knowledge
Week 15	Case Studies
Week 16	Discussion and Presentation

### **TV SCRIPT WRITING** **3-Credit Course**

#### **Objective of the course**

After studying this course student will be able:

- To advance the ability of students to write television drama and comedy scripts as per professional standard.

#### **Course Details**

#### **Concept of Script Writing**

1. Mapping screen play
2. Main Idea
3. Topic
4. Visual thinking
5. Audiences
6. Basic Characteristics of Script writing

#### **Elements of TV Scripts**

1. Language consideration
2. Pictures speak
3. Consideration of audience
4. Knowledge of the events before writing

#### **Parts of a story Scripts**

1. The Beginnings
2. The middles
3. The endings
4. The sequence

5. Character building
6. Construction of Dialogues

### **Script Writer**

1. Creative and original
2. Enthusiastic and passionate
3. Committed to career
4. Being a Researcher
5. Language ability
6. Determination of good and bad

### **Different programs Script**

1. Script for Drama
2. Script for documentary
3. Script for Music
4. Script for News
5. Script for Stage shows
6. Script for interviews

### **Different Media Script**

1. Differences between TV and Film script
2. Differences between Radio and TV Script

### **TV Script and Audience**

1. Knowledge of the audience
2. Matching the story to the audience
3. Connecting with the audience

### **Script Writing Ethics**

1. Maintaining the audience trust
2. Writer's responsibility
3. Legal and illegal factors
4. The issues of plagiarism

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Suggested books**

David Trottier (2009). *The Screenwriter's Bible: A Complete Guide to Writing, Formatting, and Selling Your Script*. Amazon, New York.

Patricia Holland (2007). *The Television Handbook*. Routledge, London.

Syd Field (2008). *The Foundation of Screen Writing*. Bantam Del. New York.

Richard A. B. (2001). *Television and Script Writing: From Concept to Contract*. Butterworth Heinemann, Woburn.

## **PROCESS AND EFFECTS OF COMMUNICATION - 3-Credit hrs**

### **Objective of the course**

This course will enable Students to:

Explain the concepts and strategies and its application in the communication process.

### **Course Details**

#### **Concept and Process of Communication**

1. Definition, Scope and Purpose of Communication
2. Elements of Communication
3. Types of Communication

#### **Hurdles to Communication**

1. Physical and Psychological hurdles
2. Effective Communication

#### **Models of Communication**

1. Functions of Communication Models
2. The Lasswell Model of Communication
3. Shannon and Weaver Model
4. Defleur's Model
5. The Osgood and Schramm Circular Model
6. Dance's Helical Model
7. The Hub Model of mass communication
8. Katz and Lazarsfeld Two Step Flow Model and personal Influence

#### **Media of Communication**

1. Space Organized Media Books, Newspapers and Magazines
2. Time Organized Media Radio, TV and Film
3. Space and Time Organized Media

#### **Folk and Traditional Media**

4. Folk Media and Its Salient Features
5. Folk Music, Folk Saying and Riddles
6. Puppetry and Street Theatre
7. Characteristics of Group Media
8. Traditional Approaches in Communication

#### **Media Audience and Feedback system**

1. Media Audience and its categories
2. Media Feedback
3. Criteria for Effective Feedback
4. Characteristics of Feedback

5. Message and Channels
6. Collecting and Expressing Data

### **Communication Technologies**

1. Computer technology
2. Communication Satellite
3. Video conferencing
4. Cable Television
5. Effects of Communication Technology

### **Psychological Warfare**

1. Concept of Psychological Warfare
2. Historical Perspectives of Psychological Warfare
3. Role of Mass Media in Psychological Warfare
4. Tools of Psychological Warfare
5. Propaganda, Rumors, Public Opinion, Publicity, Disinformation

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended Books**

1. Chaffee, Steven H. (2000) Mass Communication Uses and Effects, 3<sup>rd</sup> ed., Mac Grow Hill, New York.
2. Joseph r. Dominick (2004) The Dynamics of Mass Communication, 5<sup>th</sup> ed. Mac Graw Hill, Inc. New York.
3. Werner J. Severin & James W. Tankard, Jr. (2003) Communication Theories: Origins, and Uses in the Mass Media, (3rd ed), Longman Group Ltd. London
4. James Curran, Michael Gurevitch, (2000) Mass Media and Society (3<sup>rd</sup> ed.) St. Martin Press Inc. New York
5. Mac Quill (2003) theories of Communication, (2<sup>nd</sup> ed.), Longman group ltd. London.
6. Philip Rayner (2003) Mass Media Studies: An Essential Introduction Rutledge, New York.
7. Defleur Melvin L (1999) theories of Mass Communication, (3<sup>rd</sup> ed.) David McKay Co. New York.
8. Joseph, Dominic (2004) Mass Media Research 4<sup>th</sup> ed., Wadsworth Publishing Company, Belmont, California.
9. Dennis Everett, Marshall John (2003) Media Debates (2<sup>nd</sup> ed.) Longman Publisher, NY USA.

### **TV Camera Operation - 3-Credit hrs**

#### **Objectives**

After studying this course, students will be able to:

1. Explain TV camera techniques for programme production.
2. Differentiate digital and analogue and other types of TV camera.

3. Elaborate the various aspects of videography.

### Course Details

#### **Television Cameras**

1. Basic concept of Camera
2. Still and Moving camera
3. Parts of Camera
4. The Beam Splitter
5. The Image Device

#### **Types of Cameras**

1. Analogue and digital cameras
2. Studio cameras
3. Eng/EFP cameras and camcorders
4. Consumer camcorders

#### **Camera Lenses**

1. Types of zoom lenses
2. Studio and field lenses
3. Zoom ranges
4. Lenses format
5. Lenses format
6. Focal length
7. Focus
8. How Lenses See the World
9. The Wide-Angle Lens
10. The Normal Lens
11. The narrow-Angle, Or Telephoto, Lens

#### **Camera Mounting**

1. Standard Camera Mounts and Movements
2. The Handheld and Shoulder-Mounted Camera
3. The Monopod and Tripod
4. The Studio Pedestal
5. Special Mounting Devices
  - a) High Hat
  - b) Bean Bag
  - c) Stead cam
  - d) Short and Long Jibs
  - e) Studio Crane

#### **Camera Operation and Picture Composition**

1. Working with Camera
2. Some Basic Camera
3. Studio camera
4. Framing Effective Shots

- 5. Screen Size
- 6. Field Of View
- 7. Framing Close-Ups
- 8. Headroom
- 9. Closure

### **Framing Effective Shots**

- 1. Screen size and field of view
- 2. Dealing with height and width
- 3. Framing close up
- 4. Headroom
- 5. Nose room and Lead room

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended Books**

- Patricia Holland (2007). The Television Handbook. Routledge, London.  
Steve R. Cartwright (2003) Pre – Production Planning of Video Film and Multimedia, Focal Press, Oxford.

### **TELEVISION LIGHTING SYSTEM - 3-Credit hrs**

#### **Objectives**

After studying this course, students will be able to:

- 1. Explain requirement of lighting for TV program production
- 2. Elaborate various kinds of lights used in TV studios

#### **Course Details**

#### **Lighting Instruments**

- 1. lighting instruments
  - a. Flood light
  - b. Spot light
- 2. Lighting Control Equipment
  - a. Mounting devices
  - b. Directional Control
  - c. Intensity control
- 3. Colour Temperature

#### **TV Studio lighting techniques**

- 4. Quality of light
- 5. Lighting Functions
- 6. Lighting Techniques
- 7. Large-Area Lighting

8. Cameo Lighting
9. Silhouette Lighting
10. Chroma-Key Area Lighting
11. Controlling Eye and boon Shadows

### **Lighting Contrast**

1. Contrast Ratio
2. Measuring Contrast
3. Controlling Contrast

### **Light Intensities**

1. Key to Back Light Ratio
2. Key to Fill Light Ratio
3. The Light Plot

### **Control and use of light**

1. Soft lights
2. Lighting effects
3. Use of diffusion
4. Open-faced luminaries
5. Hard-edged projectors

### **Operation of Lights**

1. Safety
2. Preserving Lamps and power
3. Lighting in the Field
4. ENG/EFP
5. Power Supply

### **ENG lighting**

1. Shooting in Bright Sunlight
2. Shooting in Indoor Light
3. Shooting at Night

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended Books**

- Patricia Holland (2007). *The Television Handbook*. Routledge, London.
- Steve R. C. (2003). *Pre – Production Planning of Video Film and Multimedia*. Focal Press, Oxford.
- Richard, J. (1996). *Training with Video*. Knowledge Industry Publications, New York,
- Finberg and Little (2002). *Visual Editing*. Wadsworth, Belmont. London.

### **Data Journalism - 3 Credit Hrs.**

#### **Course Description**

Data journalism is a journalism specialty reflecting the increased role that numerical data is used in the production and distribution of information in the digital era. It reflects the

increased interaction between content producers and several other fields such as design, computer science and statistics.

## **Objectives**

The aim of this course is to make students learn about:

1. The use and methods of data in the news story for TV and print media.
2. The techniques of gathering/ mining data and utilizing online data, government and public records
3. How to present data using techniques such as data visualization and news applications.

## **Course Details**

### **Introduction to data journalism**

Overview of the best practices and key tools

Trends and future of data journalism - globally and regionally

### **Data Acquisition**

Where to find data: from government websites to social media

How to get data: from FOI requests to scraping without coding

### **Data Analysis & Interpretation**

Interview the data to identify its quality

Clean the data with Excel & Open Refine

Explore trends, patterns and relationships behind datasets

### **Data Visualization**

Visual basis: elements, composition and principles

Effective and high impact ways of visualizing data

Tools to make your own visualizations: info graphic, timeline, interactive map, and more

### **Storytelling with Data**

Telling compelling stories with data and visuals

Best practices for combining shoe leather reporting with data

Constructing narratives from qualitative and quantitative sources

### **Assessment Criteria**

Mid-Term        25Marks

Quizzes        15Marks

Assignment        20Marks

Final Term        40Marks

### **Suggested Readings**

1. Jonathan Gray, Lucy Chambers (2017). *The Data Journalism Handbook: How Journalists Can Use Data to Improve the News*. New York: Amazon
2. Martin & Toseland, (2012). *Infographica: The World as You Have Never Seen It Before*. Amazon. UK.
3. Chambers, Bounegru (20015). *The Data Journalism Handbook: How Journalists Can Use Data to Improve the News* 1st Edition. Riley Media Inn: California

**3D Animation - 3 Credit Hrs.**

**Course Description**

Animation is a process of making illusion of motion and change by means of rapid display of static images that minimally differ from each other, Animation can be recorded with either analogue media, a flip book, motion picture film, video tape or digital media, animated GIF, flash animation. This beginning animation course exposes students to the range of traditional and digital techniques used in stop-motion, Claymation, 2-D or 3-D computer animation. Students learn basic theory and mechanics behind animation develop observational and drawing skills and study the fundamental principles of character design, layout and storyboarding.

**Topics Covered / Weekly Lecture Schedule:**

- Week 1 Introduction to the Course. Concepts of 2d Animation and 3d Animation. The making of a short-animated film.
- Week 2 Basic animation mechanics, 12 Principles of animation, Squash & Stretch, and flip book exercise
- Week 3 Introduction to Traditional Animation. Adobe Animate CC.
- Week 4 How to create 2D Character Animation, fine-tune its movements in Adobe Animate CC, key framing and overlap techniques while creating a short animation project
- Week 5 Observational and drawing skills, fundamental principles of character design, layout and storyboarding in this class.
- Week 6 Storyboards are created for each animated character and a rough version of the animation is put together.
- Week 7 Importing Assets from adobe stock and publish to variety of formats
- Week 8 Pre-production Midterm project
- Week 9 Mid term
- Week 10 Introduction to After Effects
- Week 11 Key Framing, Rendering
- Week 12 Draw with vector and pattern brushes in your animations
- Week 13 Final Project
- Week 14 Final Project
- Week 15 Project finalization and Review.
- Week 16 Project Evaluation, Final Term.

**Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Project	40Marks

**Note**

Final project will be evaluated by Committee consists of relevant teacher, Head of Department and experts from Industry.

### Suggested Books

Justin Slick (2016). 3D Computer Animation Books - Theory and Practice. Amezon.com UK

Richard William (2016). The Animator's Survival Kit. Pluto, London.

### Programme Production - 3-Credit hrs

#### Objectives

After studying this course, students will be able to:

1. Explain about the equipment and the production techniques of Television.
2. Discuss various genres of TV programs production.
3. Elaborate various elements of the program production.

#### Course Details

##### **Introduction**

1. Scripted and Unscripted entertainment
2. Dramatic television series
3. Comedy-drama
4. Serial drama
5. Science-fiction
6. Soap operas
7. Television comedy
8. Talk shows
9. Reality television
10. Game shows

##### **Program Production Elements**

1. Camera
2. Lighting
3. Audio
4. Videotape Recording
5. Postproduction Editing
6. Special Effects

##### **Production Planning**

1. Program Idea
2. Production models
3. Writing the program proposal
4. Preparing budget
5. Presenting the proposal
6. Writing the script

##### **Directing and Producing**

1. Role of Directors
2. Preproduction Activities
3. Visualization and Sequencing
4. Script analysis

### **Program Production**

1. Pre-production
2. Principal photography
3. Post production

### **Production People**

1. Technical personal and Crew
2. Television Talent
3. The Director
4. Performer and Camera
5. Performer and Audio
6. Actor and the post editing

### **Programs Genres**

1. Magazine programs

2. Chat shows

3. News programs

4. Documentary

5. Current affairs

6. Sitcoms

7. Quiz Show

8. Reality shows

9. Drams

10. Tele Film

11. Commercial films

### **Assessment Criteria**

Mid-Term            25Marks

Quizzes            15Marks

Assignment        20Marks

Final Project      40Marks

### **Note**

Final project will be evaluated by Committee consists of relevant teacher, Head of Department and experts from Industry.

### **Suggested reading**

David Trottier (2009). The Screenwriter's Bible: A Complete Guide to Writing, Formatting, and Selling Your Script. Amazon, New York.

Patricia Holland (2007). The Television Handbook. Routledge, London.

Syd Field (2008). The Foundation of Screen Writing. Bantam Del. New York.

Richard A. B. (2001). Television and Script Writing: From Concept to Contract. Butterworth Heinemann, Woburn.

### **Television and Society - 3-Credit course**

#### **Objectives**

This course is based on analysis of the mass media effects on society. This course provides a crucial overview of the relationship between media and society. In general, the course will

interpret and analyse the different roles of media, specifically, the relationship between media, power and politics and the impact of media upon cultural identities.

After studying this course, the students will be able to analysis the role, uses, effects, sociology and global perspectives of mass media in a mass modern society.

### **Course Contents**

#### **Television and Society: General Perspectives**

1. Communication and Society
2. The effects of technology in changing social values

#### **Television and Post-Modernism**

1. The Concept of Post-modernism
2. Historical Perspective
3. Post modernism and Post Structuralism
4. Post-Modernism and the Mass Media

#### **Television and Globalization**

1. Functions of media in the modern society
2. The concept of International Communication
3. Globalization and media firms
4. Global media Flow
5. Global media effects

#### **Sociology of Mass Media**

1. Concept of Media Sociology
2. The Sociology of media Production
3. Commercialism and professionalism
4. Mass Media and conglomerates

#### **Communication values: Democracy, Freedom and Responsibility**

1. Democratic communication
2. Freedom of Communication
3. Journalistic responsibilities

#### **Communication issues in the Mass Society**

1. People's right to know
2. Public access to the media
3. Mass Media and the public trust
4. Media-government Relationship

#### **Controlling Mass media: Institutions and Regulators**

1. Relationship between commercial media and regulators
2. Media regulating authorities
3. Major laws for regulating the media
4. Media ethics

#### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended Books**

1. Joseph , Dominic (2002) Mass Media Research 5<sup>th</sup> ed., Wadsworth Publishing Company, Belmont, California.
2. Robert C. and Allen (2004) The Television Studies Reader, Routledge, London.
3. Baran, Stanley (2004) Introduction to Mass Communication, Mc Graw Hill, New York, US.
4. Babbie Earl (1991) the practice of Social Research 4<sup>th</sup> ed. Wadsworth Publishing Co. California.
5. Dennis Everette, Marshall John (2000) Media Debates (2<sup>nd</sup> ed.) Longman Publisher, NY USA.
6. Werner J. Severin & James W. Tankard, Jr. ( 2002) Communication Theories: Origins, And Uses in the Mass Media, (4th ed.), Longman Group Ltd. London
7. Mac Quill (2000) theories of Communication, 2<sup>nd</sup> ed., Longman group ltd. London.
8. Chaffee, Steven H. (1999) Mass Communication Uses and Effects, Mac Grow Hill, New York.
9. Philip Rayner (2002) Mass Media Studies: An Essential Introduction Routledge, New York.
10. Shoemaker, Reese (2001) Mediating the Message, Theories of Influences on Media content, National book Foundation, Islamabad, Pakistan.

### **TV Studio and Floor Management - 3-Credit hrs**

#### **Objective**

After studying this course, students will be able to:

1. Explain television studio and its operation.
2. Discuss equipment use in TV studio for program production.
3. Explain job requirements of different people working in the studio.

#### **Course Details**

##### **The Television Studio**

1. Physical layout
2. Major Installations
3. Studio floor
4. Studio gallery
5. Studio ceiling
6. Cycloramas
7. Lighting grid

##### **The Studio Control Room**

1. Program Control
2. Image Control Unit
3. Audio Control      Unit
4. Lighting Control Unit
5. Program Input
6. Program Storage
7. Program Retrieval

##### **Prompter, Graphing and Tape**

1. Prompter
2. Graphic overview
3. Digital Video Effects

4. Keying
5. Tape
6. Live Shop, Microwaves, satellite Remotes

**Studio Floor**

1. Camera pedestals
2. Camera Commands
3. Micro Phone
4. Light rig
5. Video monitor
6. Public Address for Communication

**Studio Floor Manager Job**

1. Checking equipment, e.g. microphones and earpieces, are working before the show;
2. Seating the audience (if in attendance);
3. Relaying instructions from the control room to the studio floor;
4. Keeping the director and producer informed of action off-camera;
5. Assisting in the planning and preparation of productions;
6. Overseeing the work of other departments, such as lighting and props; rehearsing
7. Giving cues and time counts to presenters, actors or guests;
8. Organizing runners to make the best use of studio time;
9. Looking ahead in the programme schedule to anticipate any changes to the set or to see what props are required
10. Briefing and looking after those involved in the programme;
11. Managing the audience, explaining safety requirements, show timings and explaining what will happen during
12. Filming and when the program will be aired
13. referring to floor plans
14. Controlling the studio and halting production if necessary
15. Adhering to health and safety regulations, e.g. keeping 'safe areas' and fire exits clear of equipment.

**Studio Support Areas**

1. Scenery and Properties
2. Makeup and Dressing Rooms
3. Stores

**Studio Team**

1. The Vision Mixer
2. The Production Assistant
3. Floor Manager
4. Sound director
5. Producer
6. The Station Manager
7. The News Director
8. The Production Department
9. The Engineering Department
10. The Sales Department and others

**Assessment Criteria**

Mid-Term	25 Marks
Quizzes	15 Marks

Assignment	20 Marks
Final Term	40 Marks

### **Recommended Books**

- Patricia Holland (2007). The Television Handbook. Routledge, London.  
Steve R. Cartwright (2003) Pre – Production Planning of Video Film and Multimedia, Focal Press, Oxford.

### **TV NEWS PRODUCTION AND PRESENTATION - 3-Credit hrs**

#### **Objectives**

After studying this unit, students will be able to:

1. Explain conceptual and technical aspects of TV news production.
2. Write and compile news for television.

#### **Course Details**

#### **Concept of TV News**

1. Defining TV News
2. Features of TV News
3. Sources of TV News
4. How to find a story

#### **Reporting Live TV News**

1. Organizing thoughts
2. Ad-Libbing
3. On Camera Reporting
4. The Challenge of Electronic news gathering
5. Memorizing and delivering live reports
6. Changing lenses shots

#### **Planning a Bulletin**

1. Drafting for T.V
2. Different Kinds of Visuals
3. Visual Editing

#### **Production of Bulletin**

1. Techniques of Write for picture
2. Use sound bites
3. Voice over
4. Combining words and pictures
5. Video instructions
6. Sound and Tape
7. Headlines and teases
8. Breaking News

#### **Newscaster**

1. Role and Requisites
2. Credibility
3. Presentation of News Bulletin
4. Pronunciation
5. Dialects
6. Pacing
7. Marking copy

### **Current Affairs Programs**

1. Different Types of Current Affairs Programmes
2. Producing and presentation
3. Sources of information

### **Duties of news producer**

1. Preparation of news
2. Preparation of special report
3. The Producer's Role in the Newsroom

### **TV News Writing Style**

1. Conversational style
2. Contraction
3. Avoid Information Overloaded
4. Alimenting long words and clichés
5. Good Grammar
6. Use present tense
7. Attribution
8. Using Quotes
9. Use five Ws and one H
10. Use various leads styles
11. Story Ideas and News Value

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended Books**

- Patricia Holland (2002) The television handbook. Routledge, London.
- Steve R. Cartwright (2003) Pre – Production Planning of Video Film and Multimedia, , Focal Press, Oxford.
- Steve R. Cartwright (1996) Training with Video. Knowledge Industry Publications, New York,
- Ivory (2001) Basic Television Reporting. Focal Press, London.
- Finberg and Bruce D. Little (2002). Visual Editing. Wadsworth, Belmont.
- Charles F.Cremer (2006) ENG Television News. 3rd Ed. McGraw Hill, New York.
- Shahida Kazi (1999).Television Journalism, Dynya-e-Adab, Karachi.

### **Television Commercial (TVC) - 3-Credit Course**

#### **Course Description**

The television commercial (TVC) is a significant screen industry activity that is used to promote products, services ideas and brand identities. TVC producers draw upon ideas and techniques from all genres of film and video making and often seek to turn social values and trends to the benefit of their corporate clients. The unit aims to provide students with experience of design and production in this short format, within the discipline of client briefs and tight schedules.

#### **Aims of the Course**

The purpose of this unit is to:

1. Provide students with experience in television commercial production. Promote critical analysis of television advertising and better understanding of its social, political and

cultural function. Develop student's understanding of the television advertising industry

### **Learning objectives**

On completion of this unit you should be able to:

1. Research and develop a project brief
2. Produce a short format video, television commercial
3. Work to client briefs
4. Work to tight schedules
5. Negotiate with clients and team members
6. Critically analyze television commercials

### **Topics to be covered**

1. The TVC form
2. Genres including social advocacy and community service announcements
3. The structure of the television advertising industry, its client base, professions and
4. Creative teams.
5. TVC writing Skills
6. Techniques of propaganda and persuasion in the short form.
7. Story Boarding
8. The design and creation of multi-layer messages and meaning in audio-visual media
9. Creating, and working creatively to, a tightly specified, research-based brief
10. Writing, producing and directing short format film and video to a budget and a time-line
- 11.** The production process: development, pre-production, production, post production etc.

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Project	40Marks

### **Note**

Final project will be evaluated by Committee consists of relevant teacher, Head of Department and experts from Industry.

### **Suggested Books**

Elin, Larry; Lapidès, Alan (2003) Designing and Producing the Television Commercial, Published by Pearson

Bordwell, D & Thompson, K (2004), Film art: an introduction, 7th edn. New York: McGraw Hill.

### **3-Credit hrs - TV Set Designing**

### **Objective**

After studying this course, students will be able to:

1. Explain requirements of set designing for a TV program
2. Elaborate staging techniques and requirement.
3. Arrange set design for TV program as required.

### Course Details

#### **Concept of Set Designing**

1. Basic Concept
2. Illusion of Reality
3. Designer craftsmanship
4. The Setting
5. Set Making

#### **Production Techniques and the designer**

1. Camera Requirements
2. Program purpose
3. Economic
4. Studio space

#### **Design Organization**

1. Design Preliminaries
2. Sources of Inspiration
3. Planning
4. Production Condition
5. Construction
6. Elevation
7. Graphics
8. Lighting the Setting
9. Camera Rehearsal

#### **Staging Techniques**

1. Traditional Methods
2. Basic Form of Staging
3. Area Staging
4. Kinds of Staging
5. Basic Stylistic Approach

#### **Stage and Scenic background**

1. Plain tone
2. Cameo Staging
3. Limbo Staging
4. Electronically inserted tones
5. Contrast
6. Vertical Shading
7. Dappled Background
8. Background light pattern

#### **Electronic Reality**

1. Artifice and Art

2. Using electronic effects
3. Source selection
4. Croma effects (Overlay)
5. Luminance
6. Practical problems

### **Scenic Operation**

1. The Studio
2. Wall Flat form
3. Studio Wall
4. Studio Floor
5. Fastening material
  - a. Stage Brace
  - b. Jacks
  - c. Rope and Knots
6. Disguising the joins

### **Lighting and the Stage**

1. Lighting the scene
2. Lighting aims
3. Tone, form and texture
4. Surface couture
5. Light fitting

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended Books**

- Patricia Holland (2002). The Television Handbook. Routledge, London.
- Steve R. C. (2003). Pre – Production Planning of Video Film and Multimedia. Oxford Press.
- Richard, J. (1996). Training with Video. Knowledge Industry Publications, New York,
- Finberg and Little (2002). Visual Editing. Wadsworth, Belmont. London.

## **3-Credit hrs - TV Studio and Floor Management**

### **Objective**

After studying this course, students will be able to:

1. Explain television studio and its operation.
2. Discuss equipment use in TV studio for program production.
3. Explain job requirements of different people working in the studio.

### **Course Details**

#### **The Television Studio**

1. Physical layout
2. Major Installations
3. Studio floor
4. Studio gallery
5. Studio ceiling
6. Cycloramas

7. Lighting grid

### **The Studio Control Room**

1. Program Control
2. Image Control Unit
3. Audio Control Unit
4. Lighting Control Unit
5. Program Input
6. Program Storage
7. Program Retrieval

### **Prompter, Graphing and Tape**

8. Prompter
9. Graphic overview
10. Digital Video Effects
11. Keying
12. Tape
13. Live Shop, Microwaves, satellite Remotes

### **Studio Floor**

14. Camera pedestals
15. Camera Commands
16. Micro Phone
17. Light rig
18. Video monitor
19. Public Address for Communication

### **Studio Floor Manager Job**

20. Checking equipment, e.g. microphones and earpieces, are working before the show;
21. Seating the audience (if in attendance);
22. Relaying instructions from the control room to the studio floor;
23. Keeping the director and producer informed of action off-camera;
24. Assisting in the planning and preparation of productions;
25. Overseeing the work of other departments, such as lighting and props; rehearsing
26. Giving cues and time counts to presenters, actors or guests;
27. Organizing runners to make the best use of studio time;
28. Looking ahead in the programme schedule to anticipate any changes to the set or to see what props are required
29. Briefing and looking after those involved in the programme;
30. Managing the audience, explaining safety requirements, show timings and explaining what will happen during
31. Filming and when the program will be aired
32. referring to floor plans
33. Controlling the studio and halting production if necessary
34. Adhering to health and safety regulations, e.g. keeping 'safe areas' and fire exits clear of equipment.

### **Studio Support Areas**

35. Scenery and Properties
36. Makeup and Dressing Rooms

37. Stores

**Studio Team**

38. The Vision Mixer
39. The Production Assistant
40. Floor Manager
41. Sound director
42. Producer
43. The Station Manager
44. The News Director
45. The Production Department
46. The Engineering Department
47. The Sales Department and others

**Assessment Criteria**

Mid-Term	25 Marks
Quizzes	15 Marks
Assignment	20 Marks
Final Term	40 Marks

**Recommended Books**

- Patricia Holland (2007). The Television Handbook. Routledge, London.  
Steve R. Cartwright (2003) Pre – Production Planning of Video Film and Multimedia, Focal Press, Oxford.

**3-Credit hrs - Documentary Production**

**Course Objectives:**

After studying this course, the students will be able to explain the concept of documentary and discuss its various kinds as well as the technical aspects. The student will also be able to produce documentary on professional line.

**Course Details**

**Introduction to Documentary**

1. Defining Documentary
2. Historical Background
3. Evolution of Documentary
4. Documentary Genre
5. Aesthetics and Authorship

**The elements of documentary**

1. Research
2. Writing Proposals
3. Pitching
4. Budgeting
5. Shooting
6. Post Production
7. Distribution channels

**The Documentary Genre**

1. Truth and Reality

2. Social Commentary Docs
3. Nature Docs
4. Political Docs
5. Art and Performance Docs

### **Model of Documentary**

1. Expository modes
2. Observational modes
3. Participatory modes
4. Reflexive modes
5. Per formative documentary
6. Ethics and aesthetics in documentary

### **The Production**

1. Pre-Production and Idea Development
2. Preparing to shoot
3. Directing the Interview
4. On location
5. working with others
6. organizing the mess logs
7. Production Techniques

### **The Construction and Narrative of Character**

1. The character tells his story
2. The character acts
3. Other individuals talk about the character
4. An omniscient narrator
5. The choral character
6. The character and environment
7. Organization of the event in temporal terms
8. The chronological approach
9. Re-structuring time
10. Lack of temporal structure
11. Ideological montage and the use of a metaphorical idiom

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Project	40Marks

### **Note**

Final project will be evaluated by Committee consists of relevant teacher, Head of Department and experts from Industry.

### **REQUIRED READING:**

Stella Bruzzi (2010). The event, Archive and newsreel from, New Documentary: a Critical Introduction, Rutledge: London, New York.

Patricia Zimmermann (2009). Pirates of the New World Image Orders in States of Emergency: Documentaries, Wars, Democracies. University of Minnesota Press Minneapolis.

Bill, N. (2001). Introduction to Documentary. Bloomington, Indiana University Press.

## DRAMA PRODUCTION - 3 Credit hrs

### Course Objectives:

After Studying this course, students will be able to:

1. Articulate closely with Production, pre and post production and to prepare students to produce quality drama production for the current Television market
2. Develop students' understanding of crew roles and processes involved in the production of a drama in accordance with TV industry practices
3. Provide practical experience in the directing of actors
4. Equip students with innovative creative skills in TV Drama Production
5. Learn production crafts and gain a detailed knowledge of the drama aesthetics
6. Learn to lead production team
7. Expose to the various styles of drama and practice, all the necessary steps to produce drama
8. Deep understanding of casting, budgeting, research, performance and production management

### Course Details

#### Unit No. 1

##### History and Origin of Drama

1. Historical development of drama
2. Theatrical resemblance with TV Drama
3. Greek Theatre – origin of drama
4. Overview of drama Production

#### Unit No. 2

##### Drama Production Process

1. What is drama?
2. The television production process
3. Production crew- Functions and skills
4. Key Crew Roles: The Producer, Director, Writer, Cameraman, Film Editor
5. Production Models

#### Unit No. 3

##### Understanding TV Drama

1. Features of the TV drama
2. Types of TV Drama
3. Current Dynamics - Genres
4. Basic Dramatic Structures

#### Unit No. 4

##### Story Telling Techniques

1. The art of story telling
2. Selection of stories
3. Stories containing dramatic elements
4. Dramaturgy of the screen
5. The art of converting a story into a dramatic script

#### Unit No. 4

##### Story Telling Techniques

1. The art of story telling
2. Selection of stories

3. Stories containing dramatic elements
4. Dramaturgy of the screen
5. The art of converting a story into a dramatic script

#### **Unit No. 5**

##### **Drama Production Management**

1. Auditioning and selection criteria of team
2. Acting methods
3. Directing Actors
4. Budgeting
5. Selection of Location
6. Designing sets
7. Logistics involved in actual shooting
8. Essential Guide to Planning a Drama Shoot

#### **Unit No. 6**

##### **Visualization – Visual Communication**

1. TV being a visual medium
2. Scene & Shot Division
3. Mise en scène; the arrangement of different elements of narratives in a scene
4. Importance of Ambiance
5. Visual language: angles science

#### **Unit No. 7**

##### **Drama Production: Techniques & Aesthetics**

1. Dramatic Composition
2. Production design
3. Sound effects in TV drama
4. Drama Production styles

#### **Unit No. 8**

##### **The Stylistic Dynamics of TV Drama**

1. TV Drama Production - Single Camera Techniques
2. TV Drama Production - Format
3. Types of TV Drama - one-off single drama, mini-series, serial, series and soap
4. Producing and directing
5. Lighting & Camera Techniques: Different from other genres

#### **Unit No. 9**

##### **Dramatic Post Production**

1. Dramatic editing and pace
2. Background music
3. Credits and show packaging
4. Production of promotional elements
5. Setting the stage for dialogue
6. Editing & Completion
7. Introduction to VFX Producing
8. Pitching Drama

##### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks

Assignment	20Marks
Final Project	40Marks

**Note**

Final project will be evaluated by Committee consists of relevant teacher, Head of Department and experts from Industry.

**Recommended Books and Readings**

- Cinematography by Brain Brown
- The Five C's of Cinematography by Joseph V. Mascelli
- Cinematic Storytelling by Jennifer Van Sijll
- Sound for Film and Television by Tomlinson Holman
- Theatre and Everyday Life: An Ethics of Performance
- A Hand Book of TV Production by Herbert Zettle

**3-Credit Hours - Television and Globalization**

**Course objectives**

This course will enable students to discuss the role of television in the context of globalization.

**Course Content**

**The Historical Context of International Communication**

1. Communication and Empire
2. The Growth of the Telegraph
3. The Era of News Agencies
4. The Advent of Popular Media
5. Radio and International Communication
6. The Cold War-from Communist Propaganda to Capitalist Persuasion
7. The Demand for a New World Information and Communication Order

**Approaches to Theorizing International Communication**

1. Free Flow of Information and New Information world order
2. Modernization Theory
3. Dependency Theory
4. Structural Imperialism
5. Media Hegemony
6. The Public Sphere
7. Cultural Studies Perspective on International Communication
8. Theories of Information Society
9. A Critical-Political Economy for the Twenty-first Century

**Creating a Global Communication Infrastructure**

1. The Privatization of Telecommunication
2. Free Trade in Communication
3. Liberalization of the Telecom Sector
4. Key Players in the Global Satellite Industry
5. The World of Telecommunications
6. Implications of a Liberalized Global Communication Regime

### **The Global Media Market Place**

1. Convergence
2. Global Trade in Media Products
3. Global News and Information networks
4. Setting the Global News Agenda

### **Communication and Cultural Globalization**

1. Globalization of Western Culture
2. Concerns for Global Diversity
3. Global English
4. Regionalization and Localization in the Media

### **Communication Flow in Global Media**

1. Seeing the Big World on a Small Screen
2. Global Culture's Discontents
3. Global Counter flow of Television
4. Media Exports from the South to the North

### **International Communication in the Internet Age**

1. The Dawn of the Internet Age
2. From the 'Free Flow of Information' to 'Free Flow of Commerce'
3. Internet as a Political Tool
4. The Global Digital Divide
5. International Communication- Continuity and Change

### **Major World Media organizations**

1. CNN, BBC, FOX TV
2. VOICE of America
3. Reuters, APA, Others

### **Mass Media and Clash of Civilization**

1. Role of media in Conflict Resolution
2. Clash of civilization
3. Concept of War and Peace Journalism

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended books**

1. McLuhan, Marshal (2004). Medium is the Massage. 2nd ed. Longman Publication. New York.
2. John Gultang (2004). Postmodern media and its effects on media and society. Roulade. Pittsburg.
3. Lynch. Jake (2005). Mass Media and Globalization. McGraw Hill. Sydney.
4. Media in Global Context: A Reader edited by Sreberny-Mohammadi, Annabelle; Winseck, Dwayne; McKenna, Jim & Boyd-Barrett, Oliver (London: Arnold, 1997)
5. CJ Hamelink (2005). Cultural Autonomy in Global Communications: Planning National Information Policy. Addison-Wesley Longman.

## **POST PRODUCTION -3 Credit hrs**

### **Course Objectives:**

After Studying this course, students will be able to:

- a. The process of editing, segments of motion video footage, special effects and sound recordings.
- b. Understand the non-linear and linear editing system
- c. The aesthetics of non-fictional and fictional elements in the editing
- d. Understand visual communication through organizing / editing.
- e. Learn visual art and editing grammar.
- f. Develop students' understanding of sound mixing during post production process
- g. Provide practical experience in the post production art
- h. Equip students with innovative creative skills of editing different genres
- i. Expose to the various styles of editing and graphical presentation

### **COURSE DETAILS**

#### **Unit No. 1**

##### **Introduction to Non-linear video editing software**

1. Premiere Elements (Windows)
2. Premiere Pro CC (Windows, Mac OS X)
3. Encore (Windows, Mac OS X)
4. Final Cut Pro (Mac OS X)
5. iMovie (Mac OS X)
6. Avid Technology
7. Media Composer (Windows, Mac OS X)

#### **Unit No. 2**

##### **Graphics and Animation Software**

1. Adobe Photoshop
2. Illustrator
3. Aftereffects

#### **Unit No. 3**

##### **Video Editing**

Understand the development and principles of editing

Footage Ingesting / capturing

Editing process

Synchronization of narration and sounds

Synchronizing of rushes

#### **Unit No. 4**

Grammar of different transitions

Music Mixing

Mix soundtracks: volume, loudness, pitch, and timbre

Overlap sound; inter-cut; pace effectively

Adding Special Effects

#### **Unit No. 5**

Color Correction

Creating titles

Designing and creating CG for News and talk shows

Text superimposition and subtitling

**Unit No. 6**

**Classic techniques for connecting shots**

Graphic match, rhythm, movement, and spatial relation

Experimental techniques that break the rules of continuity editing

Different techniques manipulating time, through rhythm, motion, and effects

**Unit No. 7**

In-camera editing

Visual Sequencing

Manipulation of time and space

Storytelling through visuals

**Unit No. 8**

**Techniques**

Continuity in editing

Jump-cutting

Montage creation

Crosscutting

Cutaways utilization in story

**Unit No. 9**

Fiction and non-fiction techniques

Online and offline editing

Cutting on action

Creating juxtapositions

File compression and formats for output

**Recommended Books and Readings**

A Hand Book of TV Production by Herbert Zettl

Sight, Sound and Motion by Herbert Zettl

TV Production by Gerald Millerson

**Assessment Criteria**

Mid-Term        25Marks

Quizzes        15Marks

Assignment        20Marks

Final Project        40Marks

**Note**

Final project will be evaluated by Committee consists of relevant teacher, Head of Department and experts from Industry.

**TV Sound System - 3-Credit hrs**

**Objective**

After studying this course, students will be able to:

1. Explain requirements of sound for TV program
2. Elaborate features of microphones and their operation.

**Course Details**

**Characteristics of Microphones**

1. Sound-Generation Elements
2. Pickup Patterns
3. Special Microphone features

**Operational of Microphones**

1. Lavalier Microphones
2. Hand Microphones
3. Boom Microphones
4. Headset Microphones
5. Wireless Microphones
6. Desk Microphones
7. Stand Microphones
8. Hanging Microphones
9. Hidden Microphones
10. Long-distance Microphones

**Sound-Generating Elements**

1. Dynamic Microphones
2. Condenser Microphones
3. Ribbon Microphones
4. Sound Quality

**Microphone Features**

1. Impedance
2. Frequency Response
3. Balanced and Unbalanced
4. Mics
5. Cables
6. Connectors

**Sound Controls**

1. Audio console
2. Audio-Recording Systems
3. Analogue Recording Systems
4. Digital Recording Systems

**Audio Operation**

1. Audio System calibration
2. Volume Control
3. Live Studio Mixing
4. Live Field Mixing

**Audio postproduction activities**

1. Analogue and digital Sound Editing
2. Correcting Audio Problems
3. Postproduction Mixing
4. Controlling Sound Quality

**Sound Aesthetics**

1. Environment
2. Figure-ground
3. Perspective
4. Continuity
5. Energy

**Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks

Assignment 20Marks

Final Term 40Marks

### **Recommended Books**

Patricia Holland (2002). The television handbook. Routledge, London.

Steve R. C. (2003). Pre – Production Planning of Video Film and Multimedia. Focal Press, Oxford.

Richard, J. (1996). Training with Video. Knowledge Industry Publications, New York.

Finberg and Little (2002). Visual Editing. Wadsworth, Belmont. London.

### **Research Methods in Mass Communication - 3-Credit hrs**

#### **Objectives:**

To give students an insight of the methods and techniques of scientific research, enabling them to investigate media phenomena properly

#### **Course Content**

##### **Scientific Method of Inquiry**

1. Research and scientific methods
2. Characteristics of the scientific methods.
3. Procedures used in scientific method.

##### **Steps in Research Process**

1. Selecting a research topic
2. Determining topic relevance
3. Reviewing Literature
4. Stating a hypothesis or research question
5. Research design
6. Collecting data
7. Analyzing and interpreting data
8. Presenting results

##### **Elements of Research Process**

1. Concepts and constructs
2. Variables
3. Measurement & Scales

##### **Sampling Methods**

1. Population and sample
2. Probability and non-probability samples
3. Sample size
4. Kinds of Sampling techniques

##### **Kinds of Research**

1. Qualitative and Quantitative Research
2. Basic and Applied Research
3. Historical Research
4. Descriptive Research
5. Correlational Research
6. Experimental Research

##### **Survey Research**

1. The nature of survey research
2. Selecting a sample in surveys
3. Designing a survey questionnaire

4. Administering questionnaire
5. Analyzing survey results

### **Content Analysis Research**

1. The nature of Content Analysis
2. Uses of content analysis
3. Steps in content analysis
4. Limitation of contents analysis

### **Use of Statistics in Research**

1. Descriptive statistics
2. Inferential statistics
3. The logic of hypothesis testing
4. Statistical tests for significance of difference
5. Statistical tests of relationships

### **Research Reporting and Ethics**

1. Research reports: mechanics and writing styles
2. Research ethics: general principles
3. Ethics in data analysis and reporting
4. Rules of references, indexing, footnoting
5. The use of SPSS, Excel, PowerPoint for data analysis and presentation of graphics, tables and figures.

### **Assessment Criteria**

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### **Recommended Books**

1. Joseph and Dominic (1999) Mass Media Research 4<sup>th</sup> ed., Wadsworth Publishing Company, Belmont, California.
2. Babbie, Earl (1992), The Practice of Social Research, (6th ed.), , Wadsworth Publishing Company, Belmont, California.
3. Mary John Smith (2000) Contemporary Communication Research Methods, Wadsworth Publishing Co. California
4. Kerlinger (1987) Foundation of Behavioral Research 3<sup>rd</sup> ed. Holt, Rinehart Inc. Florida.
5. R.L.Gay (1992) Research Methods in Education, Princeton publishing co. New York.

## **Comparing Media Systems - 3 Credit Hrs**

**Objective:** The course will familiarize students with the comparative approach to global and regional media systems and enable them to question existing theories about media systems based on nation states and Western models of governance while linking them to issues of South Asian media systems.

### **Outline:**

It involves reading key literature, understanding relevant theoretical and epistemological issues, and grasping some basic concepts. The course will discuss a number of issues such as

the taxonomies developed in and about North America and Europe and how helpful they are or could be in understanding media systems and institutions in other parts of the world, particularly in the post-colonial South Asia and the Middle East. Different kind of challenges faced by researchers while using nation-states as units of analysis will also be discussed. The course is aimed at raising a number of questions such as how do new media like the Internet and mobile devices impact comparative media research? How does the emergence of regional, multi-national, sometimes language-based media spheres challenge the comparative systems approach? Globalisation as a framework for global communication theory and research and what are its impacts on the comparative systems approach will also be analysed by the course.

Apart from discussing major media systems in Europe and North America, students will be also introduced to theoretical and taxonomical works about media in the Middle East, China, Russia and the post-Soviet East Europe. These media systems will be compared between each other and explored the extent to which they fit into or require a modification. In the later part of the course, students will be introduced to the post-colonial era media systems in South Asia (Pakistan, India, Bangladesh) and other important regional countries such as Afghanistan and Iran.

### **Required Readings**

Hallin, D. & Mancini, P. (2004). *Comparing Media Systems: Three Models of Media and Politics*. New York: Cambridge University Press.

Downing, John (1996). *Internationalizing Media Theory: Reflections on Media in Russia, Poland, and Hungary, 1980-95*. London: Sage.

Curtin, M. (2007). *Playing to the World's Biggest Audience: The Globalization of Chinese Film and Television*. Berkeley: University of California Press.

Rugh, William (2004). *Arab Mass Media: Newspapers, Radio, and Television in Arab Politics*. Westport, CT: Praeger.

Wagstaff, Jeremy (2010). South Asian Media: Patterns of Production and Consumption. Open Society Foundation. <https://www.opensocietyfoundations.org/sites/default/files/production-consumption-20100212.pdf>

Sehresh, Mushtaq & Baiq, Fawad (2016). Indian Media System: An application of comparative media approach.

[http://pu.edu.pk/images/journal/csas/PDF/4\\_31\\_2\\_16.pdf](http://pu.edu.pk/images/journal/csas/PDF/4_31_2_16.pdf)

## **SOCIAL PSYCHOLOGY -3 Credit Hrs**

### **Objective**

This course has been designed to orient the students about the use and importance of social psychology in mass communication specifically in formulating public opinion. The course is focus on playing with people's emotion, and propaganda. The course will help understand the student for various theories used in the media studies particularly, the theories about people perception attitude, and behaviour.

## Course Contents

### Introduction to Social Psychology

1. Definition of Social Psychology
2. Major Socio-Psychological Theories:
3. Theory of Personality. Psychoanalytic Theory
4. Social Learning Theory and Media. Cognitive Theory and Media

### Self and Socialization.

1. Definitions of the Self
2. The Symbolic Interaction and Behavioural Views
3. Application of these theories in media science

### Social Influence and Social Role.

1. Norms and Social Influence
2. Conformity
3. Independence Versus Conformity. The Development of Concept "Role"
4. Social Role as a Process
5. Sex Role. 7. Application of these theories in media science

### Attitude and Attitude Change

1. Definition and Measurement of Attitudes
2. Attitude Organization. Attitude and Behaviour
3. Attitude Change: Consistency and Social Learning Theories
4. Characteristics of the Source, the Message, and the Audience in Attitude Change
5. Application of these theories in media science

### Collective Behaviour

1. Introduction to Collective Behaviour
2. Studying Collective Behaviour. Types and Examples
3. Theoretical Approaches to the Study of Collective Behaviour
4. Social Movements. Collective Behaviour and Social Change
5. Application of these theories in media science

### Assessment Criteria

Mid-Term	25Marks
Quizzes	15Marks
Assignment	20Marks
Final Term	40Marks

### Suggested Readings

1. Stan L. Albrecht, Darwin L. Thomas and Bruce A. Chadwick, Social Psychology (1980), Prentice-Hill, Inc., Englewood Cliffs, N.J.07632.
2. Joseph and Dominic (2014). Introduction to Mass Communication, McGraw Hill: New York.
3. James A. Schellenberg, And Introduction to Social Phychology (1974), Roman House, New York.

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### Media Semiotics - 3 Credit Hrs

**Objective:** The course is aimed at giving students an overview of the semiotic analysis of media with an emphasis on (visual) multimedia communication and to provide them with an elementary theoretical background apart from some more specific analytical tools in the field.

**Outline:**

While focusing on the semiotic analysis of media, the course puts emphasis on (visual) multimedia communication. Texts are chosen in order to provide an overview of different perspectives within semiotics. Moreover, approaches from sociology of media, art theory, visual studies as well as theory of new(s) media. Introductory overviews as well some classical texts within the field offered by the course will provide students with an elementary theoretical background as well as with more specific analytical tools.

**Readings**

Leeuwen, v. T. (2005). *Introducing Social Semiotics*. New York: Routledge  
<https://pdfs.semanticscholar.org/aca7/c8ffa23c38b05faede391273a4130fc28b4a.pdf>

Bignell, Jonathan (1997): *Media Semiotics: An Introduction*. Manchester: Manchester University Press.

Danesi, Marcel (2002): *Understanding Media Semiotics* London: Arnold

Davis, Howard & Paul Walton (1983): 'Death of a Premier: Consensus and Closure in International News'. In Howard Davis & Paul Walton (Eds.), *Language, Image, Media*. Oxford: Basil Blackwell, pp. 8-49

Withalm, Gloria (2004). Media Semiotics: An overview. Paper presented at the conference "Media Semiotics Today – Mediensemiotik heute". 9th Austrian-Hungarian Semio-Philosophical Colloquium / 9. Österreichisch-Ungarisches Semio-Philosophisches Kolloquium, October 30–31, 2004, Dunabogdány, Hungary <http://www.uni-ak.ac.at/culture/withalm/wit-pdfs/Withalm2004-9OeU.pdf>

**International Media Regulations**

**(focus on South Asia & Middle East) -3 Credit Hrs**

**Objective:** This course aims at introducing students to the past and present of global media regulations with focus on Pakistan, India, Bangladesh, Afghanistan and to some degree Iran, UAE, Qatar, and Saudi Arabia as well.

**Outline:**

This course will introduce students to the general history of print and electronic media regulations and how various types of institutional and self-regulations affect news-gathering, editorial policies, the level of various types of censorships and media-government relations in different countries. Students will also be introduced to various state regulatory bodies for print and electronic media (as well as Internet and mobile technologies) in the Middle East and South Asia. This course will enable students to analyse state and self regulation systems and link them to such issues as the freedom of press, journalistic integrity, corporatisation, digitisation and journalistic codes of ethics and professionalisation. Overall, students will be introduced to various theories in the areas of policy, regulation and accountability while also inspiring them to discuss and analyse basic theoretical models of media regulations and a number of specific patterns of media regulations in broadcasting, Internet, telecommunication and cable. Various trends and dynamic forces affecting government and self regulations globally will also come under discussion.

## Readings

- Duff, M. J. (2014). Arab media regulations: identifying restraints on freedom of press in the laws of six Arabian peninsula countries. *Berkeley Journal of Middle Eastern and Islamic Law*. (2)6. <https://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?article=1036&context=jmeil>  
[https://www.ifex.org/asia\\_pacific/2015/05/05/press\\_freedom\\_wpf/](https://www.ifex.org/asia_pacific/2015/05/05/press_freedom_wpf/)  
[https://www.le.ac.uk/oerresources/media/ms7501/mod2unit11/page\\_32.htm](https://www.le.ac.uk/oerresources/media/ms7501/mod2unit11/page_32.htm)  
<http://mediareformlanka.com/media-policy-and-law-south-asia.php>
- Akdeniz, Y., Walker, C. and Wall, D. (eds) (2000). *The Internet, Law and Society*. London: Longman.
- Bertrand, C-J. (ed) (2003). *An Arsenal for Democracy: Media Accountability Systems*. Creskill NJ: Hampton Press.
- Castells, M. (2001). *The Internet Galaxy*. Oxford: Oxford University Press.
- Feintuck, M. (1999). *Media Regulation, Public Interest and the Law*. Edinburgh: University of Edinburgh Press.
- Hallin, D. and Mancini, P. (2004). *Comparing Media Systems*. Cambridge: University of Cambridge Press.

## Introduction to Film Making and Analysis - 3 Credit Hrs

**Objective:** This course will enable students to embark on a cultural and artistic exploration of film genres by critically analysing film as an art form as well as a reflector and instigator of cultural values and how it affects the world around us.

### Outline:

Students will be introduced to basic film vocabulary such as montage, mise-en-scene, narrative, cinematography, sound, editing, etc and explore film within a cultural context specifically in relationship to other media (the novel, theatre, and the visual arts). The course will also enable students to study the aesthetic eye: basic theory regarding the camera's role in shaping the viewer's perception. The course will also examine narration and sequence (storyboard) and analyse the purposes and functions of film: (its aesthetic, socio-political, spiritual, economic, expressive aspects).

## Readings

- Sikov, Ed. (2010). *Film Studies: An introduction*. New York: Columbia University Press.
- Corrigan, T. &, Patricia, W. (2012). *The Film Experience: An introduction* (3rd Ed.) New York: Bedford/St Martin's
- Corrigan, T. &, Patricia W.(2014). *The Film Experience: An Introduction* (3rd Ed.). New York: Bedford/St Martin's

## Electronic News Gathering (ENG) - 3 Credit Hrs

**Objective:** This is a production course that will train students in how to use the hand-held video camera/recorder for Electronic News Gathering (ENG). Students will also learn how to edit video tape, especially for use in broadcast journalism. A brief overview and history of electronic journalism and some issues of controversy will also be discussed in the class.

**Outline:**

The course deals with the following areas of ENG.

- Electronic News Gathering Camera - What it is, how it works, how to handle it and how to take care of it, various types of shots and how to take them.
- Digital Camera: How the Dicam is different from other analog camera, relative advantage and disadvantage.
- Sound Booths and familiarisation with various types of mikes for different situations.
- Thinking in picture and use of story board Location Shooting
- Recce
- Single Camera direction
- Multi Camera direction
- Studio Script
- Studio Practice and Commands Basic Lighting for television Spotting (Logging) using time code

**Readings**

Ascher, S, & Pincus, A. (2011). *The Filmmaker's Handbook: A comprehensive guide for the digital age*. New York: Penguin.

Boyd, A. et al. (2011). *Broadcast Journalism*. Focal Press.

**Writing for the Internet - 3 Credit Hrs**

**Objective:** This course will enable students to manage and write for the Internet pages/websites of various media organisations apart from writing blogs for the social media.

**Outline:**

The course will deal with the following areas

- Emerging trends in information technology and their impact on communication techniques
- Internet as a research tool
- Basic web design with special emphasis on putting text, stills, moving pictures and audio on your web site
- News writing for the websites
- Blogging on social media

**Readings**

Baehr, C., & Schaller, B. (2010). *Writing for the Internet: A guide to real communication in virtual space*. California: Greenwood Press

How to Write a Great Online Copy. <https://www.writers-online.co.uk/how-to-write/the-internet-and-writing-for-the-web/how-to-write-great-online-copy>

Cho, D. J. (2011). *Blogging for passion, profit and to create community*. California: Chronicle Books

### **Music Video Creation (MVC)- 3 Credit Hrs**

**Objective:** This course blends theory and practical training. The main objective of the MVC course is to teach students how to make a music video and how to ensure the music video meets the increasingly high expectations of its audience. The course covers topics ranging from the business of music videos to how to properly shoot one along with lessons in the history, evolution and future trends in the music industry.

#### **Outline:**

The MVC consists of the following three modules.

##### **Module I: Theory & Business of Music Videos**

1. Introduction
2. Music video history & record labels
3. Finding the right collaborators
4. Idea conceptualisation & imagination
5. The visual hook
6. Music video templates & structures

##### **Module II: Interviews/Case Studies**

1. Shooting music videos with only natural light
2. A day in the life of a full-time music video director
3. Music video case study: Branding tool for musicians
4. Focus on music video pre-production
5. Fashion film – the Filmmaker’s new music video

##### **Module III: Getting Your Hands Dirty**

6. Pre-production
7. Composition and framing
8. Lighting
9. Movement
10. Tonal range
11. Continuity and shot flow
12. Shooting and production
13. Editing and workflow
14. Colour correction
15. Titles and typography
16. Publishing/rendering

#### **Readings**

Tannenbaum, R., & Marks. C. (2012). *I Want My MTV: The uncensored story of the music revolution*. New York: Penguin Group.

Schwartz, M. L. (2007). *Making Music Videos: Everything you need to know from the best in the business*. Billboard Books. <https://www.amazon.com/Making-Music-Videos-Everything-Business/dp/B008SLFY22>

Vernallis, C. (2004). *Experiencing Music Video: Aesthetic and cultural context*. New York: Columbia University Press.

Austerlitz, S. (2007). *Money for Nothing: A history of the music video from Beatles to the White Stripes*. New York: The Continuum International Publishing Group Inc

Sufi, R. (October 12, 2010). The Musical History of Pakistan. Asia Society. <https://asiasociety.org/blog/asia/musical-history-pakistan>

**Launch proposal - PhD Geophysics Program**

<b>A. ACADEMIC DETAILS</b>	
1.	<b>Faculty/Department:</b> Faculty of Engineering and Sciences, Department of Earth and Environmental Sciences
2.	<b>Name of the Program:</b> PhD Geophysics - PHD (Geo-Phy)
3.	<b>Mission of the Program:</b> The mission of PhD Geophysics program is to build a strong and effective graduate program that will provide appropriate training and facilities to PhD candidates within the areas of expertise. The program will enhance research and professional skills and attract geoscientists of the national and international community. The department is committed to prepare, with a futuristic approach, competent professionals/researchers in the field of geophysics through quality education, quality research, field training, state-of-the art techniques and hands on commercial software as applied by the modern world.
4.	<b>Objectives of the Program:</b> The PhD program has the following objectives: (1) A well-structured graduate teaching and training program in order to create opportunities for students with professional experience to achieve the highest educational standards. (2) Strong links with the international community of scientists and engineers working in the various fields of geophysical studies, both in academia and industry. (3) Advanced research possibilities in the fields of Earth Sciences and exploration of hydrocarbon particularly related to the oil and gas industry. (4) Enhance their knowledge through advanced course work, field works and use of dedicated software labs. (5) Development of oil, gas, minerals and water resources research programs of national, regional and international scope. (6) Enhance ability to present and defend a substantial piece of original research that makes a distinct contribution to the improvement of professional practice or policy in the field of geophysical sciences. (7) To provide high-potential manpower to the industry and organizations through an effective postgraduate learning-teaching process.
5.	<b>Outcomes of the Program:</b> After completing the PhD coursework and thesis, the students will be able to: (1) Gain Fundamentals of geological modeling and reservoir characterization and propose solutions to geological problems (2) Apply geophysical techniques to image subsurface geology and/or the economic layers of the shallow and/or deep earth in more appropriate and acceptable modeling. (3) Conduct independently the research to provide solutions of the problems cropping up in the exploration of oil/gas and other resources. (4) Understand the potential theory and geophysical exploration techniques for the application of commercial industrial software in solving E & D projects.

	(5) Learn new trends of processing, modeling and interpret complex research findings related to current advances in geophysics.
6.	<p><b>Rationale for the Program:</b></p> <p>Geophysics is a leading discipline of modelling the Earth and is a major tool or technology of exploring the natural resources of the Earth. PhD Geophysics program is envisioned to contribute towards national efforts for producing professionals able to strengthen the research and education. The Department of Earth and Environmental Sciences desires to make Bahria University into a centre of national status and a focal point for geophysical research in the region. The Department had consensus to start the program in compliance with the role of universities to produce skilled, knowledgeable and motivated graduates for the industries and organizations in the private/public sectors.</p>
7.	<p><b>Brief Description of the Program:</b></p> <p>The revised trends in industries dictate a preference for highly trained and specialized technical personnel, in order to strengthen the goals of the country for industrial growth and research in energy sector. The doctorate program in geophysical sciences is intended to prepare the competent scientists who can initiate genuine research ideas and come up with indigenous ideas to enrich the spectrum of geophysics and conduct particularly the Pakistan specific research in oil/gas and other geosciences resources.</p> <p>The doctoral program will provide training and education to the students with the objective of creating scholar capability to conduct research independently at a high level of originality and quality. The program is comprised of course work, field visits, exposure to digital technologies, training of industrial softwares and research thesis. The PhD degree is recognition of successful research experience of national and international standard in the discipline. This requires collaboration both with internationally reputed scientists and engineers and with leading centers of learning and research institutions.</p> <p>The PhD Geophysics program will cover fundamentals of geophysical exploration as well as geological knowledge in order to produce skilled researchers and innovative individuals in the field hydrocarbons and mineral exploration. PhD Geophysics program is being proposed as per requirements of Postgraduate Academic Regulations of Bahria University and HEC.</p>
8.	<b>Duration:</b> 3 years
9.	<p><b>Venue(s): On Site/<del>Off Site/Both On &amp; Off Site</del>-(tick one/strike-through the ones not applicable; if Off Site, give details)</b></p> <p>SIR SYED Block, Bahria University, Shangrilla Road, Sector E-8, Islamabad</p>
10.	<p><b>Programme Scheduling Format:</b></p> <ul style="list-style-type: none"> <li>• <del>Morning/Evening/Weekend</del>-(tick one/strike-through the ones not applicable)</li> <li>• <del>Bi-Semester/Trimester/Semester+Summer Session/Annual/Bi Annual</del>-(tick one/strike-through the ones not applicable)</li> </ul>
11.	<b>Proposed Date of Commencement:</b> Fall 2019
12.	<p><b>Mode of study</b></p> <p>For the completion of the program the candidate must complete 54 credit hours (18 credit hours of course work in first two semesters and 36 credit hours for next four semesters</p>

	allocated for thesis). The course work will be based on class room teaching, assignments, quizzes, presentations, mid-term and final term exams which will be used to evaluate the students in each semester. After the completion of course work with CGPA 3.0/4.0, the students will start their research theses on the approved synopses under the guidance of appointed supervisors. The students have to complete their theses within stipulated time frame. The candidates also require passing the PhD Comprehensive Examination before starting their research work.
13.	<b>Additional Faculty Member(s) Required:</b> ( <i>Indicate if there is a requirement for additional faculty members, fulltime/visiting, along with qualifications.</i> )  One PhD Geophysics Faculty Member has been hired on IPFP to fulfill the HEC criteria of having three PhD faculty Members. As the Department already have two PhD Permanent Faculty Members.
14.	<b>Additional Skilled-Worker(s) Required:</b> ( <i>Indicate if there is a requirement for additional Skilled Staff, fulltime/part-time, along with their qualifications/skill sets.</i> ) <b>None</b>
15.	<b>Additional Classroom(s) required:</b> ( <i>The requirement is to include the number of classrooms and their capacities.</i> )  No extra class rooms will be required, the existing resources of SIR SYED Block will be utilized in the evening program.
16.	<b>Additional Requirement for Laboratories:</b> ( <i>The requirement is to include the number of laboratories, their equipment and their capacities.</i> )  Establishment of a dedicated Digital Geophysical Software Lab of the Department of E&ES is in process where all the Licensed softwares available with the department will be installed and students MS and PhD programs could utilize and learn the geophysical data Interpretation in a dedicated work place. Along with the existing resources available in the department, lab facilities at other campuses of the Bahria University and of those organizations/institutions with which the Bahria has signed MOUs will be utilized.
17.	<b>Additional Requirement for Books, Subscriptions, Memberships to Online Research Sites/ Repositories:</b> <b>None</b>
18.	<b>Minimum Entry Level:</b> 18 years of education. MS/MPhil degree in Geophysics
19.	<b>Admission Criteria:</b> HEC recognized MS/MPhil degree in Geophysics with 3.00/400 CGPA (Semester System) or 60% marks (Annual System) with Subject GAT/University Test Prior to admission.
20.	<b>Additional/Different Examination Requirement</b> ( <i>Indicate if there will be any examination requirement, additional to or different from the BU Academic Rules or Examination Policy in vogue.</i> )  No additional/different examination requirements. The examinations will be as per BU Academic Rules and Examination policy
21.	<b>Number of Admissions Expected for First Intake:</b> 5 admissions for first intake
22.	<b>Number of Admissions Planned/Expected for Subsequent Intakes:</b> 5 admissions per intake

23.	<b>Referred by: FBOS</b>
24.	<b>Complete Plan of Studies, inclusive of complete Roadmap:</b> <i>(Attach as Annex 'A')</i>
25.	<b>Course Outlines, Descriptions, Pre-Requisites &amp; Readings (Compulsory &amp; Recommended)</b> <i>(Attach as Annex 'B')</i>

<b>B. FINANCIAL DETAILS</b>																																																																																					
1	<b>Source of Funding (B1): Tuition Fee</b> <ul style="list-style-type: none"> <li>• BU: Fully/Partially:</li> <li>• Public Sector (B1): Fully/Partially <i>(provide complete details; attach MOU, agreement etc.)</i></li> <li>• NNGO (B1): Fully/Partially <i>(provide complete details; attach MOU, agreement etc.)</i></li> <li>• INGO (B1): Fully/Partially <i>(provide complete details; attach MOU, agreement etc.)</i></li> <li>• UN/IGO (B1): Fully/Partially <i>(provide complete details; attach MOU, agreement etc.)</i></li> </ul>																																																																																				
2	<b>(B2) Degree Duration:</b> 3 years <b>Semester System:</b> Yes (6 Semesters) <b>Total Number of Credit Hours:</b> 54																																																																																				
3	<b>Expected fee to be charged based on Cost &amp; Benefits Analysis (B3):</b> <i>(show working)</i> Per annum fee: or Fee rate per credit hour: Rs. 5,775 /-																																																																																				
4	<b>Expected Number of students for 1<sup>st</sup>&amp; 2<sup>nd</sup> Intakes (B4):</b> 5 & 5																																																																																				
5	<b>Expected Earning from first two Intakes (B5):</b> <i>(Show working)</i> <table border="1" style="margin-top: 10px;"> <thead> <tr> <th rowspan="2">Year</th> <th colspan="4">1st Intake</th> <th colspan="4">2nd Intake</th> </tr> <tr> <th>Semester</th> <th>Fee/Student</th> <th>Students</th> <th>Total Fee</th> <th>Semester</th> <th>Fee/Student</th> <th>Students</th> <th>Total Fee</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1</td> <td>Fall 2019</td> <td>99,975</td> <td>5</td> <td>499,875</td> <td>Fall 2020</td> <td>99,975</td> <td>5</td> <td>499,875</td> </tr> <tr> <td>Spring 2020</td> <td>56,975</td> <td>5</td> <td>284,875</td> <td>Spring 2021</td> <td>56,975</td> <td>5</td> <td>284,875</td> </tr> <tr> <td rowspan="2">2</td> <td>Fall 2020</td> <td>56,975</td> <td>5</td> <td>284,875</td> <td>Fall 2021</td> <td>56,975</td> <td>5</td> <td>284,875</td> </tr> <tr> <td>Spring 2021</td> <td>56,975</td> <td>5</td> <td>284,875</td> <td>Spring 2022</td> <td>56,975</td> <td>5</td> <td>284,875</td> </tr> <tr> <td rowspan="2">3</td> <td>Fall 2021</td> <td>56,975</td> <td>5</td> <td>284,875</td> <td>Fall 2022</td> <td>56,975</td> <td>5</td> <td>284,875</td> </tr> <tr> <td>Spring 2022</td> <td>56,975</td> <td>5</td> <td>284,875</td> <td>Spring 2023</td> <td>56,975</td> <td>5</td> <td>284,875</td> </tr> <tr> <td>Total</td> <td>1st Intake</td> <td colspan="3">1,924,250</td> <td>2nd Intake</td> <td colspan="3">1,924,250</td> </tr> </tbody> </table>								Year	1st Intake				2nd Intake				Semester	Fee/Student	Students	Total Fee	Semester	Fee/Student	Students	Total Fee	1	Fall 2019	99,975	5	499,875	Fall 2020	99,975	5	499,875	Spring 2020	56,975	5	284,875	Spring 2021	56,975	5	284,875	2	Fall 2020	56,975	5	284,875	Fall 2021	56,975	5	284,875	Spring 2021	56,975	5	284,875	Spring 2022	56,975	5	284,875	3	Fall 2021	56,975	5	284,875	Fall 2022	56,975	5	284,875	Spring 2022	56,975	5	284,875	Spring 2023	56,975	5	284,875	Total	1st Intake	1,924,250			2nd Intake	1,924,250		
Year	1st Intake				2nd Intake																																																																																
	Semester	Fee/Student	Students	Total Fee	Semester	Fee/Student	Students	Total Fee																																																																													
1	Fall 2019	99,975	5	499,875	Fall 2020	99,975	5	499,875																																																																													
	Spring 2020	56,975	5	284,875	Spring 2021	56,975	5	284,875																																																																													
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Total	1st Intake	1,924,250			2nd Intake	1,924,250																																																																															

									<b>3,848,500</b>	
<b>6</b>	<b>Expected Earning for the Next Five Years (B6): (show working)</b>									
Ye ar	Semester	Fres h	Existi ng	Total	Fee per student	Existin g**	Fresh	Existing	Total Fee	
<b>1</b>	<b>Fall 2019</b>	5	0	5	99,975	0	499,875	-	<b>499,875</b>	
	<b>Spring 2020</b>	0	5	5	0	56,975	-	284,875	<b>284,875</b>	
<b>2</b>	<b>Fall 2020</b>	5	5	10	99,975	56,975	499,875	284,875	<b>784,750</b>	
	<b>Spring 2021</b>	0	10	10	0	56,975	-	569,750	<b>569,750</b>	
<b>3</b>	<b>Fall 2021</b>	5	10	15	99,975	56,975	499,875	569,750	<b>1,069,625</b>	
	<b>Spring 2022</b>	0	15	15	0	56,975	-	854,625	<b>854,625</b>	
<b>4</b>	<b>Fall 2022</b>	5	10	15	99,975	56,975	499,875	569,750	<b>1,069,625</b>	
	<b>Spring 2023</b>	0	15	15	0	56,975	-	854,625	<b>854,625</b>	
<b>5</b>	<b>Fall 2023</b>	5	10	15	99,975	56,975	499,875	569,750	<b>1,069,625</b>	
	<b>Spring 2024</b>	0	15	15	0	56,975	-	854,625	<b>854,625</b>	
	<b>Year 1: Rs. 784,750 /-</b>									
	<b>Year 2: Rs. 1,354,500 /-</b>									
	<b>Year 3: Rs. 1,924,250 /-</b>									
	<b>Year 4: Rs. 1,924,250 /-</b>									
	<b>Year 5: Rs. 1,924,250 /-</b>									
	<b>Total 5 years earnings: Rs. 7,912,000 /- (7.912 million rupees)</b>									
	* per credit 5775 with 9 credit hours including admission fee, caution money, degree fee and misc. charges									
	** per credit 5775 with 9 credit hours including misc. charges									
<b>7</b>	<b>Total Estimated Salaries of all Additional Human Resources per annum (B7): (Show working)</b>									
Year	<b>Additional Human Resources (Thesis Payments)</b>									
	Semester	Description				Per Student	for 5 students			
<b>1</b>	<b>Fall 2019 and Spring 2020</b>	None				0	0			

Minutes of the 32<sup>nd</sup> ACM

	<b>2</b>	<b>Fall 2020 and Spring 2021</b>	None	0	0	
	<b>3</b>	<b>Fall 2021 and Spring 2022</b>	Payment to Supervisors	100,000	500,000	
			Payment to foreign evaluators (Thesis)	60,000	300,000	
			External and Internal Examiners (Proposal)	19,000	95,000	
			External and Internal Examiners (Thesis)	19,000	95,000	
			Miscellaneous (Field + Lab) work	100,000	500,000	
			<b>Total</b>	<b>1,490,000</b>		
	<b>4</b>	<b>Fall 2022 and Spring 2023</b>	Payment to Supervisors	100,000	500,000	
			Payment to foreign evaluators (Thesis)	60,000	300,000	
			External and Internal Examiners (Proposal)	19,000	95,000	
			External and Internal Examiners (Thesis)	19,000	95,000	
			Miscellaneous (Field + Lab) work	100,000	500,000	
			<b>Total</b>	<b>1,490,000</b>		
	<b>5</b>	<b>Fall 2023 and Spring 2024</b>	Payment to Supervisors	100,000	500,000	
			Payment to foreign evaluators (Thesis)	60,000	300,000	
			External and Internal Examiners (Proposal)	19,000	95,000	
			External and Internal Examiners (Thesis)	19,000	95,000	
			Miscellaneous (Field + Lab) work	100,000	500,000	
			<b>Total</b>	<b>1,490,000</b>		
	<b>Year 1: Rs. 0 /-</b>					
	<b>Year 2: Rs. 0 /-</b>					
	<b>Year 3: Rs. 1,490,000 /-</b>					
	<b>Year 4: Rs. 1,490,000 /-</b>					
	<b>Year 5: Rs. 1,490,000 /-</b>					
	<b>Total estimated expenses: Rs. 4,470,000 /-</b>					
	<b>Total estimated salaries of HR : Rs. 894,000 /- (per annum)</b>					
<b>8</b>	<b>Cost of Additional Laboratory Equipment/Tools (B8): (show working)</b>					
	<b>None</b>					

9	<b>Cost of Additional Classrooms (B9):</b> <i>(Include furniture, technical aids etc)</i> <b>None</b>
10	<b>Cost of Additional Books, Subscription &amp; Memberships to on-line Sites/Repositories (B10):</b> <i>(show details)</i> <b>None</b>
11	<b>Off-Site rental Expenses and Cost of other Fixtures (B11):</b> <i>(Show details)</i> <b>None</b>
12	<b>Miscellaneous Expenses required for Starting the Program (B12):</b> <ul style="list-style-type: none"> <li>- Advertisement: 30,000 /-</li> <li>- Printing &amp; Stationery: None</li> <li>- Admin Cost: None</li> <li>- Any other: None</li> <li>- <b>Total : 30,000 /-</b></li> </ul>
13	<b>Annual Recurring Expenditures in Subsequent Years (B13):</b> <ul style="list-style-type: none"> <li>- Salaries:</li> <li>- Rentals:</li> <li>- Subscriptions/Memberships:</li> <li>- Advertisements:</li> <li>- Printing &amp; Stationery:</li> <li>- Admin Cost</li> <li>- Any other</li> <li>- <b>Total:</b></li> </ul>
14	<b>Total Cost of the Programme (B14):</b> [Add B(7) to B(12)] <b>Year 1:</b> Rs. 30,000 /- <b>Year 2:</b> Rs. 0 /- <b>Year 3:</b> Rs. 1,490,000 /- <b>Year 4:</b> Rs. 1,490,000 /- <b>Year 5:</b> Rs. 1,490,000 /- <b>Total Cost:</b> Rs. 4,500,000/-
15	<b>Net Cost of the Programme (B15):</b> [Subtract B(1) from B(14)] <b>Year 1:</b> Rs. 30,000 /- <b>Year 2:</b> Rs. 0 /- <b>Year 3:</b> Rs. 1,490,000 /- <b>Year 4:</b> Rs. 1,490,000 /- <b>Year 5:</b> Rs. 1,490,000 /- <b>Total Cost:</b> Rs. 4,500,000/-
16	<b>Net Earnings in First Year (B16:</b> [Subtract B(15) from B(5)] <b>Year 1:</b> Rs. 754,750 /-
17	<b>Projected Annual Gross Earning in Subsequent Years (B 17):</b> <i>(show details &amp; working; add 10% towards all expenses in subsequent years.)</i> <b>Year 2:</b> Rs. 1,354,500/- <b>Year 3:</b> Rs. 1,924,250 /-

	<b>Year 4: Rs. 1,924,250 /-</b> <b>Year 5: Rs. 1,924,250 /-</b> <b>Total Gross Earning: Rs. 7,127,250 /-</b>
18	<b>Projected Annual Net Earning in Subsequent Years: [Subtract B(15) from B(17)]</b> <b>Year 2: Rs. 1,354,500/-</b> <b>Year 3: Rs. 434,250 /-</b> <b>Year 4: Rs. 434,250 /-</b> <b>Year 5: Rs. 434,250 /-</b> <b>Total Net Earning: Rs. 2,657,250 /-</b>

**Annex - A****ROADMAP FOR PHD GEOPHYSICS**

Semester	Credit Hours
1	9 (Course Work)
2	9 (Course Work)
3 to onward	Comprehensive Exam. Synopsis Writing, Presentation & Final Thesis Defence
	36 (Research work)
Total Credit Hours	54

**Semester - 1**

Course Code	Course Title	Credit Hours
GEO 801	Tectonic Evolution of Pakistan	3
GEO 828	Contemporary Trends in Geosciences	3
GEO 8xx	Elective course I	3

**Semester – 2**

Course Code	Course Title	Credit Hours
GEO 803	Seismic Imaging Techniques	3
GEO 8xx	Elective course II	3
GEO 8xx	Elective course III	3

**Elective Courses**

Courses	Course Title	Credit Hours
GEO 804	3D Seismic Attributes for Reservoir Characterization	3
GEO 805	3D Seismic Acquisition in Offshore & Onshore	3
GEO 806	Reservoir Modeling	3
GEO 807	GIS applications in Geophysics	3
GEO 808	Signal Processing in Geophysics	3
GEO 809	Geosciences Software	3
GEO 826	Disaster Risk Management	3
GEO 811	Advanced Reflection Seismology	3
GEO 812	Mining Geophysics	3
GEO 829	Advanced Earthquake Seismology	3
GEO 813	Gravity & Magnetic Modeling	3

GEO 810	Petrophysics	3
GEO 849	Hydrocarbon Exploration Techniques	3
GEO 850	Advanced Basin Analysis	3
GEO 851	Reservoir Characterization	3
GEO 853	Advanced Sequence Stratigraphy	3
GEO 868	Advanced Structural Geology	3
GEO 869	Geostatistics	3
GEO 871	Advanced Petroleum Geology	3
ENV 817	Advanced Research Methodology	3
GEO 872	Advanced Electrical Methods	3

**Annex – B****CORE COURSES OUTLINE FOR PHD GEOPHYSICS****1. GEO 801 Tectonic Evolution of Pakistan****Course outline:**

Physiographic and tectonic divisions and their descriptions. Geology and stratigraphy of the, Indian plate, Karakoram plate, Afghan block and Arabian plate. Kohistan, Chagai and Ras Koh magmatic arcs, oroclines and suture zones. Regional metamorphism (Himalayan and Pre-Himalayan). Main episodes of magmatism and their relations to tectonics. Economic mineral and fuel deposits of Pakistan.

**Reference text Books:**

- Kearey, P., Klepeis, K.A., & Vine, F. J. (2013). *Global tectonics*. John Wiley & Sons.
- Kazmi, A. H., & Abbasi, I. A. (2008). *Stratigraphy & historical geology of Pakistan*. Department & National Centre of Excellence in Geology.
- Kazmi, A. H., & Jan, M. Q. (1997). *Geology and tectonics of Pakistan*. Graphic publishers.

**2. GEO 828: Contemporary Trends in Geosciences****Course outline:**

The seminar topics will relate to specific areas of geophysical sciences that are not covered by existing courses. Students will give seminars and receive suggestions on literature review, methodology, geophysical modeling and research aspects. Members of the department and invited participants/speakers will also meet the students weekly to discuss current research in the world.

**References:** Student may take guideline from

- Supervisors, Experts from academia and Industry
- Case studies, Reports, Research papers etc.

### 3. GEO 803 Seismic Imaging Techniques

#### Course outline:

The connection between seismic velocity and fluid flow, Seismic and reservoir resolutions, optimal grids, and scaling issues, Fundamentals of geostatistics fundamentals, Seismic attributes and facies, Seismic Inversion, poststack and prestack, Use of seismic, well log, core, pressure test and other data in reservoir model building, Neural networks and multi-attributes, Basic statistics, Markov Chain Monte Carlo simulations, and stochastic inversion, Uncertainty in reservoir models using Bayesian probability, 4D seismic analysis.

#### Reference Text Book:

- Giese, H. M. (2010). *Seismic imaging: a review of the techniques, their principles, merits and limitations*. EAGE publications.
- Sen, M. K. (2006). *Seismic inversion*. Richardson, TX.: Society of Petroleum Engineers.

## ELECTIVE COURSES OUTLINE FOR PHD GEOPHYSICS

### 4. GEO 810 Petrophysics

#### Course outline:

Introduction to Petrophysics; Electrical properties of minerals and rocks – Resistivity, Conductivity, dielectric permittivity, ability to polarization – Relations to mineral composition, porosity, water saturation, volume and type of pore fluids, structure and texture, temperature and pressure, laboratory equipment for resistivity vs. temperature and pressure measurement; Dielectric permittivity of rocks – relation to porosity and water saturation, dispersion, dielectric permittivity as a basic for GPR; spontaneous polarization –diffusion, absorption, filtration, red-ox potentials, salinity of formation waters, role of clay minerals; Reservoir parameters – porosity, permeability, shaliness, clay components; reservoir parameters as a function of mineral composition, compaction, stratigraphic position; Archie law – relation between effective porosity and formation factor, between resistivity and structure factor – m for different rocks; water saturation, resistivity index, relation to wettability factor, Relation between resistivity and saturation and shaliness for sandy- sahly rocks, resistivity models; Thermal properties of minerals and rocks, relation between surface and heat flow and thermal conductivity, specific heat and temperature conductivity coefficient; Density -- relations between porosity and bulk density, matrix density, relation with gas saturation and oil viscosity; Elastic Parameters – definition of static and dynamic parameters, lab measurement and field recording; Nuclear factor affecting geophysical measurement – natural gamma radioactivity, scattering and absorption of gamma rays in minerals and rocks; behavior of neutrons in rock formation – neutron parameter – thermal neutron absorption cross section.

#### Reference Text Book:

- Tiab, D., & Donaldson, E. C. (2015). *Petrophysics: theory and practice of measuring reservoir rock and fluid transport properties*. Gulf professional publishing.
- Rider, M. H. (2011). *The geological interpretation of well logs*. 3<sup>rd</sup> Edition. Rider-French publishing.
- Ellis, D. V., & Singer, J. M. (2007). *Well logging for earth scientists* (Vol. 692). Dordrecht: Springer.

- Asquith, G. B., Krygowski, D., & Gibson, C. R. (2004). *Basic well log analysis* (Vol. 16). Tulsa: American Association of Petroleum Geologists.
- Rider, M. H. (2002). *The geological interpretation of well logs*. 2<sup>nd</sup> Edition. Rider-French publishing.

## 5. GEO 804 3D Seismic Attributes For Reservoir Characterization

### Course outline:

Types of attributes, Impact of seismic data quality on seismic attributes, Methods for preconditioning of seismic data, Introduction of various algorithms for attribute computation, their limitations and performance strengths, Attribute expression of structure and stratigraphy in terms of tectonics and diapirism, clastic and carbonate depositional systems and geologic hazards, Multiattribute analysis tools, Reservoir characterization workflows, Physical demonstration of attributes on real seismic data., An inventory of direct hydrocarbon indicators, including AVO, AVO and how it relates to the typical production zones around the world with various ages and depths of burial, Spectral decomposition and seismic attributes as other ways of extracting reservoir information from the seismic image.

**Softwares:** Geographix, Petrel, Opendtect

### Reference Text Book:

- Brown, A. R. (2011). *Interpretation of Three-Dimensional Seismic Data*. AAPG.
- Chopra, S., & Marfurt, K. J. (2007). *Seismic attributes for prospect identification and reservoir characterization*. Tulsa, Oklahoma: Society of Exploration Geophysicists.
- Davies, R. J. (Ed.). (2007). *Seismic geomorphology: Applications to hydrocarbon exploration and production*. Geological Society of London.
- Bacon, M., Simm, R., & Redshaw, T. (2007). *3-D seismic interpretation*. Cambridge University Press.

## 6. GEO 805 3D Seismic Acquisition in Offshore & Onshore

### Course outline:

3D acquisition geometries, classes of 3D geometries, The continuous wavefield, 3D subsets and acquisition geometry, Sampling the continuous wavefield, minimal data sets, 3D symmetric sampling, Pseudo-COV gathers, application to prestack processing, Noise suppression, Properties of low-velocity noise. Guidelines for design of 3D geometry on land. Marine seismic data acquisition. Parameters of orthogonal geometry (fold, line intervals, maximum inline and maximum crossline offset). Converted waves: Properties and 3D survey design. Factors affecting spatial resolution. DMO. Prestack migration..

### Reference Text Book:

- Vermeer, G. J. (2012). *3D Seismic Survey Design*. 2<sup>nd</sup> Edition. Tulsa: Society of Exploration Geophysicists.
- Vermeer, G. J., & Beasley, C. J. (2002). *3-D seismic survey design*. 1<sup>st</sup> Edition Tulsa: Society of Exploration Geophysicists.
- Cordsen, A., Galbraith, M., & Peirce, J. (2000). *Planning land 3-D seismic surveys* (Vol. 9). Tulsa: Society of Exploration Geophysicists.

## 7. GEO 806 Reservoir Modeling

### Course outline:

Application of Various Imaging Techniques, Principles as Applied to Exploration and Reservoir Characterization, Concepts of Structural Interpretation, Lines/Cross-Lines, Arbitrary (User Defined) Lines, Time Slices, and Phase Slices, Visualization Techniques, Including 3D Immersion, Surface Versus Volumetric Interpretation, User-tracking Versus Auto-tracking of Horizons and Faults, Structural Interpretation, Including Refined Fault Analysis, Stratigraphic Interpretation, Including Sequence Stratigraphy and Appearance of Key Stratigraphic Features, Extraction of Petrophysical Information from Seismic Data, Integration of Well Log, Well Bore Geophysics, Synthetic Seismic, Seismic Inversion, Geological Analysis to Develop Coherent Reservoir Models.

### Reference Text Book:

- Pyrcz, M. J., & Deutsch, C. V. (2014). *Geostatistical reservoir modeling*. Oxford university press.
- Luthi, S. (2013). *Geological Well Logs: Their Use in Reservoir Modeling*. Springer Science & Business Media.
- Ma, Y. Z., & La Pointe, P. R. (Eds.). (2011). *Uncertainty Analysis and Reservoir Modeling: Developing and Managing Assets in an Uncertain World*. AAPG.
- Veeken, P. C. (2006). *Seismic stratigraphy, basin analysis and reservoir characterization*. Elsevier.
- Slatt, R. M. (2006). *Stratigraphic reservoir characterization for petroleum geologists, geophysicists, and engineers*. Elsevier.

## 8. GEO 807 GIS Applications in Geophysics

### Course Outline:

GIS elements, Theory of GIS as: a science, a studies and a system, Type of geological an remote sensing data, GIS data formats, use of GIS in mineral and hydrocarbon exploration, GIS studies in geological and structural studies, spatial relationships and geological association, special case studies from Pakistan.

### Reference Text Book:

- Liu, J. G., & Mason, P. J. (2016). *Image processing and GIS for remote sensing: Techniques and applications*. John Wiley & Sons.
- Burrough, P. A., McDonnell, R. A., & Lloyd, C. D. (2015). *Principles of geographical information systems*. Oxford University Press.
- Carrara, A., & Guzzetti, F. (Eds.). (2013). *Geographical information systems in assessing natural hazards* (Vol. 5). Springer Science & Business Media.
- Davis, J. C. (1989). *Digital geologic and geographic information systems*. American Geophysical Union.

**Software:** ArcGIS and other necessary

## 9. GEO 808 Signal Processing in Geophysics

### Course outline:

This course emphasizes the application of time series analysis and image processing techniques to large geophysical data sets. The covered topics include Fourier series and transform, Discrete Fourier transform, Z-transform Digital signals aliasing and Nyquist

concepts, Convolution and deconvolution, Inverse filtering and theory, Principle value decomposition, Signal enhancement and applications.

**Reference Text Books:**

- Zhou, H. W. (2014). *Practical seismic data analysis*. Cambridge University Press.
- Upadhyay, S. K. (2013). *Seismic reflection processing: with special reference to anisotropy*. Springer Science & Business Media.
- Onajite, E. (2013). *Seismic data analysis techniques in hydrocarbon exploration*. Elsevier.
- Vaseghi, S. V. (2008). *Advanced digital signal processing and noise reduction*. John Wiley & Sons.
- Yilmaz, Ö. (2001). *Seismic data analysis*. Tulsa: SEG Books.
- Robinson, E. A., & Treitel, S. (2000). *Geophysical Signal Analysis*. SEG Books.

## 10. GEO 809 Geosciences Software

**Course outline:**

Type of Formats (UKOOA, P-190 format, SEG-D, SEG-Y etc), Basic learning of UNIX and, LINUX, Scanning, Editing and QC of Data, Navigation data loading, Seismic data loading (SEG-Y files both 2D lines and 3D cube), Well data loading (Well locations, Formation tops, well logs etc), Preparation of Synthetic Seismogram, Generation of Horizon, Generation of Faults, Perform seismic visualization and interpretation, Velocity Model Building, Generation of Time and Depth Maps, 3D Visualization of Depth Surfaces, Crustal Shortening, Perform well correlation, Model faults, Model facies throughout the reservoir, Perform Petrophysical modeling, Calculate Reservoir volumes, Rock Physics Analysis, Complex trace attributes, Horizon and formation attributes, Color display and 3D visualization, Spectral decomposition and thin bed tuning, Geometric attributes, Attribute expression of structure and stratigraphy, Impact of data quality on seismic attributes, Structure-oriented filtering and image enhancement, Multi-attribute analysis tools.

## 11. GEO 826 Disaster Risk Management

**Course outline:**

Identification of Major disasters, Comparison of hazard mitigation to disaster preparedness, response, and recovery. Hazards management versus disaster management. Disaster Modeling for Hazard Mitigation: Introduction to Inspiration Software and Disaster Modelling. Utilizing disaster models for conducting hazard and risk assessments, Atmospheric hazards and mitigations, Examine example disaster models prepared, Geologic/ Seismic Hazards and Mitigation, Hydrologic Hazards and Mitigation.

**Reference Text Books:**

- Olson, D. L., & Wu, D. D. (2017). Natural Disaster Risk Management. In *Enterprise Risk Management Models*. Springer, Berlin, Heidelberg.
- Ranke, U. (2016). *Natural Disaster Risk Management: Geosciences and Social Responsibility*. Springer
- Baas, S., Ramasamy, S., DePryck, J. D., & Battista, F. (2008). *Disaster risk management systems analysis: A guide book*(Vol. 3). Rome, Italy: Food and Agriculture Organization of the United Nations.

## 12. GEO 811 Advanced Reflection Seismology

### Course Outline:

Principles of seismic reflection profiling, focusing on methods of seismic data formats advanced seismic reflection theories. Geometries of seismic waves, Characteristics of Seismic events, Seismic Resolutions, Fourier Transforms, Synthetics and Velocity Functions, Traveltime curves and velocity, Seismic Source Wavelets, Wavelet Shaping and Deconvolution. Seismic equipments, Reflection field methods, Data Processing and Seismic data Interpretation.

### References Text Books:

- Liner, C. L. (2016). *Elements of 3D Seismology*. SEG Books.
- Wencai, Y. (2013). *Reflection Seismology: theory, data processing & interpretation*. Elsevier.
- Ashcroft, W. (2011). *A petroleum geologist's guide to seismic reflection*. John Wiley & Sons.
- Costain, J. K., & Çoruh, C. (2004). *Basic Theory in Reflection Seismology: with MATHEMATICA Notebooks and Examples on CD-ROM* (Vol. 1). Elsevier.
- Shearer, P. M. (2009). *Introduction to seismology*. Cambridge University Press.

## 13. GEO 812 Mining Geophysics

### Course Outline:

Geophysical methods for exploration and mining, Geophysical prospecting, Electromagnetics, Resistivity, Induced Polarization, Self Potential, radiometric methods applied to problems in search for metallic mineral deposits, working conditions, data collections, processing and interpretation.

### Reference Text Books:

- ParASNIS, D. S. (2014). *Mining geophysics*. (Vol. 3). Elsevier.
- Idziak, A. F., & Dubiel, R. (Eds.). (2011). *Geophysics in mining and environmental protection*. Springer Science & Business Media.

## 14. GEO 829 Advanced Earthquake Seismology

### Course Contents:

Earthquake Seismology, Seismic Wave Theory; Body Waves- Ray Theory and Ray Paths, Eikonal Equation, Travel Time Curves, Seismic Waveforms; Surface Waves-Dispersion Relations, Interpretation of Dispersion Curves, Group and Phase Velocities and Applications, Ambient Noise; The Earthquake Source- Focal mechanisms, moment tensors, source time function; Earthquake Mechanics- Friction and fracture, populations, dynamics, scaling; Seismic Recording - Sensors, recorders, networks and arrays; Seismograms-Natural and synthetic, time and frequency domain, combined influence of source, ray path, recording site and instrument; Earthquake Location- Ray parameters (arrays) and the Geiger method (networks); faulting source, double couple hypothesis, elastodynamics, Haskell's function, seismic moment tensor, focal mechanism and fault plane solutions; seismic gaps; Global Earth Structure-Layered structure from travel time tables, 3D structure from seismic tomography; Seismotectonics-Distribution of seismicity in space, regional stress and strain tensors, relationship to tectonics; Seismic Hazard; Himalayan and stable continental region earthquakes, reservoir induced seismicity

**Recommended Books:**

- Galea, D. (2016). *Earthquake Seismology: Tools, Techniques and Instrumentation.* Syrawood Publishing House.
- Rafferty, J. P. (Ed.). (2010). *Plate Tectonics, Volcanoes, and Earthquakes.* The Rosen Publishing Group.
- Stein, S., & Wysession, M. (2009). *An introduction to seismology, earthquakes, and Earth structure.* John Wiley & Sons.
- Shearer, P. M. (2009). *Introduction to seismology.* Cambridge University Press.
- Kayal, J. R. (2008). *Microearthquake seismology and seismotectonics of South Asia.* Springer Science & Business Media.

**15. GEO 813 Gravity & Magnetic Modeling**

**Course outline:**

Theoretical aspects of gravity, techniques of gravity & Magnetic techniques, principles of Gravity & Magnetic Data, field data processing and Isolation of residual and regional gravity and magnetic anomalies, Gravity & Magnetic Modeling.

**Reference Text Books:**

- Hinze, W. J., Von Frese, R. R., & Saad, A. H. (2013). *Gravity and magnetic exploration: Principles, practices, and applications.* Cambridge University Press.
- Kearey, P., Brooks, M., & Hill, I. (2013). *An introduction to geophysical exploration.* John Wiley & Sons.
- Mishra, D. C. (2011). Gravity and magnetic methods for geological studies. *Hyderabad: BS Publications.*
- Lowrie, W. (2007). *Fundamentals of geophysics.* Cambridge university press.

**16. GEO 849 Hydrocarbon Exploration Techniques**

**Course Contents:**

Hydrocarbon Exploration methods and techniques. Applications of different geophysical methods in hydrocarbon exploration like Gravity, electrical, Seismic, radioactive and well logging. Integration of different geophysical techniques, seismic interpretation, petrophysical analysis, volumetric reserves estimation, advance seismic techniques like attribute analysis, inversion, rock physics, AVO of pre and post stack seismic data, Characterization and Modeling of Petroleum System, Play Fairway Analysis.

**Recommended Books:**

- Onajite, E. (2017). *Practical Solutions to Integrated Oil and Gas Reservoir Analysis: Geophysical and Geological Perspectives.* Elsevier.
- Alsadi, H. N. (2017). *Seismic Hydrocarbon Exploration.* Springer International Publishing.
- Bjørlykke, K. (2015). *Petroleum Geosciences: From sedimentary Environments to Rock Physics.* Springer-Verlag Berlin Heidelberg.
- Onajite, E. (2013). *Seismic data analysis techniques in hydrocarbon exploration.* Elsevier.
- Miall, A. D. (2013). *The geology of fluvial deposits: sedimentary facies, basin analysis, and petroleum geology.* Springer.
- Kearey, P., Brooks, M., & Hill, I. (2013). *An introduction to geophysical exploration.* John Wiley & Sons.

- Sengbush, R. L. (2012). *Petroleum exploration: a quantitative introduction*. Springer Science & Business Media.

## 17. GEO 850 Advance Basin Analysis

### Course Contents:

Basins in their plate tectonic environment, Understanding plate motion <http://pubs.usgs.gov/publications/text/understanding.html>, Geophysical Processes in Sedimentary Basin Formation, Concept of structural Geology, The physical state of the lithosphere, Basins due to lithospheric stretching, Rifting and Passive margins, Rift Basin Architecture and Evolution, Quantitative Filling Model for Continental Extensional Basins, 3-D Diagram of a Rift Basin, Basin and Range province: The rise and Fall of Death Valley's mountain ranges and valleys, Basins due to flexure, Gravity, Flexure and Basins relationship, Anatomy of a Mountain Belt: Foreland Thrust-and-Fold Belts, Alpine Foreland Basin in Southeastern France, Ebro Foreland Basin, Spain, Devonian Clastic Wedges of the Acadian Orogeny, N. America, Virtual field trip to the Apulia foreland basin, Basins associated with subduction zones, Basins associated with strike-slip deformation, Strike-slip faults, The sediment routing system, Basin Stratigraphy, Subsidence and thermal history, The petroleum play.

### Recommended Books:

- Miall, A. D. (2013). *Principles of sedimentary basin analysis*. Springer Science & Business Media.
- Allen, P. A., & Allen, J. R. (2013). *Basin analysis: Principles and application to petroleum play assessment*. John Wiley & Sons.
- Miall, A. D. (2013). *The geology of fluvial deposits: sedimentary facies, basin analysis, and petroleum geology*. Springer.
- Veeken, P. C. (2006). *Seismic stratigraphy, basin analysis and reservoir characterisation*. Elsevier.

## 18. GEO 851 Reservoir Characterization

### Course Contents:

Importance of understanding the various scales of heterogeneity in carbonate and clastic reservoirs, Reservoir rock deposition, diagenesis, mineralogy, rock textures, and pore types, Carbonate and clastic rock pore system classification, Reservoir rock properties and core analysis, Well log response, limitations, and strengths in reservoir rocks, Determination of lithology, porosity, and permeability, Fracture identification and distribution Porosity/depth relationships in limestone, dolomite and clastic reservoirs, Importance of sequence boundaries to development of pore architecture, Variations in carbonate pore architecture and its effect on permeability, Relationship of primary depositional facies, sequence stratigraphic framework and diagenetic history to pore architecture and reservoir quality, Controls on reservoir heterogeneity, from sub-reservoir to reservoir scale, Value of analogs for development of petrophysically-based reservoir models, Value and limitations of 3D geostatistical models to understand reservoir heterogeneity and architecture.

### Recommended Books:

- Bjørlykke, K. (2015). *Petroleum Geosciences: From sedimentary Environments to Rock Physics*. Springer-Verlag Berlin Heidelberg.
- Lake, L. (Ed.). (2012). *Reservoir characterization*. Elsevier.

- Chopra, S., & Marfurt, K. J. (2007). *Seismic attributes for prospect identification and reservoir characterization*. Tulsa, Oklahoma: Society of Exploration Geophysicists.
- Lucia, F. J. (2007). *Carbonate reservoir characterization: An integrated approach*. Springer Science & Business Media.
- Slatt, R. M. (2006). *Stratigraphic reservoir characterization for petroleum geologists, geophysicists, and engineers*. Elsevier.
- Veeken, P. C. (2006). *Seismic stratigraphy, basin analysis and reservoir characterization*. Elsevier.
- Cubitt, J. M., England, W. A., & Larter, S. R. (Eds.). (2004). Understanding petroleum reservoirs: Towards an integrated reservoir engineering and geochemical approach. Geological Society of London.

## 19. GEO 853 Advanced Sequence Stratigraphy

### Course Contents:

Introduction to seismic sequence stratigraphy; concepts; Eustatic controls; Assumptions; Definition of key terms., Eustatic controls on depositional stratal patterns, Accommodation and equilibrium types, Systems tract boundaries, Seismic expression of sequence, Criteria and approach for picking sequence boundaries, Interpretation of seismic reflections in depositional sequences, Definition of seismic sequence, Seismic facies, Sequence and systems tracts, Highstand, Falling stage, Lowstand, Transgressive, Shelf margin systems tracts, Sequence expression in well logs, Log characters of parasequences, Maximum flooding surfaces and criteria for picking sequence boundaries, Interpretation of systems tracts from well log character, Integration of well log sequence stratigraphy with seismic sequence stratigraphy, Clastic and carbonate depositional environments, Depositional responses to changes in relative sea level, Variation on the model: Application and exploration significance – use of global sea level curve, Introduction: review of philosophy and epistemology, Application of geophysical fundamentals (wave theory, attributes, frequency substitution, and coherency), Amplitude variation with offset (lithologies, fluids, gases, porosities, and pressures), Fault mechanical stratigraphy, Vail and Galloway sequence theory and application, High resolution sea level curve generation from micropaleo, Shallow and deep water siliciclastic sequences, Seismic facies and paleo-environmental analysis, Reservoir scale geophysics using the wavelet, Imaging hydrocarbons, Geohistory reconstruction, Optimizing exploration and development.

### Recommended Books:

- Haq, B. U. (Ed.). (2013). *Sequence stratigraphy and depositional response to eustatic, tectonic and climatic forcing*. Springer Science & Business Media.
- Emery, D., & Myers, K. (Eds.). (2009). *Sequence stratigraphy*. John Wiley & Sons.
- Catuneanu, O. (2006). *Principles of sequence stratigraphy*. Elsevier.
- Veeken, P. C. (2006). *Seismic stratigraphy, basin analysis and reservoir characterization*. Elsevier.

## 20. GEO 868 Advanced Structural Geology

### Course Contents:

Force, strain and stress (including Mohr diagram and strain analysis methods); Deformation dynamics, kinematics and structures; Deformation modes and mechanisms; Brittle rock deformation: faulting (including fault rock development, fault seal analysis and palaeostress

analysis from fault slip data) and fracturing (including joint development) in the upper crust; Ductile rock deformation: folding and shear zone development, lithospheric extension models, development of rift basins and passive margins and stretching factors; lithospheric compression models and development of foreland fold and thrust belts; diagram techniques, construction and interpretation of block diagrams and contour maps, stereographic analysis, cross section construction, restoration and balancing, 4D cross section evolution

**Recommended Books:**

- Fossen, H. (2016). *Structural geology*. Cambridge University Press.
- Ghosh, S. K. (2013). *Structural geology: fundamentals and modern developments*. Elsevier.
- Park, R. G. (2013). *Foundation of structural geology*. Routledge.
- Davis, G. H., Reynolds, S. J., Kluth, C. F. (2011). *Structural Geology of Rocks and Region*. 3<sup>rd</sup> Edition. Wiley Publishing.
- Twiss, R. J., & Moores, E. M. (2006). *Structural geology*. W. H. Freeman.
- Pollard, D. D., & Fletcher, R. C. (2005). *Fundamentals of structural geology*. Cambridge University Press.

**21. GEO 869 Geostatistics**

**Course Contents:**

Introduction to geostatistics; computer application in geo-statistics, collection of data: collection of primary data, collection of secondary data, editing of data; measures of central tendency or averages, types of averages, the arithmetic mean, the median, the mode, empirical relation between mean, median and mode, relative merits and demerits of various averages; measures of dispersion range, semi-interquartile range or quartile deviation, mean deviation, standard deviation, skewness; correlation and simple regression, coefficient of correlation, scatter diagram, rank correlation, regression; geo-statistical analyst: powerful exploration and data interpretation solutions multiple tools for data representation; The variogram calculation, interpretation, linking variogram behaviour with physical causes (geology, sampling); Extension variances and estimation variances/simple calculations in one and two dimensions; Global reserve/resource estimation; Optimal estimation and introduction to kriging;

**Recommended Books:**

- Hohn, M. (2013). *Geostatistics and petroleum geology*. Springer Science & Business Media.
- Wackernagel, H. (2013). *Multivariate geostatistics: an introduction with applications*. Springer Science & Business Media.
- Chilès, J. P., & Delfiner, P. (2012). *Geostatistics: Modeling Spatial Uncertainty*. Wiley Publishing.
- Armstrong, M. (2012). *Basic Linear Geostatistics*. Springer Science & Business Media.

**22. GEO 871 Advanced Petroleum Geology**

**Course Contents:**

Review of Petroleum Geology; Petroleum Geochemistry / Source Rock Evaluation; Modeling of Thermal History and Petroleum Generation and Expulsion; Production Seismic; Basin Analysis; Reservoir Geology & Reservoir modeling; Volumetric Reserve Estimation; Field Appraisal; Integrated Geology Workshop; Sequence Stratigraphy.

**Recommended Books:**

- Bjørlykke, K. (2015). *Petroleum Geosciences: From sedimentary Environments to Rock Physics*. Springer-Verlag Berlin Heidelberg.
- Selley, R. C., & Sonnenberg, S. A. (2014). *Elements of petroleum geology*. Academic Press.
- Gluyas, J., & Swarbrick, R. (2013). *Petroleum geoscience*. John Wiley & Sons.
- Zou, C. (2017). *Unconventional petroleum geology*. Elsevier.
- Chapman, R. E. (2000). *Petroleum geology* (Vol. 16). Elsevier.
- North, F.K. (1985). *Petroleum geology*. Springer.

**23. EVN 817 Advanced Research Methodology**

**Course Contents:**

Research paradigms; techniques and pre-requisites of scientific research; research concept development; critical thinking and developing of research question; writing research proposal and its importance for acquisition of funds/grants from various agencies; the logic of sampling; sampling design; experimental work to address relevant analytical techniques; analytical data handling and presentation skills; relevant software utilization; thesis writing; paper review technique; techniques of research paper publication in journals of repute

**Recommended Books:**

- How to Research, L. Blaxter, C. Hughes, M. Tight, 4th Edition, 2010.
- Research Methodology: A Step-by-Step Guide for Beginners, Ranjit Kumar, Publisher: SAGE,3rd Edition, 2010
- Wayne C. Booth, Gregory G. Colombo, Joseph M. Williams, 2008, The Craft of Research (Chicago Guides to Writing, Editing, and Publishing). University Of Chicago Press , 336
- Creswell, J.W, 2006, Designing and Conducting Mixed Methods Research. Sage Publications (CA). 275
- Research Methodologies – A step by step guide for beginners, Ranjit Kumar, 2005.
- Dawson, C. 2002, Practical Research Methods, A user-friendly guide to mastering research. Cromwell Press, Trowbridge, Wiltshire. 169
- William R. Shadish, Thomas D. Cook, Donald T. Campbell, 2001, Experimental and Quasi-Experimental Designs for Generalized Causal Inference. Houghton Mifflin. 623

**24. GEO 872 Advanced Electrical Methods**

**Course Contents:**

Basic principal and theory of Electrical Resistivity method . Fundamentals of current flow in the Earth. Electric potentials and fields. Static charge distributions. Resistivity Imaging study its survey designing for Geophysical Electrical Exploration. Field procedures including Instruments and electrode arrangements. Processing and interpretation of resistivity data. Its limitations, advantages and disadvantages. Basic principal and theory of Induced polarization method its field procedure, data acquisition, interpretation, limitations, advantages and disadvantages. Basic principal and theory of Self potential method its field procedure, data acquisition, interpretation, limitations, advantages and disadvantages. Basic principal and theory of Electromagnetic method including Telluric Method and Magneto telluric Method, survey designing, data acquisition, interpretation, limitations, advantages and disadvantages. Basic principal and theory of Charge body potential Method Mise A La Masse method and its applications. Study of case histories of all electrical methods.

**Recommended Books:**

- Kaufman, A. A., Alekseev, D., & Oristaglio, M. (2014). *Principles of electromagnetic methods in surface geophysics*. Newnes.
- Fitch, A. A. (Ed.). (2012). *Developments in Geophysical Exploration Methods—3*. Springer Science & Business Media.
- Fitch, A. A. (Ed.). (2012). *Developments in Geophysical Exploration Methods—3*. Springer Science & Business Media.
- Kaufman, A. A., & Anderson, B. (2010). *Principles of electric methods in surface and borehole geophysics*. Elsevier.
- Yungul, S. H. (1996). *Electrical methods in geophysical exploration of deep sedimentary basins*. Springer.

**REVIEW OF VISION, MISSION AND OBJECTIVES OF HUMANITIES AND SOCIAL SCIENCES**  
**DEPARTMENT, BUKC**

<b>Vision</b>	<b>Mission</b>	<b>Objectives</b>
To become a compatible Department of Humanities and Social Sciences of international repute by contributing in multidisciplinary fields of knowledge and undertake research for providing solution of social issues to the societies.	To promote excellence in education and research pertaining to humanities and social sciences to educate young minds on societal issues and concepts thereby developing their personality so as to become socially responsible and professionals of their fields.	<ul style="list-style-type: none"> <li>▪ To produce high quality graduates of humanities and social sciences who could put into practice the theories.</li> <li>▪ To produce researchers in the field of humanities and social sciences for societal development.</li> <li>▪ To provide appealing and convincing solutions to organizations on social challenges in national and international perspectives.</li> <li>▪ To produce graduates who could develop understanding of diverse social background for collaborations and coexistence in the comity of nations</li> </ul>

**Appendage 3209****PROPOSED COURSE CODES - DPT**

Campus: BUMDC  
 Department: BUCPT  
 Program Title: DPT  
 Program Level: Graduate  
 Total Duration of Program: 5 Years+(One Year House Job)  
 Total Number of semesters: Ten

**For Curriculum 2011****Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	ANT 101	ANATOMY-I ( <b>THEORY</b> ) ANATOMY-I ( <b>PRACTICAL</b> )	4	3	1
2	-----	PHY 102	PHYSIOLOGY-I ( <b>THEORY</b> ) PHYSIOLOGY-I ( <b>PRACTICAL</b> )	3	2	1
3	-----	KNS 103	KINESIOLOGY-I ( <b>THEORY</b> ) KINESIOLOGY-I ( <b>PRACTICAL</b> )	3	2	1
4	-----	ENG 103	ENGLISH-I (FUNCTIONAL ENGLISH)	3	3	0
5	-----	PAK 101	PAKISTAN STUDIES	2	2	0
6	-----	BST 106	BIOSTATISTICS-I	3	3	0
<b>Total Credit Hours in Semester-1</b>				<b>18</b>		

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	ANT 107	ANATOMY-II ( <b>THEORY</b> ) ANATOMY-II ( <b>PRACTICAL</b> )	4	3	1
2	-----	PHY 108	PHYSIOLOGY-II ( <b>THEORY</b> ) PHYSIOLOGY-II ( <b>PRACTICAL</b> )	3	2	1
3	-----	KNS 109	KINESIOLOGY-II ( <b>THEORY</b> ) KINESIOLOGY-II ( <b>PRACTICAL</b> )	3	2	1
4	-----	ENG 104	ENGLISH-II	3	3	0

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			(COMMUNICATION SKILLS)			
5	-----	ISL 101	ISLAMIC STUDIES/ETHICS	2	2	0
6	-----	BST 112	BIOSTATISTICS-II / University optional	3	3	0
<b>Total Credit Hours in Semester-2</b>			<b>18</b>			

**Semester-3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	ENG 201	ENGLISH-III (Technical Writing & Presentation Skills)	3	3	0
2	-----	ITC 202	INTRODUCTION TO COMPUTER	3	2	1
3	-----	ANT 203	ANATOMY-III ( <b>THEORY</b> ) ANATOMY-III ( <b>PRACTICAL</b> )	3	2	1
4	-----	PHY 204	PHYSIOLOGY-III ( <b>THEORY</b> ) PHYSIOLOGY-III ( <b>PRACTICAL</b> )	3	2	1
5	-----	BIE 205	BIOMECHANICS & ERGNOMICS-I	3	3	0
6	-----	BIG 206	BIOCHEMISTRY & GENETICS-I	2	2	0
<b>Total Credit Hours in Semester-3</b>				<b>17</b>		

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	ANT 207	ANATOMY-IV (NEUROANATOMY) ( <b>THEORY</b> ) ANATOMY-IV (NEUROANATOMY) ( <b>PRACTICAL</b> )	3	2	1
2	-----	BIE 208	BIOMECHANICS & ERGNOMICS-II ( <b>THEORY</b> ) BIOMECHANICS & ERGNOMICS-II ( <b>PRACTICAL</b> )	3	2	1
3	-----	BPP 209	BEHAVIORAL SCIENCES (PSYCHIATRY & PSYCHOLOGY)	3	3	0
4	-----	BIG 210	BIOCHEMISTRY & GENETICS-II	2	2	0
5	-----	EPY 211	EXERCISE PHYSIOLOGY	3	3	0

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6	-----	MEP 212	MEDICAL PHYSICS (THEORY) MEDICAL PHYSICS (PRACTICAL)	3	2	1
<b>Total Credit Hours in Semester-4</b>				<b>17</b>		

**Semester-5**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	PAM 301	PATHOLOGY & MICROBIOLOGY I	2	2	0
2	-----	PHA 302	PHARMACOLOGY I	3	3	0
3	-----	PAE 303	PHYSICAL AGENTS & ELECTROTHERAPY I <b>(THEORY)</b> PHYSICAL AGENTS & ELECTROTHERAPY I <b>(PRACTICAL)</b>	3	2	1
4	-----	TET 304	THERAPEUTIC EXERCISES & TECHNIQUES <b>(THEORY)</b> THERAPEUTIC EXERCISES & TECHNIQUES <b>(PRACTICAL)</b>	3	2	1
5	-----	SOC 305	SOCIOLOGY	2	2	0
6	-----	HEW 306	HEALTH & WELLNESS	2	2	0
7	-----	SCP 307	SUPERVISED CLINICAL PRACTICE I <b>(PRACTICAL )</b>	3	0	3
<b>Total Credit Hours in Semester-5</b>				<b>18</b>		

**Semester-6**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	PAM 308	PATHOLOGY & MICROBIOLOGY II	2	2	0
2	-----	PHA 309	PHARMACOLOGY II	3	3	0
3	-----	PAE 310	PHYSICAL AGENTS & ELECTROTHERAPY II <b>(THEORY)</b> PHYSICAL AGENTS & ELECTROTHERAPY II	3	2	1

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		<b>(PRACTICAL)</b>				
4	-----	MAT 311	MANUAL THERAPY ( <b>THEORY</b> ) MANUAL THERAPY <b>(PRACTICAL)</b>	3	2	1
5	-----	TMC 312	TEACHING METHODOLOGY & COMMUNITY MEDICINE	3	3	0
6	-----	SCP 313	SUPERVISED CLINICAL PRACTICE II ( <b>PRACTICAL</b> )	3	0	3
<b>Total Credit Hours in Semester-6</b>				<b>17</b>		

**Semester-7**

<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1	-----	MED 401	MEDICINE I	3	3	0
2	-----	SUG 402	SURGERY I	3	3	0
3	-----	RDI 403	RADIOLOGY & DIAGNOSTIC IMAGING ( <b>THEORY</b> ) RADIOLOGY & DIAGNOSTIC IMAGING ( <b>PRACTICAL</b> )	3	2	1
4	-----	MPT 404	MUSCULOSKELETAL PHYSICAL THERAPY ( <b>THEORY</b> ) MUSCULOSKELETAL PHYSICAL THERAPY ( <b>PRACTICAL</b> )	3	2	1
5	-----	HDC 405	HUMAN GROWTH ,DEVELOPMENT & COMMUNITY BASED REHABILITATION	2	2	0
6	-----	SCP 406	SUPERVISED CLINICAL PRACTICE III ( <b>PRACTICAL</b> )	3	0	3
<b>Total Credit Hours in Semester-7</b>				<b>17</b>		

**Semester-8**

<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1	-----	MED 407	MEDICINE II	3	3	0

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2	-----	SUG 408	SURGERY II	3	3	0
3	-----	NPT 409	NEUROLOGICAL PHYSICAL THERAPY ( <b>THEORY</b> ) NEUROLOGICAL PHYSICAL THERAPY ( <b>PRACTICAL</b> )	3	2	1
4	-----	EBP 410	EVIDENCE BASED PRACTICE ( <b>THEORY</b> ) EVIDENCE BASED PRACTICE ( <b>PRACTICAL</b> )	3	2	1
5	-----	PRO 411	PROSTHETICS & ORTHOTICS	2	2	0
6	-----	SCP 412	SUPERVISED CLINICAL PRACTICE IV ( <b>PRACTICAL</b> )	3	0	3
<b>Total Credit Hours in Semester-8</b>				<b>17</b>		

**Semester-9**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	CPT 501	CARDIOPULMONARY PHYSICAL THERAPY ( <b>THEORY</b> ) CARDIOPULMONARY PHYSICAL THERAPY ( <b>PRACTICAL</b> )	3	2	1
2	-----	EPT 502	EMERGENCY PROCEDURES PRIMARY CARE IN PHYSICAL THERAPY	2	2	0
3	-----	CDD 503	CLINICAL DECISION MAKING & DIFFERENTIAL DIAGNOSIS	3	3	0
4	-----	SRM 504	SCIENTIFIC INQUIRY & RESEARCH METHODOLOGY ( <b>THEORY</b> ) SCIENTIFIC INQUIRY & RESEARCH METHODOLOGY ( <b>PRACTICAL</b> )	3	2	1
5	-----	PPL 505	PROFESSIONAL PRACTICE (LAWS, ETHICS & ADMINISTRATION)	2	2	0
6	-----	IPT 506	INTEGUMENTRY PHYSICAL	2	2	0

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			THERAPY			
7	-----	SCP 507	SUPERVISED CLINICAL PRACTISE V ( <b>PRACTICAL</b> )	3	0	3
<b>Total Credit Hours in Semester-9</b>				<b>18</b>		

**Semester-10**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	OGT 508	OBSTETRICS & GYNAECOLOGICAL PHYSICAL THERAPY	2	2	0
2	-----	PET 509	PAEDIATRIC PHYSICAL THERAPY	2	2	0
3	-----	GGT 510	GERONTOLOGY & GERIATRIC PHYSICAL THERAPY	2	2	0
4	-----	SPT 511	SPORTS PHYSICAL THERAPY	2	2	0
5	-----	SCP 512	SUPERVISED CLINICAL PRACTICE VI ( <b>PRACTICAL</b> )	4	0	4
6	-----	REP 513	RESEARCH PROJECT	6		
<b>Total Credit Hours in Semester-10</b>				<b>18</b>		

**Bahria University, Islamabad**

Campus: BUMDC  
 Department: BUCPT  
 Program Title: DPT  
 Program Level: Graduate  
 Total Duration of Program: 5 Years+(One Year House Job)  
 Total Number of semesters: Ten

**For Curriculum 2016****Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	----	ANT 101	ANATOMY –I (Theory) ANATOMY –I (Practical)	4	3	1
2	----	PHY 102	PHYSIOLOGY-I (Theory) PHYSIOLOGY-I (Practical)	3	2	1
3	----	KNS 103	KINESIOLOGY-I (Theory) KINESIOLOGY-I (Practical)	3	2	1
4	----	ENG 103	ENGLISH-I (FUNCTIONAL ENGLISH)	3	3	0
5	----	PAK 101	PAKISTAN STUDIES	2	2	0
6	----	ITC 106	INTRODUCTION TO COMPUTER	3	2	1
<b>Total Credit Hours in Semester-1</b>				<b>18</b>		

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	----	ANT 107	ANATOMY –II (Theory) ANATOMY –II (Practical)	4	3	1
2	----	PHY 108	PHYSIOLOGY-II (Theory) PHYSIOLOGY-II (Practical)	3	2	1
3	----	KNS 109	KINESIOLOGY-II (Theory) KINESIOLOGY-II (Practical)	3	2	1

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4	----	ENG 104	ENGLISH-II (COMMUNICATION SKILLS)	3	3	0
5	----	ISL 101	ISLAMIC STUDIES / ETHICS	2	2	0
6	----	SOC 112	SOCIOLOGY	2	2	0
<b>Total Credit Hours in Semester-2</b>			<b>17</b>			

**Semester-3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	----	ENG 201	ENGLISH-III (Technical Writing & Presentation Skills)	3	3	0
2	----	MEP 202	MEDICAL PHYSICS (Theory) MEDICAL PHYSICS (Practical)	3	2	1
3	----	ANT 203	ANATOMY –III (Theory) ANATOMY –III (Practical)	3	2	1
4	----	PHY 204	PHYSIOLOGY-III (Theory) PHYSIOLOGY-III (Practical)	3	2	1
5	----	BIE 205	BIOMECHANICS & ERGONOMICS-I	3	3	0
6	----	BIO 206	BIOCHEMISTRY I	2	2	0
<b>Total Credit Hours in Semester-3</b>			<b>17</b>			

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	----	ANT 207	ANATOMY-IV (Neuro Anatomy) (Theory) ANATOMY-IV (Neuro Anatomy) (Practical)	3	2	1
2	----	BIE 208	BIOMECHANICS &	3	2	1

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			<b>ERGONOMICS-II</b>			
3	----	HEW 209	HEALTH & WELLNESS	2	2	0
4	----	BIO 210	BIOCHEMISTRY II (Theory) BIOCHEMISTRY II (Practical)	3	2	1
5	----	EPY 211	EXERCISE PHYSIOLOGY (Theory) EXERCISE PHYSIOLOGY (Practical)	3	2	1
6	----	MBG 212	MOLECULAR BIOLOGY & GENETICS	2	2	0
<b>Total Credit Hours in Semester-4</b>				<b>16</b>		

**Semester-5**

<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1	----	PAM 301	PATHOLOGY & MICROBIOLOGY I	2	2	0
2	----	PHT 302	PHARMACOLOGY & THERAPEUTICS I	2	2	0
3	----	PAE 303	PHYSICAL AGENTS & ELECTROTHERAPY I (Theory) PHYSICAL AGENTS & ELECTROTHERAPY I (Practical)	3	2	1
4	-----	TET 304	THERAPEUTIC EXERCISES & TECHNIQUES (Theory) THERAPEUTIC EXERCISES & TECHNIQUES (Practical)	3	2	1
5	-----	BST 305	BIOSTATISTICS I	3	3	0
6	-----	BPE 306	BEHAVIORAL SCIENCES (PSYCHOLOGY & ETHICS)	2	2	0
7	-----	SCP 307	SUPERVISED CLINICAL PRACTICE I (Practical)	3	0	3
<b>Total Credit Hours in Semester-5</b>				<b>18</b>		

**Semester-6**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	PAM 308	PATHOLOGY & MICROBIOLOGY II (Theory) PATHOLOGY & MICROBIOLOGY II (Practical)	3	2	1
2	-----	PHT 309	PHARMACOLOGY & THERAPEUTICS II	2	2	0
3	-----	PAE 310	PHYSICAL AGENTS & ELECTROTHERAPY –II (Theory) PHYSICAL AGENTS & ELECTROTHERAPY –II (Practical)	3	2	1
4	-----	BST 311	BIOSTATISTICS II (university optional)	3	3	0
5	-----	CMR 312	COMMUNITY MEDICINE & REHABILITATION	3	3	0
6	-----	SCP 313	SUPERVISED CLINICAL PRACTICE II (Practical)	3	0	3
<b>Total Credit Hours in Semester-6</b>				<b>17</b>		

**Semester-7**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	MED 401	MEDICINE I	3	3	0
2	-----	SUG 402	SURGERY I	3	3	0
3	-----	RDI 403	RADIOLOGY & DIAGNOSTIC IMAGING (Theory) RADIOLOGY & DIAGNOSTIC IMAGING (Practical)	3	2	1
4	-----	MPT 404	MUSCULOSKELETAL	3	2	1

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			PHYSICAL THERAPY (Theory) MUSCULOSKELETAL PHYSICAL THERAPY (Practical)			
5	-----	EBP 405	EVIDENCE BASED PRACTICE (Theory) EVIDENCE BASED PRACTICE (Practical)	3	2	1
6	-----	SCP 406	SUPERVISED CLINICAL PRACTICE III (Practical)	3	0	3
<b>Total Credit Hours in Semester-7</b>				<b>18</b>		

**Semester-8**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	MED 407	MEDICINE II	3	3	0
2	-----	SUG 408	SURGERY II	3	3	0
3	-----	NPT 409	NEUROLOGICAL PHYSICAL THERAPY (Theory) NEUROLOGICAL PHYSICAL THERAPY (Practical)	3	2	1
4	-----	SRM 410	SCIENTIFIC INQUIRY & RESEARCH METHODOLOGY (Theory) SCIENTIFIC INQUIRY & RESEARCH METHODOLOGY (Practical)	3	2	1
5	-----	EPT 411	EMERGENCY PROCEDURES & PRIMARY CARE IN PHYSICAL THERAPY (Theory) EMERGENCY PROCEDURES & PRIMARY CARE IN	3	2	1

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			<b>PHYSICAL THERAPY (Practical)</b>			
6	-----	SCP 412	SUPERVISED CLINICAL PRACTICE IV (Practical)	3	0	3
<b>Total Credit Hours in Semester-8</b>				<b>18</b>		

**Semester-9**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-----	CPT 501	CARDIOPULMONARY PHYSICAL THERAPY (Theory) CARDIOPULMONARY PHYSICAL THERAPY (Practical)	3	2	1
2	-----	PRO 502	PROSTHETICS & ORTHOTICS	2	2	0
3	-----	CDD 503	CLINICAL DECISION MAKING & DIFFERENTIAL DIAGNOSIS	3	3	0
4	-----	MAT 504	MANUAL THERAPY (Theory) MANUAL THERAPY (Practical)	3	2	1
5	-----	PPL 505	PROFESSIONAL PRACTICE (LAWS , ETHICS &ADMINISTRATION)	2	2	0
6	-----	IPT 506	INTEGUMENTRY PHYSICAL THERAPY (Theory)	2	2	0
7	-----	SCP 507	SUPERVISED CLINICAL PRACTICE V (Practical)	3	0	3
<b>Total Credit Hours in Semester-9</b>				<b>18</b>		

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**Semester-10**

<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1	-----	OGT 508	OBSTETRICS & GYNAECOLOGICAL PHYSICAL THERAPY	2	2	0
2	-----	PET 509	PAEDIATRIC PHYSICAL THERAPY	2	2	0
3	-----	GGT 510	GERONTOLOGY & GERIATRIC PHYSICAL THERAPY	2	2	0
4	-----	SPT 511	SPORTS PHYSICAL THERAPY	2	2	0
5	-----	SCP 512	SUPERVISED CLINICAL PRACTICE VI (Practical)	4	0	4
6	-----	REP 513	RESEARCH PROJECT	6		
<b>Total Credit Hours in Semester-10</b>				<b>18</b>		

**PROPOSED COURSE CODES – MLT (MEDICAL LAB TECHNOLOGY)**

Campus: BAHRIA UNIVERSITY MEDICAL AND DENTAL COLLEGE KARACHI  
 Department: MEDICAL LAB TECHNOLOGY  
 Program Title: MLT-MEDICAL LAB TECHNOLOGY  
 Program Level: UNDERGRADUATE  
 Total Duration of Program: 4 YEAR  
 Total Number of semesters: 8 SEMESTER

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MBC 101	Medical Biochemistry -I	4	3	1
2		HPH 102	Human Physiology-I	4	3	1
3		HAT 103	Human Anatomy-I	4	3	1
4		ENG 103	English -I	2	2	0
5		PAK 101	Pakistan Studies	2	2	0
6		CSK 106	Computer Skills	2	1	1
<b>Total Credit Hours in Semester-1</b>				<b>18</b>		

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MBC 107	Medical Biochemistry -I	4	3	1
2		HPH 108	Human Physiology-II	4	3	1
3		HAT 109	Human Anatomy-II	3	2	1
4		ENG 104	English -II	2	2	0
5		GPT 111	General Pathology-I	3	2	1
6		ISL 101	Islamic Studies	2	2	0
<b>Total Credit Hours in Semester-2</b>				<b>18</b>		

**Semester-3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		GPH 201	General Pharmacology -I	3	2	1
2		HMT 202	Hematology -I	3	2	1
3		HGN 203	Human Genetics	3	2	1
4		DMB 204	Diagnostic Microbiology -I	3	2	1
5		GPT 205	General Pathology-II	3	2	1
<b>Total Credit Hours in Semester-3</b>				<b>15</b>		

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		GPH 206	General Pharmacology y-II	3	2	1
2		DMB 207	Diagnostic Microbiology-II	3	2	1
3		HMT 208	Hematology -I	3	2	1
4		CPT 209	Chemical Pathology	3	2	1
5		CVM 210	Clinical Virology and Mycology	3	2	1
6		BSC 211	Behavioral Sciences	2	2	
<b>Total Credit Hours in Semester-4</b>				17		

**Semester-5**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		WPD 301	WBCS and Platelets Disorders	3	2	1
2		HPT 302	Histopathology	3	2	1
3		CPS 303	Clinical Parasitology	3	2	1
4		CPT 304	Clinical Pathology	3	2	1
5		BTC 305	Biotechnology	3	2	1
<b>Total Credit Hours in Semester-5</b>				15		

**Semester-6**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MLI 306	Medical Laboratory Instrumentation	3	2	1
2		BSS 307	Biostatistics	3	2	1
3		IAS 308	Immunology and Serology	3	2	1
4		RMT 309	Research Methodology	3	2	1
5		BLB 310	Blood Banking	3	2	1
<b>Total Credit Hours in Semester-6</b>				15		

**Semester-7**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MLM 401	Medical Laboratory Management Skills	3	2	1

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2		FIC 402	Fundamental of Infection Control	3	2	1
3		MCB 403	Molecular Biology	3	2	1
4		EPD 404	Epidemiology	2	2	0
5		SDB 405	Systematic Diagnostic Bacteriology	3	2	1
6		CAC 406	Cytology and Cytogenetics	3	2	1
<b>Total Credit Hours in Semester-7</b>				17		

**Semester-8**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		RPT 407	Research Project	6	6	0
2		SMR 408	Seminar	1	1	0
3		MSC 409	Medical Sociology	3	2	1
4		BIN 410	Bioinformatics	2	1	1
5		CSK 411	Communication Skills	3	2	1
<b>Total Credit Hours in Semester-8</b>				15		

**PROPOSED COURSE CODES - BS (NURSING) PROGRAMME**

Campus: PNS SHIFA HOSPITAL KARACHI  
 Department: PAKISTAN NAVY NURSING COLLEGE (PNNC)  
 Program Title: NURSING 4-YEAR DEGREE PROGRAMME  
 Program Level: BACHELOR / UNDERGRADUATE LEVEL  
 Total Duration of Program: 4 YEARS  
 Total Number of semesters: EIGHT

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Total Credit Hours	Theory	Clinical	Skills/Lab
1	-	FON101	Fundamental of Nursing-I	4	2	-	2
2	-	MIC 102	Microbiology	3	2.5	-	0.5
3	-	ANP 103	Anatomy and Physiology-I	3	3	-	-
4	-	BIO 104	Biochemistry for Nurses	3	2	-	1
5	-	ENG 103	English-I	2	2	-	-
6	-	COS 106	Computer Skills	1	1	-	1
<b>Total Credit Hours in Semester-1</b>				16	11.5	-	4.5

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Total Credit Hours	Theory	Clinical	Skills/Lab
1	FON 101	FON 107	Fundamental of Nursing-II	4	2	1	1
2	ANP 103	ANP 108	Anatomy and Physiology-II	3	-	-	-
3	-	CHN 109	Community Health Nursing-I	3	2	1	-
4	-	APP 110	Applied Nutrition	1	1	-	-
5	ENG 103	ENG 104	English-II	2	2	-	-
6	-	ISL 101	Islamic Studies	2	2	-	-
7	-	PAK 101	Pakistan Studies	2	2	-	-
<b>Total Credit Hours in Semester-2</b>				17	11	2	1

**Semester-3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Total Credit Hours	Theory	Clinical	Skills/Lab
1	-	AHN 201	Adult Health nursing-I	8	4	3	1
2	-	PTH 202	Pathophysiology-I	2	1.75	-	0.25
3	-	HEA 203	Health Assessment-I	2	1	-	1
4	-	PHR 204	Pharmacology-I	2	2	-	-
5	-	MAT 205	Mathematics	1	1	-	-
6	ENG 104	ENG 112	English-III	2	2	-	-
<b>Total Credit Hours in Semester-3</b>				17	11.75	3	2.25

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Total Credit Hours	Theory	Clinical	Skills/ Lab
1	AHN 201	AHN 207	Adult Health nursing-II	8	4	3	1
2	PTH 202	PTH 208	Pathophysiology-II	3	2.75	-	0.25
3	HEA 203	HEA 209	Health Assessment-II	2	1	-	1
4	-	DVP 210	Developmental psychology	2	2	-	-
5	PHR 204	PHR 211	Pharmacology-II	2	2	-	-
6	ENG 112	ENG 212	English-IV	2	2	-	-
7.	-	NRE 213	Nursing Ethics	1	1	-	-
<b>Total Credit Hours in Semester-4</b>				20	14.75	3	2.25

**Semester-5**

Sr.N o.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Clinical	Skills/ Lab
1	-	PHN 301	Paediatric Health Nursing	7	3	3	1
2	CHN 109	CHN 302	Community Health Nursing	6	2.5	2.5	1
3	-	TEL 303	Teaching/Learning: Principles/Practices	3	3	-	-
4	ENG 212	ENG 304	English V	2	2	-	-
<b>Total Credit Hours in Semester-5</b>				18	10.5	5.5	2

**Semester-6**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Clinical	Skills/Lab
1	-	MHN 305	Mental Health Nursing	6	3	3	-
2	-	INB 306	Introduction to Biostatistics	3	2.5	-	0.5
3	-	BHP 307	Behavioral psychology	3	3	-	-
4	-	EPI 308	Epidemiology	2	2	-	-
5	ENG 304	ENG 315	English-VI	2	2	-	-
6	-	CHS 210	Culture, Health and Society	2	2	-	-
<b>Total Credit Hours in Semester-6</b>				18	14.5	3	0.5

**Semester-7**

Sr.No	Pre-requisite course code	Course Code	Course Title	Total Credit Hours	Theory	Clinical	Skills/ Lab
1	-	CCN 401	Critical Care Nursing	7	2.5	4	0.50
2	-	INT 402	Introduction to Nursing Theories	2	2	-	-
3	-	LIV 403	Leadership and Management in Nursing	3	2	1	-
4	-	NUR 404	Nursing Research	3	3	-	-
5	ENG 315	ENG 415	English VII	2	2	-	-
<b>Total Credit Hours in Semester-7</b>				17	11.5	5	0.50

**Semester-8**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Clinical	Tutorial
1	CHN 109,302	CHN 406	Community Health Nursing-III	5	2	3	-
2	-	NST 407	Nursing Seminar/Role Transition	2	2	-	-
3	-	CLP 408	Clinical Practicum	5	-	4	1
<b>Total Credit Hours in Semester-8</b>				12	4	7	1

**Updated Road Maps with Course Codes MPhil Programs BUMDC****Bahria University Medical & Dental College, Karachi**Department: AnatomyProgram Title: MPhil AnatomyTotal Duration of Program: Two yearsTotal Number of semesters: Four**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 701	Research Methodology	3+0	3	0
2		MED 712	Medical Biology & Genetics	2+0	2	0
3		MED 713	Medical Education, Ethics & Writing	2+0	2	0
4		MED 714	Instruments & Animal use in research	2(1+1)	1	1
5		MED 715	Journal Club (Essential)-1	No credit hour	0	0
6		MED 718	Teaching Internship (Essential)-1	No credit hour	0	0
<b>Total Credit Hours in Semester-1</b>				9	8	1

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		ANA 730	Neuro-Anatomy with Head & Neck	3(2+1)	2	1
2		ANA 731	GIT with related abnormalities	3(2+1)	2	1
3		XXX XXX	Elective-I	3 (2+1)	2	1
4		MED 716	Journal Club (Essential)-2	No credit hour	0	0
5		MED 719	Teaching Internship (Essential)-2	No credit hour	0	0
<b>Total Credit Hours in Semester-2</b>				9	6	3

**Semester-3****Semester-1 & Semester-2 are Pre-requisite to proceed to Semester -3**

<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1		XXX XXX	Elective-II	3 (2+1)	2	1
2		XXX XXX	Elective-III	3 (2+1)	2	1
3		THS 700	Thesis-I	3+0	3	0
4		MED 717	Journal Club (Essential)-3	No credit hour	0	0
5		MED 720	Teaching Internship (Essential)-3	No credit hour	0	0
6						
<b>Total Credit Hours in Semester-3</b>				9	7	2

**Semester-4**

<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1	THS 700	THS 701	Thesis-II	3+0	3	0

**List of Elective Courses**

<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1		MED 706	Tissue processing	3(1+2)	1	2
2		MED 708	Cadaveric dissection	3(1+2)	1	2
3		MED 709	Advanced microscopic techniques	3(1+2)	1	2
4		ANA 732	Microscopic structure of Tissue	3(2+1)	2	1
5	ANA 730 ANA 731	ANA 733	Developmental Anatomy	3(2+1)	2	1
6	ANA 730 ANA 731	ANA 734	Musculoskeletal system	3(2+1)	2	1
7	ANA 730 ANA 731	ANA 735	Cardiovascular & Respiratory system	3(2+1)	2	1
8	ANA 730 ANA 731	ANA 736	Urogenital system	3(2+1)	2	1

9	ANA 730 ANA 731	ANA 737	Reticulo-Endothelial system	3(2+1)	2	1
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Campus: Bahria University Medical & Dental College KarachiDepartment: PathologyProgram Title: MPhil PathologySub-Specialities: 1.Histopathology (H)2.Microbiology (M)Total Duration of Program: Two YearsTotal Number of semesters: Four**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 701	Research Methodology	3+0	3	0
2		MED 712	Medical Biology & Genetics	2+0	2	0
3		MED 713	Medical Education, Ethics & Writing	2+0	2	0
4		MED 714	Instruments & Animal use in research	2 (1+1)	1	1
5		MED 715	Journal Club (Essential)-1	No credit hour	0	0
6		MED 718	Teaching Internship (Essential)-1	No credit hour	0	0
<b>Total Credit Hours in Semester-1</b>				9	8	1

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		PAT 740	General & Special Pathology -I(H) Basic Microbiology(M)	3(2+1)	2	1
2		PAT 741	Special Pathology-II(H) Special bacteriology& Mycology(M)	3(2+1)	2	1
3		XXX XXX/ XXX XXX	Elective- I	3(1+2)	1	2
4		MED 716	Journal Club (Essential)-2	No credit hour	0	0
5		MED 719	Teaching Internship (Essential)-2	No credit hour	0	0
6						
<b>Total Credit Hours in Semester-2</b>				9	5	4

**Semester-3**  
**Semester-1 & Semester-2 are Pre-requisite to proceed to Semester -3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		XXX XXX/ XXX XXX	Elective-II	3(1+2)	1	2
2		XXX XXX/ XXX XXX	Elective-III	3(1+2)	1	2
3		THS 700	Thesis-I	3+0	3	0
4		MED 717	Journal Club (Essential)-3	No credit hour	0	0
5		MED 720	Teaching Internship (Essential) -3	No credit hour	0	0
6						
<b>Total Credit Hours in Semester-3</b>				9	5	4

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	THS 700	THS 701	Thesis-II	3+0	3	0
<b>Total Credit Hours in Semester-4</b>				3	3	0

**List of Elective Courses**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	PAT 740	PAT 742	Tissue processing for histopathology	3(1+2)	1	2
2	PAT 741	PAT 746	Microbiology laboratory - procedures & reporting	3(1+2)	1	2
3		PAT 743	Histopathology laboratory procedures &reporting	3(1+2)	1	2
4		PAT 745	Molecular pathology laboratory- related to tissue	3(1+2)	1	2

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			pathology			
5		PAT 749	Parasitology	3(1+2)	1	2
6		PAT 748	Virology	3(1+2)	1	2
7	PAT 740 PAT 741	PAT 744	Endocrine & Renal disorders	3(1+2)	1	2
8	PAT 740 PAT 741	PAT 747	Molecular pathology laboratory- related to infectious diseases	3(1+2)	1	2

Campus: Bahria University Medical & Dental College, Karachi.

Department: Pharmacology

Program Title: MPhil Pharmacology

Program Level: -

Total Duration of Program: Two Years

Total Number of semesters: Four

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 701	Research Methodology	3+0	3	0
2		MED 712	Medical Biology & Genetics	2+0	2	0
3		MED 713	Medical Education, Ethics & Writing	2+0	2	0
4		MED 714	Instruments & Animal use in research	2(1+1)	1	1
5		MED 715	Journal Club (Essential)-1	No credit hour	0	0
6		MED 718	Teaching Internship (Essential)-1	No credit hour	0	0
<b>Total Credit Hours in Semester-1</b>				9	8	1

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		PHM 721	Pharmacological concepts & Adrenergic Pharmacology	3(2+1)	2	1

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2		PHM 722	Cholinergic & Cardio-Respiratory Pharmacology	3+0	3	0
3		XXX XXX	Elective -I	3+0	3	0
4		MED 716	Journal Club (Essential)-2	No credit hour	0	0
5		MED 719	Teaching Internship (Essential)-2	No credit hour	0	0
6						
<b>Total Credit Hours in Semester-2</b>				9	8	1

**Semester-3**

**Semester-1 & Semester-2 are Pre-requisite to proceed to Semester -3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		XXX XXX	Elective-II	3+0	3	0
2		XXX XXX	Elective-III	3+0	3	0
3		THS 700	Thesis-I	3+0	3	0
4		MED 717	Journal Club (Essential)-3	No credit hour	0	0
5		MED 720	Teaching Internship (Essential)-3	No credit hour	0	0
6						
<b>Total Credit Hours in Semester-3</b>				9	9	0

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	THS 700	THS 701	Thesis-II	3+0	3	0
<b>Total Credit Hours in Semester-4</b>				3	3	0

**List of Elective Courses**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 706	Tissue Processing	2+1	2	1
2		MED 707	Drug Bio-screening & Herbal Medications	2+1	2	1
3		PHM 723	Neuropharmacology	3+0	3	0
4	PHM 721 PHM 722	PHM 724	Endocrine & Gastrointestinal	3+0	3	0

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			<b>Pharmacology</b>			
5	PHM 721 PHM 722	PHM 725	Chemotherapy	3+0	3	0
6	PHM 721 PHM 722	PHM 726	Toxicology	3+0	3	0
7	PHM 721 PHM 722	PHM 727	Pharmacogenetics	3+0	3	0
8	PHM 721 PHM 722	PHM 728	Autacoids & Analgesics	3+0	3	0
9	PHM 721 PHM 722	PHM 729	Age specific Pharmacotherapy	3+0	3	0
10	PHM 721 PHM 722	PHM 730	Dental Pharmacology	3+0	3	0

**Appendage 3211****REVIEW OF CURRICULUM OF BS (MARITIME BUSINESS AND MANAGEMENT)****Bahria University, Karachi Campus**

Campus: Bahria University, Karachi Campus  
 Department: Humanities & Social Sciences  
 Program Title: BS (Maritime Business and Management)  
 Program Level: Under Graduate  
 Total Duration of Program: 4 Years  
 Total Number of semesters: 8 Semesters  
 Total Credit Hours: 135 Credit Hours

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		ENG 105	Functional English	3	Yes	-
2		MAT 105	Mathematics	3	Yes	-
3		ITC 101	IT Skills	3	Yes	-
4		ECO 101	Fundamentals of Economics	3	Yes	-
5		MTM 101	Introduction to Maritime Industry	3	Yes	-
6		MGT 211	Self-Management	3	Yes	-
<b>Total Credit Hours in Semester-1</b>				18		

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MGT 111	Principles of Management	3	Yes	-
2	ENG 105	BCM 121	Business Communication Skills	3	Yes	-
3		ISI 100/SOC 361	Islamic Studies/Ethics	3	Yes	-
4	MTM 101	GEO 115	Introduction to Geophysics	3	Yes	-
5		MTM 120	Introduction to Meteorology &	3	Yes	-

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			Oceanography			
6		HSS 202	Introduction to Sociology	3	Yes	-
<b>Total Credit Hours in Semester-2</b>			<b>18</b>			

**Semester-3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTM 230	Introduction to Maritime Law and International Maritime Convention	3	Yes	-
2		ENG 132	Oral Communication & Public Speaking Skills	3	Yes	-
3		PAK 101	Pakistan Studies	3	Yes	-
4		FIN 205	Fundamentals of Accounting and Finance	3	Yes	-
5	ECO 101	MTM 202	Economics of Sea Transport & International Trade	3	Yes	-
6		MGT 221	Management and Leadership	3	Yes	-
<b>Total Credit Hours in Semester-3</b>				<b>18</b>		

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTM 222	Introduction to Coastal Zone Management	3	Yes	-
2		MTM 223	Marine Insurance	3	Yes	-
3		MTM 224	Marine Pollution & Control	3	Yes	-
4		MTM 226	Regulatory Framework of Maritime Organizations	3	Yes	-
5		MAT 205	Statistics	3	Yes	-
6		HSS 225	Psychological & Emotional Development	3	Yes	-
<b>Total Credit Hours in Semester-4</b>				<b>18</b>		

**Semester-5**

<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1		MTM 304	Port Operations and Management	3	Yes	-
2		MTM 305	Maritime Logistics	3	Yes	-
3	MTM 225	MTM 303	Law of Carriage of Goods by Sea	3	Yes	-
4	MGT 221	MKT 110	Principles of Marketing	3	Yes	-
5		HRM353	Human Resource Management	3	Yes	-
6		MIS 460	E-Commerce	3	Yes	-
<b>Total Credit Hours in Semester-5</b>				18		

**Semester-6**

<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1		MTM 306	Shipping Operations and Management	3	Yes	-
2		MTM 322	Fisheries Resources & Management	3	Yes	-
3		MRM 302	Research & Project Writing Methods	3	Yes	-
4			Elective	3	Yes	-
5			Elective	3	Yes	-
6			Elective	3	Yes	-
<b>Total Credit Hours in Semester-6</b>				18		

**Semester-7**

<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1		MTM 401	Coastal Eco-Tourism Development and Management	3	Yes	-
2		MTM 402	Hydrographic Data & Services Management/Hydrography & Navigation	3	Yes	-
3	MTM 322	MTM 403	Maritime Innovation & Entrepreneurship	3	Yes	-

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4			Elective	3	Yes	-
5			Elective	3	Yes	-
<b>Total Credit Hours in Semester-7</b>			<b>15</b>			

**Semester-8**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	MRM 302	SDW 499	Project / Thesis	6	Yes	-
2			Elective	3	Yes	-
3			Elective	3	Yes	-
<b>Total Credit Hours in Semester-8</b>			<b>12</b>			

**List of Elective Courses**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTM 501	Maritime Business: China Pakistan Perspective under CPEC	3	Yes	-
2		MTM 521	Maritime Business and HRM	3	Yes	-
3		MTM 522	Design Port Management	3	Yes	-
4		MTM 504	Maritime Management: Concept and Applications	3	Yes	-
5		MTM 505	Contemporary Issues of Maritime Management	3	Yes	-
6		MTM 506	Maritime Management in Pakistan: Past, Present and Future	3	Yes	-
7		ECO 521	Marine Technology	3	Yes	-
8		ECO 515	Union and Labor Laws	3	Yes	-
9		ECO 502	Industrial Economics	3	Yes	-
10		MTM 508	Occupational Health and Safety, Risk and Disaster Management	3	Yes	-
11		MTM 523	Ship Chartering	3	Yes	-
12		HRM 508	Marine Environments and Administration	3	Yes	-
13		MTM 524	Custom Documentation	3	Yes	-

**Appendage 3212****REVIEW OF TITLE AND CURRICULUM - BS (ECONOMICS)**

Campus: Bahria University, Karachi Campus  
 Department: Humanities & Social Sciences  
 Program Title: BS (Economics and Finance)  
 Program Level: Under Graduate  
 Total Duration of Program: 4 Years  
 Total Number of semesters: 8 Semesters  
 Total Credit Hours: 135 Hours

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		ENG 105	Functional English	3	Yes	-
2		QTM 101	Business Math (for Economists)	3	Yes	-
3		ECO 110	Microeconomics- I	3	Yes	-
4		MIS 161	IT Skills (Word, Excel)	3	Yes	-
5		HSS 108	Introduction to Sociology	3	Yes	-
6		MGT 111	Principles of Management	3	Yes	-
<b>Total Credit Hours in Semester-1</b>				18		

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		ISL 101	Islamic Studies	3	Yes	-
2		QTM 105	Introduction to Statistics	3	Yes	-
3		QTM 120	Numeracy Skills	3	Yes	-
4		ECO 121	Macroeconomics-I	3	Yes	-
5	ECO 110	ECO 111	Microeconomics-II	3	Yes	-
6		FIN107	Financial Accounting	3	Yes	-
<b>Total Credit Hours in Semester-2</b>				18		

**Semester-3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		PAK 101	Pakistan Studies	3	Yes	-
2		ECO 203	Digitalization of Economy and Artificial Intelligence	3	Yes	-
3	ECO 121	ECO 122	Macroeconomics-II	3	Yes	-
4		ECO 123	Issues in Pakistan's Economy	3	Yes	-
5	ENG 105	ENG 105	Oral Communication (Public Speaking Skills)	3	Yes	-
6	QTM 101	QTM 204	Statistical Inference	3	Yes	-
<b>Total Credit Hours in Semester-3</b>				18		

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		FIN 315	Fundamentals of Econometrics	3	Yes	-
2		ECO 311	Economics of Entrepreneurs	3	Yes	-
3		ECO 304	Business Taxation and Public Finance	3	Yes	-
4		RMT 240	Research Methods & Techniques	3	Yes	-
5		FIN 201	Fundamentals of Finance	3	Yes	-
6		BCM 304	Business Communication Skills	3	Yes	-
<b>Total Credit Hours in Semester-4</b>				18		

**Semester-5**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		ECO 204	Financial Management	3	Yes	-
2	FIN 315	FIN 316	Financial Econometrics and Modeling	3	Yes	-
3		ECO 361	Managerial Economics	3	Yes	-
4		MGT 311	Career Exploring Management	3	Yes	-

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5		ECO 317	Monetary Theory & Policy	3	Yes	-
<b>Total Credit Hours in Semester-5</b>				15		

**Semester-6**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		ECO 320	Resource and Environmental Economics	3	Yes	-
2		HSS 301	Social and Psychological Development	3	Yes	-
3		FIN 321	Finance of Emerging Markets	3	Yes	-
4		FIN 322	Money and Banking	3	Yes	-
5		FIN 323	Financial Markets	3	Yes	-
<b>Total Credit Hours in Semester-6</b>				15		

**Semester-7**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	RMT 240	MGT 401	Project Management and Evaluation	3	Yes	-
2		MGT 402	Self-Management	3	Yes	-
3			Elective-1	3	Yes	-
4			Elective-2	3	Yes	-
5			Elective-3	3	Yes	-
6			Elective-4	3	Yes	-
<b>Total Credit Hours in Semester-7</b>				18		

**Semester-8**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MGT 403	Corporate Skills	3	Yes	-
2			Elective-5	3	Yes	-
3			Elective-6	3	Yes	-
4	RMT 240 MGT 401	SDW 404	Project / Thesis	6	Yes	-
<b>Total Credit Hours in Semester-15</b>				15		

**List of Elective Courses**

S. No	Course Code	Previous Courses	CH
1.	ECO 502	Industrial Economics	3
2.	ECO 503	Budgeting and Financial Planning	3
3.	ECO 504	Advanced Topics in Microeconomics	3
4.	ECO 505	Advanced Topics in Macroeconomics	3
5.	DST 506	Poverty & Income Distribution	3
6.	HSS 507	International Economics	3
7.	ECO 508	Labor Economics	3
8.	FIN 509	Investment Banking & Security Analysis	3
9.	ECO 510	Islamic Economics	3
10.	ECO 511	Urban Economics	3
11.	ECO 512	Regulation and Competition Policy	3
12.	HSS 514	Union and Labor Laws	3
13.	ECO 516	Agriculture Economics and Food Security	3
14.	ECO 517	Economic Perspective and Public Policy	3
15.	MGT 512	Corporate Law and Governance	3
16.	ECO 518	Financial Risk Management	3
17.	FIN 516	Introduction to Microfinance	3
18.	FIN 521	Introduction to Financial Inclusions	3
19.	FIN 654	Marketing Financial Services	3
20.	FIN 611	Corporate Finance	3
21.	FIN 612	Analysis of Financial Statement	3
22.	FIN 615	Financial derivative	3
23.	FIN 613	Portfolio Analysis and Management	3
24.	FIN 690	Financial modeling	3

**Appendage 3213****REVIEW OF TITLE AND ROAD MAP OF MS (MARITIME AFFAIRS)**

Campus: Bahria University, Karachi Campus  
 Department: Humanities & Social Sciences  
 Program Title: MS (Maritime Ports and Shipping Management)  
 Program Level: PostGraduate  
 Total Duration of Program: 2 Years  
 Total Number of semesters: 4 Semesters  
 Total Credit Hours: 36 Hours

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTM 701	Maritime Industry: Pakistan and China in Global Perspective	3	Yes	-
2		MTM 702	Ports and Shipping Management in Contemporary Environments	3	Yes	-
3		MTM 703	Maritime Law and International Maritime Convention	3	Yes	-
4		MTM 704	Maritime Economics and Finance	3	Yes	-
<b>Total Credit Hours in Semester-1</b>				12		

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTM 705	Coastal Zone Management and Contemporary Issues	3	Yes	-
2		MTM 706	Marine Insurance, Risk and Disaster Management	3	Yes	-
3			Elective	3	Yes	-

<b>Total Credit Hours in Semester-2</b>	9		
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**Semester-3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		RMT 705	Research Methodology and Proposal Development	3	Yes	-
2			Elective	3	Yes	-
3			Elective	3	Yes	-
<b>Total Credit Hours in Semester-3</b>				9		

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	RMT 705	SDW 790	Thesis	6	Yes	-
<b>Total Credit Hours in Semester-4</b>				6		

**List of Elective Courses**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTM 750	Maritime Trade and Industrial Economics	3	Yes	-
2		MTM 711	Logistics at Ports and Supply Chain Management	3	Yes	-
3		MTM 712	Hydrographic Data and Service Management	3	Yes	-
4		MTM 753	Chartering Practices and Ship Brokering	3	Yes	-
5		MTM 754	Intermodal Transportation	3	Yes	-
6		MTM 713	Maritime Logistics and Shipping	3	Yes	-
7		MTM 756	Marine Resources &	3	Yes	-

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			Environment			
8		MTM 757	Tourism, Fish & Food Processing	3	Yes	-
9		MTM 758	Ocean Governance Policy and Maritime Law	3	Yes	-
10		MTM 759	Introduction to Maritime Geophysics Geology	3	Yes	-
11		MTM 714	Dynamics of Maritime Domains	3	Yes	-
12		MTM 761	Maritime Security Issues and Strategies	3	Yes	-
13		MTM 762	Management of Oceanic Resources	3	Yes	-

**Appendage 3214****REVIEW OF ROAD MAP OF MS (MARITIME TRADE AND LOGISTICS)**

Campus: Bahria University, Karachi Campus  
 Department: Humanities & Social Sciences  
 Program Title: MS (Maritime Trade and Logistics)  
 Program Level: PostGraduate  
 Total Duration of Program: 2 Years  
 Total Number of semesters: 4 Semesters  
 Total Credit Hours: 36 Hours

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTM 710	Maritime Industry: Pakistan and China in Global Perspective	3	Yes	-
2		MTM 711	Maritime Trade and Logistics: Emerging Global Realities and Issues	3	Yes	-
3		MTM 712	Maritime Strategy: Overview and Impacts on Trade and Commerce	3	Yes	-
4		MTM 713	Maritime Transport: Legal Framework and Issues in the Contemporary Environments	3	Yes	-
<b>Total Credit Hours in Semester-1</b>				12		

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTM 714	Supply Chain Management in Maritime Business and Trade	3	Yes	-
2		MTM 715	International Business	3	Yes	-

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			and Economics: China Pakistan Perspective			
3			Elective	3	Yes	-
<b>Total Credit Hours in Semester-2</b>				9		

**Semester-3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		RMT 705	Research Methodology and Proposal Development	3	Yes	-
2			Elective	3	Yes	-
3			Elective	3	Yes	-
<b>Total Credit Hours in Semester-3</b>				9		

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	RMT 705	SDW 790	Thesis	6	Yes	-
<b>Total Credit Hours in Semester-4</b>				6		

**List of Elective Courses**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTM 750	Maritime Trade and Industrial Economics	3	Yes	-
2		MTM 771	Globalization and Maritime Trade: Contemporary Issues and Resolving Strategies	3	Yes	-
3		MTM 772	Maritime Technologies and Commercial Applications	3	Yes	-
4		MTM 773	Maritime Business Management under BRI and CPEC	3	Yes	-
5		MTM 774	Ports and Logistics Management	3	Yes	-
6		MTM 775	Tanker Operations: Management under	3	Yes	-

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			Contemporary Security Dynamics			
7		MTM 776	Ship Security: Threats, Financial and Commercial Implications	3	Yes	-
8		MTM 777	Coastal Zone Management and Maritime Emergency Preparations	3	Yes	-
9		MTM 778	Custom Clearing and Freight Forwarding	3	Yes	-
10		MTM 779	LNG Shipping	3	Yes	-

**REVIEW OF COURSES TITILE OF CERTIFICATE AND DIPLOMA OF CHINESE LANGUAGE****PROGRMS**

Campus: Bahria University, Karachi Campus  
 Department: Humanities & Social Sciences  
 Program Title: Chinese Language  
 Program Level: Certificate  
 Total Duration of Program: 6 Months  
 Total Number of semesters: 1 Semester

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		CHE 101	Comprehensive Chinese -I	3		
2		CHE 102	Reading & Writing Skill-I	3		
3		CHE 103	Listening Comprehension-I	3		
4		CHE 104	Oral Skills	3		
<b>Total Credit Hours in Semester-1</b>				<b>12</b>		

Campus: Bahria University, Karachi Campus  
 Department: Humanities & Social Sciences  
 Program Title: Chinese Language  
 Program Level: Diploma  
 Total Duration of Program: 1 Year  
 Total Number of semesters: 2 Semesters

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		CHE 101	Comprehensive Chinese -I	3		
2		CHE 102	Reading & Writing Skill-I	3		
3		CHE 103	Listening Comprehension-I	3		
4		CHE 104	Oral Skills	3		
<b>Total Credit Hours in Semester-1</b>				<b>12</b>		

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<b>Sr.No.</b>	<b>Pre-requisite course code</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Theory</b>	<b>Practical</b>
1		CHE 121	Comprehensive Chinese-II	3		
2		CHE 122	Reading & Riding Skills-II	3		
3		CHE 123	Listening Comprehension-II	3		
4		CHE 124	Oral Skills-II	3		
<b>Total Credit Hours in Semester-2</b>				12		

**Appendage 3217**

**CHANGE OF FORMAT POSTGRADUATE DIPLOMA (LOGISTICS & PORT MANAGEMENT) FROM  
TRIMESTER TO BI-SEMESTER**

Campus: Bahria University, Karachi Campus  
 Department: Humanities and Social Sciences  
 Program Title: PGD (Logistics & Port Management)  
 Program Level: Post Graduate Diploma  
 Total Duration of Program: 1 Year  
 Total Number of Semesters: 2 Semesters  
 Total Credit Hours: 30 Hours

**Semester-1**

Sr. No.	Pre-requisite Course Code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MTM 501	Fundamentals of Maritime Sector	3	Yes	-
2		MTM 503	Port Development, Operations & Management	3	Yes	-
3		MTM 504	Shipping Operations and Management	3	Yes	-
4		MTM 514	Admiralty, Shipping & Marine Environmental Law	3	Yes	-
5		BEN 511	Business English	3	Yes	-
<b>Total Credit Hours in Semester-1</b>				15		

**Semester-2**

Sr. No.	Pre-requisite Course Code	Course Code	Course Title	Credit Hours	Theory	Practical
1.		ACC 501	Financial Accounting	3	Yes	-
2.		MTM 508	Logistics, Supply Chain	3	Yes	-

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			Management & Methods			
3		MGT 514	Theories & Practices of Management	3	Yes	-
4			Maritime Elective	3	Yes	-
5			Maritime Elective	3	Yes	-
<b>Total Credit Hours in Semester-2</b>				15		

## Appendage 3218

### **REVIEW OF CURRICULUM - MS IN (SOFTWARE ENGINEERING)**

#### **Proposed for Spring 2019 and onward**

##### **Vision Statement of the Department:**

Department aims to be recognized as a leader in software Engineering education and research through excellence in education and targeted research themes in emerging areas of software Engineering disciplines.

##### **Mission Statement of the Program**

The mission of the Masters of Science (Software Engineering) program is to equip students with theoretical and applied knowledge of Software Engineering which is helpful in the design & development of complex software systems. Moreover, it is aimed to prepare students to enhance further in their careers in industry or academia through advanced software engineering knowledge in both applied and research domain.

##### **Admission Eligibility Criteria**

HEC recognized 4 years Bachelor's Degree or equivalent in a relevant computing discipline (Software Engineering, Computer Science, IT, Computer Engineering, Information Systems & Informatics or equivalent) with a minimum CGPA of 2.5/4.0 or 50% marks where CGPA is not given. The following courses (or equivalent) are pre-requisite for the MS Software Engineering program:

1. Introduction to Software Engineering
2. Object Oriented Programming
3. Data Structure & Algorithms

Students will be required to complete the deficiency courses (as mentioned above) if required. Additionally, applicants must provide HEC verification of all academic degrees and transcripts as per BU rules.

##### **Program Educational Objectives**

1. Prepare graduates who can critically apply concepts, theories and practices to provide creative solutions of complex computing problems.
2. Prepare graduates with a theoretical software engineering background and applied research needed to enter a doctorate program in relevant domains of computing or pursue a research career in Industry.
3. Prepare graduates who are able to join an appropriate and respectable level position in a computing related field and to maintain their professional skills in rapidly evolving field.

##### **Learning Outcomes of the Degree Program**

The MS SE program offers the following learning outcomes by which students are:

- Able to demonstrate an understanding of advanced knowledge of the practice of software, from vision to analysis, design, validation, and deployment
- Able to tackle complex engineering problems and tasks, using contemporary engineering principles, methodologies, and tools
- Able to understand research aspects of software engineering and its relevant domain
- Able to communicate effectively, in both oral and written forms

**MS Software Engineering Roadmap**

Bahria University, Islamabad

Campus: [BUIC & BUKC](#)  
 Department: [Software Engineering](#)  
 Program Title: [MS Software Engineering](#)  
 Program Level: [Postgraduate](#)  
 Total Duration of Program: [2 Years](#)  
 Total Number of semesters: [4 Semester](#)

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-	SEN 522	Advanced Software System Architecture	3	3	0
2	-	SEN 558	Advanced Requirement Engineering	3	3	0
3	-	ESC 701	Research Methodology	3	3	0
<b>Total Credit Hours in Semester-1</b>				<b>9</b>		

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-	SEN 547	Software Testing and Quality Assurance	3	3	0
2	-		Elective I	3	3	0
3	-		Elective II	3	3	0
<b>Total Credit Hours in Semester-2</b>				<b>9</b>		

**Semester-3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-		Elective III	3	3	0
2	-		Elective IV	3	3	0
3	-	ESC 600	Thesis I / (Elective V)	3	3	0
<b>Total Credit Hours in Semester-3</b>				<b>9</b>		

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-	ESC 600	Thesis II / (Elective VI)	3	3	0
<b>Total Credit Hours in Semester-4</b>				<b>3</b>		
<b>Total Program Credit Hours</b>				<b>30</b>		

**Core Courses**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-	SEN 522	Advanced Software System Architecture	3	3	0
2	-	SEN 547	Software Testing and Quality Assurance	3	3	0
3	-	SEN 558	Advanced Requirement Engineering	3	3	0
4	-	ESC 701	Research Methodology	3	3	0

**List of Elective Courses DOMAIN ELECTIVE COURSES**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-	SEN 523	Automated Software Engineering	3	3	0
2	-	SEN 546	Software Metrics	3	3	0
3	-	SEN 601	Advanced Software Project Management	3	3	0
4	-	SEN 602	Agile Software Development Methods	3	3	0
5	-	SEN 603	Complex Networks	3	3	0
6	-	SEN 720	Advanced Human-Computer Interaction	3	3	0
7	-	SEN 723	Formal Methods and Specifications	3	3	0
8	-	SEN 754	Advanced Web Computing System and Application	3	3	0
9	-	SEN 755	Service-Oriented Computing	3	3	0
10	-	SEN 756	Advanced Usability Engineering	3	3	0
11	-	SEN 758	Component-based Software Engineering	3	3	0
12	-	SEN 759	Software Re-Engineering	3	3	0
13	-	SEN 760	Complex Adaptive Systems	3	3	0

14	-	SEN 762	Advanced Big Data Analytics	3	3	0
15	-	SEN 763	Advanced Software Engineering	3	3	0
16	-	SEN 764	Ontology Engineering	3	3	0
17	-	SEN 774	IoTs Architecture, Protocols & Applications	3	3	0

Note: (Minimum 2 of the above courses)

#### GENERAL ELECTIVE COURSES

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	-	CSC 504	Ubiquitous Computing	3	3	0
2	-	CSC 521	Advanced Design and Analysis of Algorithm	3	3	0
3	-	CSC 704	Advanced Cryptography	3	3	0
4	-	CSC 708	Advanced Simulation and Modeling	3	3	0
5	-	CSC 711	Advanced Artificial Intelligence	3	3	0
6	-	CSC 719	Machine Learning	3	3	0
7	-	CSC 720	Advanced Operating Systems	3	3	0
8	-	CSC 741	Advanced Natural Language Processing	3	3	0
9	-	CSC 744	Advanced Computer Graphics	3	3	0
10	-	CSC 746	Advanced Data Mining	3	3	0
11	-	CSC 750	Advanced Neural Networks	3	3	0
12	-	CSC 751	Pattern Recognition	3	3	0
13	-	CSC 753	Distributed Databases	3	3	0
14	-	CSC 759	Agent-based Modeling	3	3	0
15	-	CSC 760	Advanced Data Warehousing	3	3	0
16	-	CSC 764	Computer Vision	3	3	0
17	-	CSC 765	BioMedical Image Analysis	3	3	0
18	-	CSC 781	Cloud Computing	3	3	0
19	-	SEN 604	Blockchain Technologies	3	3	0
20	-	DSC 707	Deep Learning	3	3	0
21	-	CEN 707	Advanced Distributed Systems	3	3	0
22	-	CEN 720	Advanced Computer Architecture	3	3	0
23	-	CEN 745	Advanced Digital Image Processing	3	3	0

24	-	GSC 700	Advanced Engineering Mathematics	3	3	0
25	-	EET 702	Advanced Network Security	3	3	0

Note: (Minimum 2 of the above courses)

### Course outlines

**Course Title:** Advanced Software System Architecture

**Course Code:** SEN 522

**Credit Hours:** 3

#### Course Description:

The course teaches how large, complex software systems are designed and their system level architecture and class level object oriented designs are developed. There is a special emphasis on the study of architectural and design patterns: the core of solutions to commonly occurring design problems; representations of design/architecture; architectural assessment; product lines; architecture extraction; and refactoring. A very special focus will be given to the architectural patterns and state of the art software architectures related to the evolving technology spectrum. In this regard, novel concepts such as workflows, Service Oriented Architecture (SOA), Web 2.0 and Cloud Computing and large scale distributed systems will also be discussed. Students will be given assignments based on different case studies. Students will also be required to read suggested research papers and compile their original ideas in (at least one) research paper(s)/report(s).

#### Reference Books:

- Bass, L, Clements, P., & Kazman, R. (2012). *Software Architecture in Practice*. 3<sup>rd</sup> Edition. Pearson Education Inc.
- Duggan, D. (2012). *Enterprise Software Architecture & Design: Entities, Services & Resources*. John Wiley & Sons Publishers.
- Fairbanks, G.H. (2010). *Just Enough Software Architecture: A Risk Driven Approach*. Marshall & Brainerd Publishers.

**Course name:** Software Testing and Quality Assurance

**Course Code:** SEN 547

**Credit Hours:** 3

#### Course Description:

This course takes off by providing an overview of fundamental notions of software testing and quality assurance techniques used to build and check quality in software systems. A particular emphasis is placed on quantitative assessment of software quality and quality control using software testing techniques. The students would not only be introduced with the theoretical background of these concepts but they would also be given hands on experience of applying these concepts.

Once, a sound background is updated, students are focused on advanced concepts such as slicing, test suite reduction techniques, test case prioritization, TMMI, etc. The students are

given a sound understanding of ISO 9001:2008 and CMMI where they are able to practically implant these in their respective organizations. This course introduces the student fundamental notions of software quality and the techniques used to build and check quality in software systems.

A particular emphasis is placed on quantitative assessment of software quality and quality control using software testing techniques. The students would not only be introduced with the theoretical background of these concepts but they would also be given hands on experience of applying these concepts. The assignments would be planned carefully to enhance students' learning of applying the learned concepts from a practical standpoint. The assignments are planned carefully to enhance students' learning of applying the learned concepts from a practical standpoint.

**Reference Books:**

- Myers, G. J., Sanders, C., & Badgett, T. (2015). *The Art of Software Testing*, 3<sup>rd</sup> Edition, John & Wiley Inc.
- Laporte, C. Y., & April, A. (2018). *Software Quality Assurance*, Wiley.

**Course Title: Advanced Requirements Engineering**

**Course Code: SEN 558**

**Credit Hours: 3**

**Course Description:**

This course exposes students to the problem of determining and specifying what a proposed software system should do, why and for whom the system is needed; not how the system should do it, which is the topic of downstream software engineering activities such as design and coding. There are some nontechnical aspects of the course, with respect to communication and negotiation with multiple stakeholders. Most of the course covers technical approaches to the requirements problem, such as techniques for eliciting stakeholder goals and requirements, notations and models for documenting and specifying requirements, and techniques for analyzing requirements. The course is a practical guide to Requirements engineering and upon completion of this course, the students will be able to:

- Understand how to analyze a system and its scope, stakeholders etc. Knowledge of techniques available to ensure competence in complete and efficient elicitation requirements
- Understand the different types of documentation options available at different levels of the requirements process and the content required
- How to write good quality natural language requirements, some common issues associated with writing them and possible tools to assist in consistency
- How to ensure a good requirements management process, considering grouping, visualization and movement and traceability of requirements through the process
- To know how to apply the learned concepts, knowledge, and techniques to solve real world problems
- Understanding the need for research on selected topics in requirements engineering.

**Reference Books:**

- Dick, J., Hull, E., & Jackson, K. (2017). *Requirements engineering*. Springer.
- Hatley, D., Hruschka, P., & Pirbhai, I. (2013). *Process for system architecture and requirements engineering*. Addison Wesley.
- Hofmann, H. F. (2013). *Requirements engineering: a situated discovery process*. Springer Verlag.

**Course name: Research Methodology**

**Course Code: ESC 701**

**Credit Hours: 3**

**Course Description:**

This course presents a basic understanding of the principles involved in the research. RM, as compared to any other engineering courses, is not a subject that one may master it by securing a good grade but it comes with experience. this course, however, introduces the basic logic and principal involved. it will give you an understanding of the research and your role to effectively and synergistically participate in it. Students shall be able to take on independent research tasks and will be able to produce one IEEE style conference paper.

Broadly, the course covers the following aspects:

- Research types and 'The scientific method of research'
- Literature Review – Searching & Review
  - Forward and backward literature search
  - Organization of literature
  - Different between an annotated bibliography and comprehensive literature review
- Research Design and Methods
- Choosing a research problem & Supervisor (MS, Ph.D.)
- Formulating the research question, identifying variables and generating a hypothesis
- Introduction to bibliographic management tools and brief introduction on Latex
- Writing the literature review, Plagiarism and ways to avoid it
  - Introduction to 'Turnitin' or any other plagiarism detection tool
- Formulating the research question, identifying variables and generating a hypothesis
- Sampling: Selection of samples
- Data Analysis, Interpretation and presentation
- Thesis Manuscript writing and tool utilization (e.g. latex)
- Writing a research proposal for funding/grants
- Publishing Research in Conferences, Journals, and Paper Reviewing
- Planning & Delivering Scientific Presentation

**Reference Books:**

- Bryman, A. & Bell, E. (2011). *Business Research Methods*. 3<sup>rd</sup> Edition, Oxford University Press.
- Wieringa, R.J. (2014). *Design Science Methodology for Information System & Software Engineering*. Springer

- Stappleton, N. (2013). *Advancing Research Methods with New Technologies*. Information Science Reference.
- Wayne, C. B., Colomb, G.G., & Willams, J. M. (2009). *The craft of Research*, Third Ed (Chicago Guides to Writing, Editing, and Publishing).

**Course name:** Automated Software Engineering

**Course Code:** SEN 523

**Credit Hours:** 3

**Course Description:**

Introduction to Automated Software Engineering, What is Automation, Automation in SE, Why, When and Limitations, When to and when not to automate, Automated Software Project Management, Automated Communication Management, Automated Software Quality Management and Quality Audit, Automated Requirement Management, Automated Requirement Management, Requirement Traceability, Automated Quality Assurance and Testing, Software Quality Assurance and Testing, Automated Test Case Generation, Automated Configuration and Change Management, Examples of CASE TOOL, SPM, SQM, SQA, REM and CCM CASE TOOL.

**Reference Books:**

- Stanev, I., Grigorova, K. (2012). *Knowledge Based Automated Software Engineering*. Cambridge Scholars Publishing.
- Storr, A., & Jarvis, D. H. (2013). *Software Engineering for Manufacturing Systems: Methods and CASE tools*. Chapman & Hall.

**Course name:** Software Metrics

**Course Code:** SEN 546

**Credit Hours:** 3

**Course Description:**

This course offers state of the art knowledge of software measurements and best practices with emphasis on the value of software measurement as a set of pragmatic methodologies and tools for both software engineers and software project management. After completing this course student will have a good understanding of nature and problems associated with software measurement and experimentation, software measurement planning and implementation (incl. data collection and analysis), software size measurement (Function Point counting, etc.), software cost estimation (COCOMO II model and tool, etc.), software resource, process, and product (i.e., product structure, complexity, quality, and reliability) measurement.

**Reference Books:**

- Fenton, N., & Bieman, J. (2014). *Software Metrics: A rigorous and practical approach*, 3<sup>rd</sup> Edition, CRC Press.
- Nicolette, D. (2015). *Software Development Metrics*. Manning Publications.

**Course name: Advanced Software Project Management**

**Course Code: SEN 601**

**Credit Hours: 3**

**Course Description:**

This course deals with managing information technology and software development projects. It is not restricted to project managers but encompasses the art and science of using teamwork to meet project goals. The team includes the project manager, lead developers, software engineers, supporting functions, business experts and other stakeholders. Therefore, this course is directed to students across a wide range of backgrounds and interests. The student will learn how to conceptualize, initiate, plan and execute a successful project. Students will participate in a competitive team effort to propose a major design project.

Students will be able to:

- recognize the principles of general management theory which transfer to project management
- apply techniques for successfully managing a project throughout its life cycle
- interpret the processes and knowledge areas in the Project Management Institute's Project Management Body of Knowledge
- formulate the determination of success as a measurable organizational value
- consider the human side of projects including participation in a team project
- understand the propositions of software design by the legendary Fred Brooks

**Reference Books:**

- Marchewka, J. (2012). *Information Technology Project Management*, 4th Edition. John Wiley & Sons.
- Brooks, F. (2010). *The Design of Design: Essays from a Computer Scientist*, Pearson Education.
- Fairley, R. E. (2011). *Managing and Leading Software Projects*. John Wiley & Sons.

**Course name: Agile Software Development Methods**

**Course Code: SEN 602**

**Credit Hours: 3**

**Course Description:**

In software problem areas that require exploratory development efforts, those with complex requirements and high levels of change, agile software development practices are highly effective when deployed in a collaborative, people centered organizational culture. This course examines agile methods, including Extreme Programming (XP), Scrum, Lean, Crystal, Dynamic Systems Development Method and Feature Driven Development to understand how rapid realization of software occurs most effectively. The ability of agile development teams to rapidly develop high quality, customer valued software is examined and contrasted with teams following more traditional methodologies that emphasize planning and documentation. Students will learn agile development principles and techniques covering the

entire software development process from problem conception through development, testing, and deployment, and will be able to effectively participate in and manage agile software developments as a result of their successfully completing this course. Case studies and software development projects are used throughout.

**Reference Books:**

- Maximini (2015). *The Scrum Culture: Introducing Agile Methods in Organization*. Springer.
- Ashmore & Runyan (2014). *Introduction to Agile Methods*. Pearson Education Inc.

**Course name: Complex Networks**

**Course Code: SEN 603**

**Credit Hours: 3**

**Course Description:**

This course covers theory and modeling of real world networks such as a computer, social, and biological networks where the underlying topology is a dynamically growing complex graph. Many phenomena in nature can be modeled as a network. Researchers from many areas including biology, computer science, engineering, epidemiology, mathematics, physics, and sociology have been studying complex networks of their field. Scale free networks and small world networks are well known examples of complex networks where power law degree distribution and high clustering are their respective characteristic feature. These networks have been identified in many fundamentally different systems. Complex networks display non trivial topological features that require an in depth study.

**Reference Books:**

- Barabasi, A. (2016). *Network Science*, Cambridge University Press.
- Gros, C. (2015). *Complex and Adaptive Dynamical Systems*, Springer.

**Course name: Advance Human Computer Interaction**

**Course Code: SEN 720**

**Credit Hours: 3**

**Course Description:**

The aim of this course is to provide extensive guideline to the students for the design of computer technology, and how computer technology can be made more usable by people. It takes research oriented approach to providing students with specialized human computer interaction (HCI) knowledge as they grapple with designing, prototyping and testing a device or software application to solve a problem. The main topics covers including human factors, interaction design, cognitive aspects, social and emotion interaction, interfaces, prototyping and construction, data gathering, designing HCI experiments, evaluation studies. Upon completion of this course, students will be able to:

- Comprehend different approaches used in human computer interaction domain
- Understand and analyze different kinds of interfaces

- Understand cognitive aspects for designing and testing a device or software application
- Apply HCI techniques and methods to the design of software

**Reference Books:**

- Mackenzie, S. (2013). *Human Computer Interaction: An Empirical Research Perspective*. Elsevier Ltd.
- Rogers, Y., Sharp, H., & Preece, J. (2011). *Interaction Design: Beyond Human Computer Interaction*. 3<sup>rd</sup> Edition, John Wiley & Sons.
- Cipolla Ficarra, F. V. (2014). *Advanced Research and Trends in New Technologies, Software, Human Computer Interaction, and Communicability*. IGI Global.
- Kurosu, M. (2013). *Human Computer Interaction: Human Centered Design Approaches*. Springer.
- Purchase, H. C. (2013). *Experimental Human Computer Interaction. A Practical Guide with Visual Examples*.

**Course name: Formal Methods and Specifications**

**Course Code: SEN 723**

**Credit Hours: 3**

**Course Description:**

As more complex computational systems are used within critical applications, it is becoming essential that these systems are formally specified. Such specifications are used to give a precise and unambiguous description of the required system. While this is clearly important in critical systems such as industrial process management and air/spacecraft control, it is also becoming essential when applications involving E commerce and mobile code are developed. In addition, as computational systems become more complex in general, the formal specification can allow us to define the key characteristics of systems in a clear way and so help the development process. Formal specifications provide the basis for verification of properties of systems. While there are a number of ways in which this can be achieved, the model checking approach is a practical and popular way to verify the temporal properties of finite state systems. Indeed, such temporal verification is widely used within the design of critical parts of integrated circuits, has recently been used to verify parts of the control mechanism for one of NASA's space probes, and is now beginning to be used to verify general Java programs.

Upon completing this module, a student will understand: the principles of standard formal methods, such as Z; the basic notions of temporal logic and its use in relation to reactive systems; the use of model checking techniques in the verification of reactive systems; be aware of some of the current research issues related to formal methods.

**Reference Books:**

- Alagar, V. S. & Periyasamy, K. (2011). *Specification of Software Systems*, 2nd Edition, Springer.
- Monin, J. (2012). *Understanding Formal Methods*, Springer.

**Course name: Advanced Web Computing System and Application**

**Course Code: SEN 754**

**Credit Hours: 3**

**Course Description:**

The course aims to enable students to understand the emerging trends in the Web application development. It will enable students to understand the core issues related to the development of systematic, cost effective and quality Web application.

**Reference Books:**

- Keig, A. (2013). *Advanced Express Web Application Development*. Packt Publishing Ltd.
- Velasquez, J. D., Jain, L. C. (Eds.) (2010). *Advanced Techniques in Web Intelligence* 1. Springer.

**Course name: Service Oriented Computing**

**Course Code: SEN 755**

**Credit Hours: 3**

**Course Description:**

This course covers architectures for Web applications based on the classical publish, find, and bind triangle, but formulates it at a higher level. It considers sophisticated approaches for the description, discovery, and engagement of Web services. This course emphasizes Web service composition. Key topics include semantics, transactions, processes, agents, quality of service, compliance, and trust.

**Reference Books:**

- Griffiths, N., & Chao, K. (Eds.) (2010). *Agent based Service oriented Computing*, Springer.
- McDonald, N. (2016). *High Performance Service oriented Computing*.

**Course name: Advanced Usability Engineering**

**Course Code: SEN 756**

**Credit Hours: 3**

**Course Description:**

The course objective is to introduce a product's design considerations that should be taken into account right from the beginning of the product inception. Subsequently, evaluation based upon usability principles will be discussed.

**Reference Books:**

- Rebelo, F., & Soares, M.M. (Eds.) (2013). *Advances in Usability Evaluation*. Taylor & Francis Group.
- Richter, M., & Fluckiger, M. (2014). *User Centered Engineering: Creating Products For Humans*. Springer.

- Spiliotopoulos, T., Papadopoulou, P., Martakos, D., Kouroupetroglou, G. (2010). *Integrating Usability Engineering For Designing The Web Experience: Methodologies and Principles*. IGI Global.
- Garcia Ruiz, M. A. (2013). *Cases on Usability Engineering: Design And Development Of Digital Products*.

**Course name:** Component based Software Engineering

**Course Code:** SEN 758

**Credit Hours:** 3

**Course Description:**

The course focuses on an approach to software development based on extensive use of pre-existing standard (or customizable) components. It also illustrates how a repository of reusable candidate components can be integrated into a typical evolutionary process model. The Component based Software Engineering process involves identifying candidate components; qualify each component interface and adapting components.

**Reference Books:**

- Lau, K., & Di Cola, S. (2017). An Introduction to Component based Software Development, Vol 3, World Scientific.
- Bruegge, B. & Dutoit, A. H. (2009). *Object Oriented Software Engineering: Using UML, Patterns, and Java*, 3rd Edition, Prentice Hall.

**Course name:** Software Re engineering

**Course Code:** SEN 759

**Credit Hours:** 3

**Course Description:**

This course covers software re-engineering techniques and tools that facilitate the evolution of legacy systems. This course is broken into three major parts. In the first part, the course discusses the terminology and the processes pertaining to software evolution. In the second part, the course provides the fundamental re-engineering techniques to modernize legacy systems. These techniques include source code analysis, architecture recovery, and code restructuring. The last part of the course focuses on specific topics in software re-engineering research. The topics include software refactoring strategies, migration to Object Oriented platforms, quality issues in re-engineering processes, migration to network centric environments, and software integration. Students would learn:

- Introduction to software re-engineering
- Program comprehension
- Software re-engineering techniques in source code transformation and refactoring strategies
- Software metrics & quality
- Re engineering economics
- Techniques for the migration of legacy systems into network centric environments
- Software integration issues and enabling technologies in web enabled and distributed environments.

**Reference Books:**

- Birchall, C. (2016). *Re engineering Legacy Software*. Manning Publications.
- Ryan,C. (2012). *Automatic Re-engineering of Software Using Genetic Programming*. Springer.

**Course name: Complex Adaptive System**

**Course Code: SEN 760**

**Credit Hours: 3**

**Course Description:**

The main goal of the course is to understand Complex Adaptive Systems theory and its relation to the socio technical systems around us. The course primarily integrates theories and methodologies from human factors and human computer interaction to provide design guidelines and recommendations. Moreover, the course provides a road map for all steps in system design process including conception, analysis, design, and implementation consideration for complex adaptive system. Secondary goal is for the student to learn about the basics of Agent Based Modeling and its significant realization in real world examples.

**Reference Books:**

- Wilensky, U., & Rand, W. (2015). *An Introduction to Agent Based Modeling: Modeling Natural, Social, and Engineered Complex Systems with NetLogo*. MIT Press.
- Hou, M., Banbury, S., & Burns, C. (2014). *Intelligent Adaptive Systems: An Interaction Centered Design Perspective*, CRC Press.

**Course name: Advanced Big Data Analytics**

**Course Code: SEN 762**

**Credit Hours: 3**

**Course Description:**

This course shall provide the fundamental knowledge to equip students being able to handle those challenges. This discipline inherently involves many fields. Because of its importance and broad impact, new software and hardware tools and algorithms are quickly emerging. A data scientist needs to keep up with these ever changing trends to be able to create a state of the art solution for real world challenges.

This Big Data Analytics course shall first introduce the overview applications, market trend, and the things to learn. Then, students shall be introduced fundamental platforms, such as Hadoop, Spark, and other tools, such as IBM System G for Linked Big Data. Afterward, the course will introduce several data storage methods and how to upload, distribute, and process them. This shall include HDFS, HBase, KV stores, document database, and graph database. The course will go on to introduce different ways of handling analytics algorithms on different platforms. Then, students shall introduce visualization issues and mobile issues on Big Data Analytics. Students will then have a fundamental knowledge of Big Data Analytics to handle various real world challenges. Course will also focus on large scale machine learning methods that are foundations for artificial intelligence and cognitive networks. The course will discuss several methods to optimize the analytics based on different hardware platforms,

such as Intel & Power chips, GPU, FPGA, etc. The lectures will conclude with the introduction of the future challenges of Big Data, especially on the ongoing Linked Big Data issues which involve graphs, graphical models, spatiotemporal analysis, cognitive analytics, etc.

**Reference Books:**

- EMC Education Services (2015), *Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data*, Wiley.
- Provost, F., & Fawcett, T. (2013). *Data Science for Business: What You Need to Know about Data Mining and Data Analytic Thinking*, O'Reilly Media.
- Foreman, J.W. (2013). *Data Smart: Using Data Science to Transform Information into Insight*, Wiley.

**Course name: Advanced Software Engineering**

**Course Code: SEN 763**

**Credit Hours: 3**

**Course Description:**

This course defines a systematic approach to software development using the object oriented paradigm. The student should be able to fully understand the fundamental concepts, benefits, and applicability of object orientation. The student should gain application experience of the concepts through the use of an object oriented analysis and design methodology and software development in an object oriented language.

**Reference Books:**

- Dogru, A.H., & Bicer, U. (2010). *Modern Software Engineering Concepts and Practices: Advanced Approaches*. Information Science Reference.
- Ocboa, S. F., & Roman, G. (Eds.) (2009). *Software Engineering: Expanding the Frontiers of Software Technology*. Springer.

**Course name: Ontology Engineering**

**Course Code: SEN 764**

**Credit Hours: 3**

**Course Description:**

The course will provide students with a theoretical and practical understanding of leading edge solutions for the Semantic Web. It will introduce students to the W3C standard Web Ontology Language, OWL, and its underlying Description Logics. It will provide students with experience using a set of established patterns for developing OWL ontologies and help them to learn to avoid the major pitFalls in using OWL. It will give them an opportunity to become familiar with a widely used environment for developing and an API for applying OWL ontologies and making use of reasoning services accessible via both.

Ontologies provide rich, expressive vocabularies of terms describing a domain (e.g. medicine, astronomy, music etc.) They are key to the development of the next generation of the Web, support a number of activities such as information exchange, data integration, and search. This unit will provide an introduction to OWL, a standardized language for the representation

of ontologies. It will cover the syntax and semantics of the language; authoring ontologies (including the use of standard design patterns); the use of reasoning and the use of ontologies in applications.

**Reference Books:**

- Keet, M. (2014). Lecture Notes Ontology Engineering. Department of Computer Science, University of Cape Town, South Africa.
- Allemang, D. & Hendler, J. (2011). Semantic Web for the Working Ontologist. 2nd Edition, Elsevier Inc.
- De Pablos, Ordóñez (2013). Advancing Information Management through Semantic Web Concepts and Ontologies. IGI Global.
- Sheth, A. (2013). Semantic Web Ontology and Knowledge Based Enabled Tools, Services and Applications. IGI Global.
- Duchame, B. (2013). Learning SPARQL.O" Reilly.

**Course Title:** IoT Architecture, Protocols & Applications

**Course Code:** SEN 774

**Credit Hours:** 3

**Course Description:**

This course aims at building the necessary background and foundation about IoTs. Basic IoT concepts covering architecture, PHY and MAC layer protocols along with enabling technologies (i.e., machine 2 machine communication) are the essential part of this course. Some advanced application of IoTs such as smart city, smart grid, and smart homes is also discussed. Main goal of this course is to teach different theories, concepts and building blocks involved in IoTs architectures for developing smart applications.

**Reference Books:**

- Waher, P. (2015). *Learning Internet of Things*, Packt Publishing.
- Lea, P. (2018). *Internet of Things for Architects: Architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security*, Packt Publishing.

**Course name:** Ubiquitous Computing

**Course Code:** CSC 504

**Credit Hours:** 3

**Course Description:**

This course will teach the basics of ubiquitous computing (also known as pervasive computing) as well as the basics of research, including reading research papers, speaking and presentation, formulating research questions, and empirical investigation.

**Reference Books:**

- Poslad, S. (2011). *Ubiquitous Computing: Smart Devices, Environments and Interactions*, Wiley.
- Krumm, J. (2016). *Ubiquitous Computing Fundamentals*, CRC Press.

- Kuniavsky, M. (2010). *Smart Things: Ubiquitous Computing User Experience Design*, Elsevier.

**Course name:** Advanced Design and Analysis of Algorithm

**Course Code:** CSC 521

**Credit Hours:** 3

**Course Description:**

This course introduces students to advanced concepts for designing and analyzing algorithms. The effect of data structures on program design is investigated. The uses of data structures and algorithms in a variety of application areas are covered. The focus is on algorithmic thinking, performance guarantees and boundary cases, and efficient solutions to practical problems. Advanced topics will cover a selection of modern algorithms, many of which come from real world applications.

**Reference Books:**

- Sedgewick, R., & Flajolet, P. (2013). *An Introduction to the Analysis of Algorithms*, 2<sup>nd</sup> Edition, Addison Wesley.
- Vrajitou, D., & Knight, W. (2014). *Practical Analysis of Algorithms*, Springer.
- Kozen, D.C. (2012). *The Design and Analysis of Algorithms*, Springer.

**Course name:** Advanced Cryptography

**Course Code:** CSC 704

**Credit Hours:** 3

**Course Description:**

This course focuses on modern cryptography. It includes building blocks such as one way functions, pseudo random number generation, encryption, and digital signatures, protocols and applications such as information security, secure network communication, secure cloud computing, and privacy preserving data analytics. Fundamental security properties, cryptographic constructions, and their applications are emphasized.

**Reference Books:**

- Katz, J., Lindell, Y. (2014). *Introduction to Modern Cryptography*, 2<sup>nd</sup> Edition, CRC Press.
- Ferguson, N., Schneier, B., & Kohno, T. (2011). *Cryptography Engineering: Design Principles and Practical Applications*, by Niels Ferguson, Bruce Schneier and Tadayoshi Kohno, Wiley Publishing Inc.

**Course name:** Advanced Simulation and Modeling

**Course Code:** CSC 708

**Credit Hours:** 3

**Course Description:**

As simulation is increasingly applied to more complex applications, exploiting efficiencies in model design and model execution becomes a challenging task. The aim of this course is to provide students with the ability to model, simulate and analyze complex systems within a

reasonable time. This course is divided into three parts and covers advanced techniques in simulation model design, model execution, and model analysis. A selection of model design techniques such as conceptual models, declarative models, functional models, constraint models, and multi models will be discussed. Model execution techniques include discussion of serial and parallel discrete event simulation algorithms. For model analysis, topics include input output analysis, variance reduction techniques and experimental design. Present concepts of computer based modeling and simulation applicable to various domains of engineering and science. Provide theoretical concepts, methods, and hands on experience with object oriented modeling and simulation. Students are expected to gain a solid foundation and associated experience for a computer based toolset for constructing, simulating and analyzing models of complex systems.

**Reference Books:**

- Zeigler, B.P., & Sarjoughian, H.S. (2011). *Guide to Modelling and Simulation of Systems of Systems*, 2<sup>nd</sup> Edition, Springer.
- Murin, J., Kompis, V., & Kutis, V. (2010). *Computational Modelling and Advanced Simulations*, Springer.
- Sokolowski, J.A., & Banks, C.M. (2011). *Principles of Modelling and Simulation: A Multidisciplinary Approach*. Wiley.

**Course name: Advanced Artificial Intelligence**

**Course Code: CSC 711**

**Credit Hours: 3**

**Course Description:**

This course will present advanced topics in Artificial Intelligence (AI). It will begin by defining the term "software agent" and discussing how software agents differ from programs in general. We will then take a look at those problems in the field of AI that tend to receive the most attention. Different researchers approach these problems differently. In this course, we will focus on how to build and search graph data structures needed to create software agents, an approach that you will find useful for solving many problems in AI. Students will also learn to "break down" larger problems into a number of more specific, manageable sub problems.

**Reference Books:**

- Zhongci, S. (2011). *Advanced Artificial Intelligence*, World Scientific.
- Bibel, W. et al. (2014). *Fundamentals of Artificial Intelligence: An Advanced Course*, Springer Berlin Heidelberg.

**Course Title:** Machine Learning

**Course Code:** CSC 719

**Pre Requisite:** None

**Course Description:**

This course is an overview of concepts and techniques in machine learning, beginning with topics such as classification and linear regression and ending up with more recent topics such as boosting, support vector machines, hidden Markov models, and Bayesian networks. The

course will give the student the basic ideas behind modern machine learning methods. Salient contents of the course are: Introduction to Machine Learning, Concept learning, Decision tree learning, Linear models for regression, Linear models for classification, Artificial neural networks, Kernel methods, Sparse kernel machines, Mixture models and the EM algorithm, Evaluation, Combining multiple learners, Support vector machines, Bayesian networks.

**Reference Books:**

- Kelleher, J.D., Namee, B.M., & D'Arcy, A. (2017). *Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies*. MIT Press, 1st Edition, 2017.
- Chapman, J. (2017). *Machine Learning: Fundamental Algorithms for Supervised and Unsupervised Learning With Real World Application*, 2nd Edition, 2017.

**Course name:** Advanced Operating System

**Course Code:** CSC 720

**Credit Hours:** 3

**Course Description:**

The operating systems course is of prime importance in the curriculum of any graduate or undergraduate program in computer science. This course deals with advanced concepts with relevance to the graduate level study. It has been designed using references of similar courses being offered at accredited universities. The intention is to deliver the state of art operating system concepts ranging from embedded microkernels to popular platforms like LINUX, SOLARIS, Windows 2000 and XP. The focus will be on the internals, architecture, device driver writing and the distributed processing support on multi processor systems. An effort will be made to conduct the course in such a way that the students get a research orientation. For this purpose, the state of the art research articles will be reviewed and areas of further research will be identified. In some cases, we may be able to come up with research papers.

**Reference Books:**

- Silberschatz, A, Gagne, G., & Galvin, P.B. (2013). *Operating System Concepts*, 9th Edition, Wiley.
- Tanenbaum, A.S, & Bos, H. (2014). *Modern Operating Systems*, 4th Edition, Pearson.

**Course name:** Advanced Natural Language Processing

**Course Code:** CSC 741

**Credit Hours:** 3

**Course Description:**

This course offers an in depth coverage of methods for Natural Language Processing. We will present fundamental models and tools to approach a variety of Natural Language Processing tasks, ranging from syntactic processing to semantic processing, to final applications such as information extraction, human machine dialogue systems, and machine translation. The flow of the course is along two main axes: (1) computational formalisms to describe natural language processes, and (2) statistical and machine learning methods to acquire linguistic models from large data collections.

**Reference Books:**

- Thanaki, J. (2017). *Python Natural Language Processing: Advanced machine learning and deep learning techniques for natural language processing*, Packt Publishing.
- Rodrigues, M., & Teixeria, A. (2015). *Advanced Applications of Natural Language Processing for Performing Information Extraction*, Springer.

**Course name: Advanced Computer Graphics**

**Course Code: CSC 744**

**Credit Hours: 3**

**Course Description:**

This course is intended to provide a advanced level introduction to modern computer graphics. Students will study some of the basic background of 3D computer graphics in the areas of geometry, physical simulation and rendering. The course is intended to bring students up to the research frontier, and prepare them for further work in the field. As such, at least half the material in the course will go over topics of current research interest, such as the physical simulation and coupling of solids and fluids, and pre computation based methods for real time rendering. Topics to be covered include, but are not limited to: Introduction to Basic Ray Tracing and BRDFs, Global Illumination and Monte Carlo Rendering, Recent Developments in Fast Offline Rendering, Image Based and Real Time Rendering, Data Driven Methods, Signal processing and low dimensional and data sparse methods, Imaging and Computational Photography, Basic Geometric Concepts, Meshes and Subdivision Surfaces, Finite Elements and Numerical Integration for Animation, Fluid Simulation and Reduced Order Models, Inverse Kinematics and Rigid Body Dynamics.

**Reference Books:**

- Hughes, J.F. et al. (2014). *Computer Graphics: Principles and Practices*, 3<sup>rd</sup> Edition, Addison Wesley Professional.
- Pharr, M., & Humphreys, G. (2010). *Physically Based Rendering – From Theory to Implementation*, 3<sup>rd</sup> Edition, Morgan Kaufmann.
- Ganovelli, F., & Corsini, M. (2014). *Introduction to Computer Graphics: A Practical Learning Approach*, CRC Press.

**Course name: Advanced Data Mining**

**Course Code: CSC 746**

**Credit Hours: 3**

**Course Description:**

The objective of the course is to create awareness amongst the students about different aspects of data warehousing. The course will also introduce students to the basic concepts and techniques of data mining. The aim is to develop skills of using recent data mining software for solving practical problems and to gain experience of doing independent study and research.

**Reference Books:**

- Han, J. & Kamber, M. (2011). *Data Mining Concepts & Techniques*, 3<sup>rd</sup> Edition, Elsevier.
- Roiger, R. J. (2017). *Data Mining: A Tutorial Based Primer*, 2<sup>nd</sup> Edition, CRC Press.
- Benson, J. (2015). *Advanced Data Mining*, Clanrye International.

**Course name: Advanced Neural Networks**

**Course Code: CSC 750**

**Credit Hours: 3**

**Course Description:**

Neural networks provide a model of computation drastically different from traditional computers. Typically, neural networks are not explicitly programmed to perform a given task; rather, they learn to do the task from examples of desired input/output behavior. The networks automatically generalize their processing knowledge into previously unseen situations, and they perform well even when the input is noisy, incomplete or inaccurate. These properties are well suited for modeling tasks in ill structured domains such as face recognition, speech recognition, and motor control. This course will cover basic neural network architectures and learning algorithms, for applications in *pattern recognition, image processing, and computer vision*.

**Reference Books:**

- Russell, R. (2018). *Neural Networks: Easy Guide to Artificial Neural Networks*, CreateSpace Independent Publishing.
- Story, B. (2017). *Neural Networks for Beginners: An Easy To Use Manual for Understanding Artificial Neural Network Programming*, CreateSpace Independent Publishing.

**Course name: Pattern Recognition**

**Course Code: CSC 752**

**Credit Hours: 3**

**Course Description:**

Pattern recognition techniques are concerned with the theory and algorithms for putting abstract objects, e.g., measurements made on physical objects, into categories. Typically, the categories are assumed to be known in advance, although there are techniques to learn the categories (clustering). Methods of pattern recognition are useful in many applications such as information retrieval, data mining, document image analysis and recognition, computational linguistics, forensics, biometrics, and bioinformatics.

**Reference Books:**

- Bishop, C.M. (2016). *Pattern Recognition and Machine Learning*, Springer.
- Murty, M.N., & Devi, V.S. (2011). *Pattern Recognition: An Algorithmic Approach*, Springer.
- Duda, R.O., Hart, P.E., & Stork, D. G. (2012). *Pattern Classification*, 2<sup>nd</sup> Edition, John Wiley & Sons Inc.

**Course name: Distributed Databases**

**Course Code: CSC 753**

**Credit Hours: 3**

**Course Description:**

This course outlines the advanced data models including conceptual database design, concurrency control techniques, recovery techniques, query processing and optimization, integrity and security, client Server architecture, distributed database systems. It also includes the current trends in database systems, database technologies, machines and modeling.

**Reference Books:**

- Öszo, T. & Valduriez, P. (2011). *Principles of Distributed Database Systems*, 3rd edition, Springer.
- Rahimi, S. K. (2014). *Distributed Database Management Systems: A Practical Approach*, Wiley India Private Limited.

**Course name: Agent based Modeling**

**Course Code: CSC 759**

**Credit Hours: 3**

**Course Description:**

This course will guide students through the research process of agent based modeling in the engineering and social sciences: formulating a research question, specifying a model, creating a simulation and interpreting the output. During the course, students will be helped to build a model using NetLogo, acquiring basic and intermediate programming skills. Moreover, this course will provide the students with the basic insights into Complex Adaptive Systems (CAS) theory and its main modeling tool, Agent Based Modeling. Many different and seemingly contradictory properties of CAS, such as Adaptiveness and Robustness, Path dependency and Evolution, Chaos and Stability etc. will be discussed using socio technical examples and Agent Based computer simulations.

**Reference Books:**

- Railsback, S.F., & Grimm, V. (2012). *Agent Based and Individual Based Modeling: A Practical Introduction*, Princeton and Oxford: Princeton University Press.
- Wilensky, U., & Rand, W. (2015). *An Introduction to Agent Based Modeling: Modeling Natural, Social, and Engineered Complex Systems with NetLogo*. MIT Press.

**Course name: Advanced Data Warehousing**

**Course Code: CSC 760**

**Credit Hours: 3**

**Course Description:**

This course will be an introduction to data mining and Data Warehousing (Taught Course). The course will be taught through lectures, with class participation expected and encouraged. There will be frequent reading and practical assignments to supplement the lectures. The core focus of the subject will be on learning data mining & DW techniques.

**Reference Books:**

- Vaisman, A., & Zimanyi, E. (2014). *Data Warehouse Systems: Design and Implementation*, Springer.
- Krishnan, K. (2013). *Data Warehousing in the Age of Big Data*, Elsevier.

**Course name: Computer Vision**

**Course Code: CSC 764**

**Credit Hours: 3**

**Course Description:**

The goal of computer vision is to make computers understand and interpret visual information. Computer vision systems bring together imaging devices, computers, and sophisticated algorithms for solving problems in areas such as industrial inspection, medicine, document analysis, autonomous navigation, and remote sensing.

**Reference Books:**

- Szeliski, R. (2011). *Computer Vision: Algorithms and Applications*, Springer.
- Prince, S.J.D. (2012). *Computer Vision: Models, Learning, and Inference*, Cambridge University Press.
- Forsyth, D. A., & Ponce, J. (2011). *Computer Vision: A Modern Approach*, Pearson.
- Solomon, J. (2015). *Numerical Algorithms: Methods for Computer Vision, Machine Learning, and Graphics*, A K Peters/CRC Press.
- Slavio, J. (2017). *Deep Learning and Artificial Intelligence: A Beginners' Guide to Neural Networks and Deep Learning*, CreateSpace Independent Publishing.

**Course name: Bio Medical Image Analysis**

**Course Code: CSC 765**

**Credit Hours: 3**

**Course Description:**

The course covers different aspects of biomedical imaging including topics on image formation and reconstruction, processing, analysis and interpretation. The course aims to offer the student an understanding of the generic concepts underpinning the physical processes of imaging, and their practical realizations in specific imaging modalities and imaging systems.

**Reference Books:**

- Birkfellner, W. (2016). *Applied Medical Image Processing: A Basic Course*, 2<sup>nd</sup> Edition, CRC Press.
- Dougherty, G. (Ed.) (2011). *Medical Image Processing: Techniques and Applications*, Springer.

**Course name:** Cloud Computing

**Course Code:** CSC 781

**Credit Hours:** 3

**Course Description:**

Cloud Computing has transformed the IT industry by opening the possibility for infinite or at least highly elastic scalability in the delivery of enterprise applications and software as a service (SaaS). Amazon Elastic Cloud, Microsoft's Azure, Google App Engine, and many other Cloud offerings give mature software vendors and new start ups the option to deploy their applications to systems of infinite computational power with practically no initial capital investment and with modest operating costs proportional to the actual use. The course examines the most important APIs used in the Amazon and Microsoft Cloud, including the techniques for building, deploying, and maintaining machine images and applications. We will learn how to use Cloud as the infrastructure for existing and new services. We will use open source implementations of highly available clustering computational environments, as well as RESTful Web services, to build very powerful and efficient applications. We also learn how to deal with not trivial issues in the Cloud, such as load balancing, caching, distributed transactions, and identity and authorization management. In the process, we will also become very familiar with the Linux operating system.

**Reference Books:**

- Rafaels, R. J. (2015). *Cloud Computing: From Beginning to End*, CreateSpace Independent Publishing.
- Marinescu, D.C. (2013). *Cloud Computing Theory and Practice*, Elsevier.
- Erl, T., Puttini, R., & Mahmood, Z. (2013). *Cloud Computing: Concepts, Technology & Architecture*, Prentice Hall.

**Course Title:** Blockchain Technologies

**Course Code:** SEN 604

**Credit Hours:** 3

**Course Description:**

Bitcoin Protocol and Consensus: A High Level Overview, Bitcoin and Blockchain History: From the Cypher punk Movement to JPMorgan Chase, Bitcoin Mechanics and Optimizations: A Technical Overview, Bitcoin IRL: Wallets, Mining, and More, Ethereum & Smart Contracts: Enabling a Decentralized Future, Game Theory and Network Attacks: How to Destroy Bitcoin, Crypto economics and Proof of State, Distributed Systems and Alternative Consensus, Scaling Blockchain: Cryptocurrencies for the Masses, Enterprise Blockchain: Real World Applications, Anonymity: Mixing and Altcoins, Blockchain Hype and the Future.

**Reference Books:**

- Narayanan, A., Bonneau, J. Felten, E., Miller, A., & Goldfeder, S. (2016). *Bitcoin and Cryptocurrency Technologies*. Princeton.
- Fleming, S. (2017). Blockchain Technology: Introduction to Blockchain Technology and its impact on Business Ecosystem.

**Course Title:** Deep Learning  
**Course Code:** DSC 707  
**Pre Requisite:** Machine Learning

**Course Description:**

The objective of this course is to acquaint the students with the state of the art deep learning techniques to solve different learning problems. Students will learn to design as well as implement deep neural network architectures (through hands on tasks) to solve various recognition problems.

Salient contents of the course are: Introduction to neural networks, activation functions and back propagation; Convolutional Neural Networks: History, Convolution, Pooling, CNNs for classification, Deep learning Software, CNN Architectures; Sequence Modeling: Recurrent and Recursive Nets: Long Short Term Memory models and variants, Language modeling and image captioning, Unsupervised learning: Restricted Boltzmann Machines and Auto encoders; Case Studies.

**Reference Books:**

- Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep Learning (Adaptive Computation and Machine Learning series)*, The MIT Press, 2016.
- Patterson, J., & Gibson, A. (2017). Deep Learning: A Practitioner's Approach, O'reilly.

**Course name:** Advanced Distributed System

**Course Code:** CEN 707

**Credit Hours:** 3

**Course Description:**

This course aims to make the students become familiar with the advanced topics in distributed systems, starting with a basic model of distributed computation, followed by an algorithmic description of logical clocks, snapshot recording, message passing and group communication, and how to reach to a consensus. The course will also focus on Multiagent Systems as a design tool for Complex Adaptive Systems. More emphasis will be on algorithms of leader selection and agreement. Distributed models of decision making of agents such as Swarm Intelligence and Game Theory will also be explored. The course will also focus on Systems side of the domain, with System Modeling, Clustering and Virtualization, Computing Clouds, Grids, P2P, and The Future Internet (IoT).

**Reference Books:**

- Kshemkalyani, A.D. (2011). *Distributed Computing: Principles, Algorithms, and Systems*, Cambridge University Press.
- Hwang, K., Fox, G.C., & Dongarra, J. (2013). *Distributed and Cloud Computing: From Parallel Processing to the Internet of Things*, Elsevier Science.
- Vlassis, N. (2007). *A Concise Introduction to Multiagent Systems and Distributed Artificial Intelligence*.

**Course name: Advanced Computer Architecture**

**Course Code: CEN 720**

**Credit Hours: 3**

**Course Description:**

This course builds on the computer architecture concepts. It covers advanced features in state of art CPUs and their design and evaluation. The topics covered include instruction set design, microprogrammed CPU design, pipelining, instruction level parallelism, high speed memory systems, storage systems, interconnection networks, and multiprocessor architectures. The fault tolerance, real time systems, and multimedia systems along with case studies of Intel Pentium 4, SunSparc and DEC Alpha are introduced. The new domains like multi core processors and use of programmable hardware for ASIC or FPGA designs are also discussed.

**Reference Books:**

- Hennessy, J.I., & Patterson, D.A. (2011). *Computer Architecture: A quantitative approach*, 5<sup>th</sup> Edition, Morgan Kauffman Series.
- Harris, D., & Harris, S. (2012). *Digital Design and Computer Architecture*, 2<sup>nd</sup> Edition, Morgan Kauffman Series.
- Hwang, K. (2011). *Advanced Computer Architecture, Parallelism, Scalability, and Programmability*, 2<sup>nd</sup> Edition, McGraw Hill publication.

**Course name: Advanced Digital Image Processing**

**Course Code: CEN 745**

**Credit Hours: 3**

**Course Description:**

The goal of this course is to understand digital image processing beyond just the fundamental or introductory level, to choose appropriate image processing algorithms to achieve a desired result, to properly implement such algorithms using modern computing tools such as MATLAB, and to correctly interpret and present the results. The course would also cover the study of research topics of current interest in image processing and analysis.

**Reference Books:**

- Woods, R. E., & Gonzales, R.C. (2016). *Digital Image Processing*, 3rd Edition, Pearson.
- Burger, W., & Burge, M.J. (2013). *Principles of Digital Image Processing: Advanced Methods*, Springer.
- McAndrew, A. (2015). *A Computational Introduction to Digital Image Processing*, 2<sup>nd</sup> Edition, Chapman and Hall/CRC.

**Course name: Advanced Engineering Mathematics**

**Course Code: GSC 700**

**Credit Hours: 3**

**Course Description:**

This unit provides students with the advanced knowledge and skills required at Engineering Technologist level to solve mathematical problems typically encountered in a civil engineering design office. Students will learn to appraise problems and choose possible solutions as part of the process involved in achieving a satisfactory resolution to a problem through the study of real world cases. Topics include vectors, matrix algebra, calculus, and statistics.

**Reference Books:**

- Kreyszig, E. (2011). *Advanced Engineering Mathematics*, 10th Edition, Wiley.
- Zill, D. G. (2016). *Advanced Engineering Mathematics*, 6th Edition, Jones & Barnett Learning.

**Course name: Advanced Network Security**

**Course Code: EET 702**

**Credit Hours: 3**

**Course Description:**

Organizations today are linking their systems across enterprise wide networks and virtual private networks (VPNs), as well as increasing their exposure to customers, competitors, browsers, and hackers on the Internet. Each connection magnifies the vulnerability to attack.

This course provides the fundamental knowledge students need to analyze risks to networks and systems. Students learn the steps to take in order to select and deploy the appropriate countermeasures to reduce exposure to network threats.

**Reference Books:**

- Kaufman, C., Perlman, R., & Speciner, M. (2016) *Network Security: Private Communication in a Public World*, by, Prentice Hall.
- Stalling, W. (2016). *Cryptography and Network Security: Principles and Practice*, Pearson Education.

**REVISION OF MS (ENGINEERING MANAGEMENT) ROADMAP**  
**(Applicable from Spring 2019)**

## **1. Introduction**

Department of Software Engineering is offering MS in Engineering Management (MS-EM). The main aim of this program is to equip graduates with essential Engineering processes management skills that are needed in industry to enable them to perform in a global engineering environment. Some of these skills include:

- Decision and Risk Analysis
- Systems Modelling, Design and Optimization
- Engineering Project Management
- Supply Chain and Logistics Engineering
- Quality Engineering
- Information and Knowledge management
- Manufacturing and Maintenance Management
- Energy Systems Design and Planning
- Technology Management
- Understanding of Global Business Dynamics

The program will follow a multi-disciplinary approach enabled through a flexible curriculum realized by a keen and thoughtful collaboration within Engineering and Management Sciences disciplines of Bahria University (BU).

### **1.1 Program Aims and Objectives**

Engineering management incorporates the leadership skills and concepts from engineering, business, and governance to develop and manage real solutions to complicated, evolving problems. The individuals that work in this field are systems thinkers who view problems and solutions through a holistic lens, striving to create a systems solution that incorporates evolution and adaptation as a key attribute, rather than struggling simply to interface individually engineered components.

This program would aim to:

- Approach each phase of the engineering solution life cycle with the ultimate goal of balancing the risks, needs, and desires of the stakeholders and producing a successful, sustainable system.
- Develop an educational experience that prepares successful leaders for the real world of emerging problems, evolving technologies, and growing complexity in the engineering community.

The proposed program would bear following objectives:

- Emphasizing, developing and applying big-picture thinking to manage critical challenges in the respective engineering and technology discipline.
- Extending benefits to students from various engineering backgrounds by sharing case studies from a wide range of engineering disciplines.

## **1.2 Program Educational Objectives**

The overall objective of the Engineering Management program is to prepare graduates who will be successful in their chosen career paths. Within few years of graduation, graduates of MS-EM program will attain:

**PEO 1:** Success in their chosen profession as evidenced by career satisfaction, promotions.raises, and leadership at levels appropriate to their experience.

**PEO 2:** Success in lifelong learning as evidenced by satisfaction with the decision to further their education through advanced degrees, certification/professional courses and professional visibility (e.g., publications, presentations, awards, etc.).

## **1.3 Program Learning Outcomes**

The Engineering Management program prepares students to attain the educational objectives by ensuring that students demonstrate achievement of the following student outcomes.

**PLO 1:** An ability to identify, formulate, analyze, and solve engineering management problems.

**PLO 2:** An ability to design, implement, and provide management solutions to complex industrial and entrepreneurial concerns.

**PLO 3:** An ability to use current techniques, technologies, and tools necessary for professional practice.

**PLO 4:** An ability to design and conduct studies and research appropriate to the discipline, as well as to analyze and interpret data.

**PLO 5:** An ability to communicate with a range of audiences and function on multidisciplinary teams to accomplish common goals.

**PLO 6:** An understanding of professional, ethical, legal, security, and societal issues and responsibilities appropriate to the discipline.

## **2. Admission Requirements**

Applicants must follow all the requirements laid down for MS programs in BU, which include:

1. Bachelor degree or its equivalent in Engineering or relevant scientific and technological field from an accredited institution with a minimum CGPA of 2.5 out of 4 or 50% marks where CGPA is not given.
2. Official transcript(s) for all post-secondary coursework.
3. BU admission test or NTS-GAT General (with at least 50% or more marks).

Additionally, applicants must provide HEC verification of all academic certificates / degrees as per BU admission policy.

## **3. Roadmap for MS-EM**

The MS-EM program is divided into four semesters. The first semester mainly comprises of core courses, in addition to a university requirement course for the program. In semester two and three, a student is supposed to acquire competency by choosing appropriate elective courses in the area of interest. In the final semester, a student may opt to undertake research work (i.e. thesis) or study elective appropriate courses for his/her area of specialization.

**Semester 1**

<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
EMG 500	Principles of Engineering Management	3
EMG 501	Finance for Engineers	3
ESC 701	Research Methodology	3
	<b>Total</b>	<b>9</b>

**Semester 2**

<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
EMG 601	Engineering Project Management	3
EMG 604	Quality Engineering	3
	Elective – I	3
	<b>Total</b>	<b>9</b>

**Semester 3**

<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
	Elective – II	3
	Elective – III	3
ESC 600	Thesis I/ Course Work (Elective Course)	3
	<b>Total</b>	<b>9</b>

**Semester 4**

<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
	Elective – IV	3
ESC 600	Thesis II/ Course Work (Elective Course)	3
	<b>Total</b>	<b>6</b>
	<b>Total Program Credit Hours</b>	<b>33</b>

**3.1 Core Courses for MS-EM**

The following are the core courses for MS-EM program:

<b>Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
EMG 500	Principles of Engineering Management	03
EMG 501	Finance for Engineers	03
EMG 601	Engineering Project Management	03
EMG 604	Quality Engineering	03

Following is the university core:

<b>Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
ESC 701	Research Methodology	03

**3.2 List of Elective Courses**

<b>Course Code</b>	<b>Course Title</b>	<b>Proposed Credit Hrs</b>
<b>1. Operations Management</b>		
EMG 602	Business Process Analysis and Development	03
OPM 611	Operations and Production Management	03
SCM 510	Supply Chain Management	03
EMG 605	Forecasting and Decision Making	03
EMG 629	Advanced Operations Research	03
EMG 635	Industrial Psychology	03
<b>2. Energy Management and Urban Planning</b>		
EMG 622	Management in Global Energy Industry	03
EMG 623	Business Policy and Regulations in Global Energy Industry	03
EMG 624	Traffic Engineering	03
EMG 625	Urban and Regional Planning	03
EMG 632	Energy Economics	03
EEP 514	Renewable Energy	03
<b>3. Organizational Management</b>		
HRM 648	Organizational Development	03
EMG 612	Marketing Management for Engineering Concerns	03
EMG 613	Advanced Statistical Methods for Engineering Research	03
EMG 615	Human Resource Management and Corporate Social Responsibility	03
EMG 616	Systems Thinking	03
EMG 627	Entrepreneurship for Engineers	03
SCM 513	Engineering Laws and Contract Management	03

MGT 662	Strategic Management	03
FIN 681	Financial Risk Management	03
<b>4. Information, Knowledge and Software Management</b>		
SEN 762	Advanced Big Data Analytics	03
EMG 617	Information Systems Management	03
EMG 618	Enterprise Systems and Audit	03
EMG 619	Information Systems Strategy and Innovation	03
EMG 630	Information Systems Security and Ethics	03
SEN 756	Advanced Usability Engineering	03
EMG 621	Socio-Technical Systems	03
CSC 518	Decision Support Systems	03
SEN 658	Systems Requirement Engineering	03
SEN 621	Advanced Software and System Architecture	03
SEN 523	Automated Software Engineering	03
CSC 746	Advanced Data Mining and Warehousing	03
SEN 647	Advanced Software Project Management	03
<b>5. Technology Management</b>		
EMG 631	Innovation and Technology Management	03
EMG 630	Technology and Entrepreneurship	03
EMG 701	Competitive Strategies in Technology Management	03
EMG 702	Transfer of Technology	03

### Course Outline of New Courses

**Course Title:** Principles of Engineering Management

**Course Code:** EMG 500

**Credit Hours Theory:** Three (3)

**Course Outline:**

Principles of engineering management focusing on the managing technology and research and development. Topics include, but are not limited to, processes of project management, technological innovation, strategic and intermediate term planning, organizing, leadership, motivation, finance and budgeting, operations management, legal issues, working within groups, written and oral communication, and professionalism. Case studies and current literature will be utilized.

**Recommended Books:**

1. C. M. Chang (2016), "Engineering Management: Meeting the Global Challenges", 2nd Edition, CRC Press.

**Course Title:** Transfer of Technology

**Course Code:** EMG 702

**Credit Hours Theory:** Three (3)

**Course Outline:**

The Technology transfer course is designed to prepare students for effective technology transfer activities, to make complex decisions for innovation development and solve technology commercialization issues, using knowledge transfer models and technology transfer networks for business companies or research institutions. Upon successful completion of course, students should have understanding about technology transfer process and be prepared to use it in practice.

Salient topics include: Concept of technology transfer, Technology transfer process, Organizational models for technology transfer activities, Knowledge types and transfer models, understanding of complex technology markets and needs, Technology assessment, Open innovation and global technology transfer networks. Building strategic R&D alliances and negotiation of contracts, Introduction to Intellectual Property Law, Copyright Protection, Trademark Protection, Invention Protection, Commercial Secrets.

**Recommended Books:**

1. Phyllis L. Speser (2012) "The Art and Science of Technology Transfer". John Wiley & Sons.
2. Audretsch, D.B., Lehmann, E.E., Link, A.N., Starnecker, A. "Technology Transfer in a Global Economy". Springer, 2013.

**Course Title:** Technology and Entrepreneurship

**Course Code:** EMG 631

**Credit Hours Theory:** Three (3)

**Course Outline:**

This course focuses on technology entrepreneurs and their new ventures. It helps the student who is majoring in science, engineering, or other non-business disciplines to understand key aspects of entrepreneurship and the formation of new technology companies so that you can decide if a technology business path is right for you. Major class topics include learning to identify and evaluate innovation opportunities, assessing an industry, conducting market

research, intellectual property strategies, the founding team, business models, and funding a new venture.

### **PART I FUNDAMENTALS OF BUSINESS AND ECONOMICS**

Session 01: Chapter 01: Fundamentals of Business

Session 02: Chapter 02: Fundamentals of Economics

Session 03: Chapter 03: Technology Entrepreneurship in the Global Economy

### **PART II LEGAL STRUCTURE AND CAPITAL**

Session 04: Chapter 04: Legal Structure and Equity Distribution

Session 05: Chapter 05: Capital and Deal Structuring

Session 06: Chapter 06: Exit Strategies & Return on Investment

### **PART III INTELLECTUAL PROPERTY AND CONTRACTS**

Session 07: Chapter 07: Intellectual Property Management & Protection

Session 08: Chapter 08: Contracts

Session 09: Chapter 09: Negotiating Contracts

### **PART IV TECHNOLOGY VENTURE STRATEGY AND OPERATIONS**

Session 10: Chapter 10: Launching Technology Ventures

Session 11: Chapter 11: Going to Market and Distribution Strategies

Session 12: Chapter 12: Financial Management & Control

Session 13: Chapter 13: Venture Management & Leadership

### **PART V MANAGING RISK AND CAREER DEVELOPMENT**

Session 14: Chapter 14: Venture Risk Management

Session 15: Chapter 15: Managing Your Entrepreneurial Career

Session 16: Final Projects and their Review

### **Recommended Books:**

1. Lechter, Duening (2010), "Technology Entrepreneurship: Creating, Capturing, and Protecting Value", 1st Edition, Academic Press, ISBN: 9780123745026
2. Claudio Petti (2009), "Cases in Technological Entrepreneurship: Converting Ideas into Value", 2009, Edward Elgar, ISBN 9781848441866
3. Abhishek Jain (2001), "The Technology Entrepreneur's Guidebook", 2001, Washington Technology Partners.

**Course Title: Competitive Strategies in Technology Management**

**Course Code: EMG 701**

**Credit Hours Theory: Three (3)**

### **Course Outline:**

Innovation is taking place at breath-taking speed, with the birth of new and different industries, such as computers, integrated circuits, and pharmaceuticals that are primarily technology driven. This course will examine a variety of important strategic issues on how to manage innovation within these types of technology-oriented firms and industries. Indeed, an understanding of innovation is critical to the study of any modern day management and economic activity, particularly as more and more advanced technology is absorbed into various, more traditional industries.

Course outline and breakdown:

1. Session 01: Part IA: Technological Innovation
2. Session 02: Part IB: Technological Innovation and Strategy
3. Session 03: Part IIA: Technological Evolution

4. Session 04: Part IIB: Industry Context
5. Session 05: Part IIC: Organizational Context
6. Session 06: Part IID: Strategic Action
7. Session 07: Part IIIA: Technology Sourcing
8. Session 08: Individual Paper Presentations: Each student: 15min + 10min Q&A)
9. Session 09: Part IIIB: Finding New Markets for New Technologies
10. Session 10: Part IIIC: Internal Corporate Venturing
11. Session 11: Part IVA: New Product Development
12. Session 12: Part IVB: Building Competencies/Capabilities
13. Session 13: Part VA: Innovation Challenges in Established Firms
14. Session 14: Chapter 13: Crafting a Deployment Strategy
15. Session 15: Group Project Presentations (Topics will be decided after Mid-term)
16. Session 16: Revision, Q&A and Exam review

**Recommended Books:**

1. Narayanan (2011), "Managing Technology and Innovation for Competitive Advantage", 1<sup>st</sup> edition. Pearson Education. ISBN: 0130305065

**Course Title: Industrial Psychology**

**Course Code: EMG 635**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course will provide an Introduction to Industrial and Organizational Psychology, a scientific discipline that studies human behaviour in the workplace. Organizational psychologists help institutions hire, manage, develop, support employees and align employee efforts with business needs. Their work contributes to outcomes such as better talent to achieve the strategic goals of the organization, reduced turnover, increased productivity, and improved employee engagement. Salient topics include: Principles, Practices and Problems of Industrial Psychology, Techniques, Tools and Tactics, Employee Selection 1: Principles and Techniques, Employee Selection 2: Psychological Testing

Performance Appraisal, Training and Development in Organizations, Leadership in Organization, Leadership in Organization, Motivation, Job Satisfaction and Job Involvement, Motivation, Job Satisfaction and Job Involvement, Motivation, Job Satisfaction and Job Involvement, Classical vs Modern Organizational Style}, Introduction of Change in Organization, Condition of Work, Engineering psychology, Stress at Work.

**Recommended Books:**

1. Frank J. Landy, Jeffrey M. Conte (2012), "Work in the 21st Century: An Introduction to Industrial and Organizational Psychology", 4th Eds, Wiley.
2. Michael G. Aamodt (2015), "Industrial/Organizational Psychology: An Applied Approach", 8<sup>th</sup> Eds, Cengage Learning.
3. Emmanuel B. DE Leon, "Industrial Psychology".

**Course Title: Advanced Operations Research**

**Course Code: EMG 629**

**Credit Hours Theory: Three (3)**

**Course Outline:**

Introduction to mathematical modelling. Linear program models, simplex method for solving LP models, sensitivity analysis, other solution techniques for LP models, specialized LP models

(transport, assignment, etc.). Network based models, shortest path, min weight spanning tree, max flow, PERT/CPM. Decision models, dynamic programming, games theory. Probabilistic models, expected return models, Markov chains, stochastic processes, queuing models, stochastic inventory models.

**Recommended Books:**

- Hamdi A. Taha (2010), "Operations Research: An Introduction", (9/e).
- F.S. Hillier, and G. J. Liebermann (2010), "Introduction to Operations Research", (10/e).

**Course Title: Energy Economics**

**Course Code: EMG 632**

**Credit Hours Theory: Three (3)**

The course relates to the method, application, and limitations of traditional economic approaches to the study of energy problems. Topics include microeconomic foundations of energy demand and supply; regression analysis, elasticity of demand, curve fitting, future projections, pricing and allocation of energy resources; macro linkages of energy with economics etc. It will also include discussions on energy market structures with (a) vertically integrated utilities (b) emerging concept of unbundled utilities with open access and competition in the market; regulatory practices, determination of prices for utility services and retail prices etc.

**Text & Reference Books**

1. **Bhattacharyya**, Subhes C (2011), "Energy Economics: Concepts, Issues, Markets and Governance", Springer.

**Course Title: Renewable Energy**

**Course Code: EEP 514**

**Credit Hours Theory: Three (3)**

Definition of Renewable Energy, category of resources, status of technological development, economics of utilization, distributed and grid based systems, hybrid systems, issues in exploitation of resources, policies for harnessing resources and future outlook. Review of experiences of various countries. Transfer of technologies to developing countries. Efficiency and environmental considerations.

**Text & Reference Books**

1. Godfrey Boyle (2012) "Renewable Energy: Power for a Sustainable Future", 3<sup>rd</sup> Ed, Oxford University Press.

**Course Outline of Existing Courses**

**Course Title: Engineering Project Management**

**Course Code: EMG 601**

**Credit Hours Theory: Three (3)**

**Course Outline:**

The objectives (of this course) for prospective project managers are to understand the role of a project in their organizations and to master the project management tools, techniques, and interpersonal skills necessary to orchestrate projects from start to finish. When students

finish this course they would have learnt program and project portfolio management, role of PM, systems view of PM, understanding organizations, stakeholder management, project phases and project life cycle, project management process groups, mapping the process groups to the knowledge areas, estimating project times and costs, project integrations management, strategic planning and project selection, developing project plans, project closure, project management plans, project execution, project scope management, project time management, project cost management, project quality management, project human resource management, project communication management, project risk management, project procurement management.

**Recommended Books:**

- PMI (2017), "Guide to the Project Management Body of Knowledge (PMBOK® Guide)", 6<sup>th</sup> Ed, PMI Institute.
- Kathy Schwalbe (2015), "Information Technology Project Management", 8<sup>th</sup> Edition, Cengage Learning.

**Course Title: Finance for Engineers**

**Course Code: EMG 603**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course presents data analysis and econometric modeling using applications in finance. Equivalently, this course covers computational finance and financial econometrics. As such, the course utilizes concepts from microeconomics, finance, mathematical optimization, data analysis, probability models, statistical analysis, and econometrics.

Topics in financial economics include asset return calculations, portfolio theory, index models, the capital asset pricing model and investment performance analysis. Mathematical topics covered include optimization methods involving equality and inequality constraints and basic matrix algebra. Statistical topics to be covered include probability and statistics (expectation, joint distributions, covariance, normal distribution, sampling distributions, estimation and hypothesis testing etc.) with the use of calculus, descriptive statistics and data analysis, linear regression, basic time series methods, the simulation of random data and re-sampling methods.

**Recommended Books:**

1. Frank J. Fabozzi, Edwin H. Neave, Guofu Zhou (2011), "Financial Economics" Wiley.
2. David Ruppert (2010), "Statistics and Data Analysis for Financial Engineering", Springer-Verlag. A Beginner's Guide to R by Alain Zuur, Elena Ieno and Erik Meesters, Springer-Verlag.
3. R Cookbook by Paul Teator, O'Reilly.

**Course Title: Business Process analysis and Development**

**Course Code: EMG 602**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course is the foundation for all courses in the Business Process Management curriculum and is required for CEG BPM certification. It provides an overview and discussion of the principles, concepts and techniques required to transform your business from a traditional, functional organization to a process-centric organization. The course introduces a systematic approach and methodology for planning, monitoring, measuring and managing your company

business process performance and for redesigning and improving specific processes. BPM is a must for everyone interested in business process improvement. Designed for business managers, business analysts, and practitioners involved in process-based change and the automation of process solutions. This course is the foundation for all other courses in the CEG BPM curriculum. It establishes a methodology, a common language, and a baseline for all other courses in the curriculum.

**Recommended Books:**

- Marlon Dumas, Marcello La Rosa, Jan Mendling, Hajo A. Reijers (2013), "Fundamentals of Business Process Management", Springer.
- Peter Franz, Mathias Kirchmer (2013), "Value-Driven Business Process Management: The Value-Switch for Lasting Competitive Advantage", McGraw-Hill Education.
- Tristan Boutros, Tim Purdie (2013), "The Process Improvement Handbook: A Blueprint for Managing Change and Increasing Organizational Performance", McGraw-Hill Education.

**Course Title: Quality Engineering**

**Course Code: EMG 604**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course outlines the Quality Engineer Body of Knowledge, which outlines specific areas of expertise. These include training in quality management systems (QMS) and the students will learn essential information about quality systems, auditing, product and process control and design, quality methods and tools, technologies, applied statistics, System Engineering, SPC, and Design of Experiments. Further, the quality engineer must understand the quality system, quality standards and regulations. On successful completion of this course students will be able to:

- Understand the relationship of the quality engineer to the quality system.
- Analyze the relationship of statistics to a process.
- Understand basic quality management principles.
- Understand process capability and use statistical process control to monitor a process.
- Generate acceptance sampling plans and identify and use technical quality tools.
- Incorporate quality technology in design, customer-supplier relationships, Reliability, Availability, and Maintainability (RAM), materials control, measurement, auditing, quality costs and document control within a quality system w.r.t ISO.
- Apply problem-solving tools and Software Engineering methodologies, process control and process capability plans, acceptance sampling, product quality and attribute controls.

**Recommended Books:**

2. Amitava Mitra (2016), "Fundamentals of Quality Control and Improvement" 4th Ed, Wiley.
3. K. S. Krishnamoorthi & V. Ram Krishnamoorthi (2011), "A First Course in Quality Engineering: Integrating Statistical and Management Methods of Quality", 2<sup>nd</sup> Ed, CRC Press.

4. Kenneth Rose (2014), "Project Quality Management: Why, What and How", 2nd Edition, J. Ross Publishing.
5. Thomas Pyzdek, Paul A. Keller (2013), "The Handbook for Quality Management: A Complete Guide to Operational Excellence", 2<sup>nd</sup> Ed, McGraw-Hill Education.
6. Genichi Taguchi, Subir Chowdhury, Yulin Wu (2004) "Taguchi's Quality Engineering Handbook", Wiley-Interscience.
7. Thomas Pyzdek, Paul A. Keller (2003), "Quality Engineering Handbook (Quality and Reliability)", 2<sup>nd</sup> Ed, CRC Press.

**Course Title: Strategic Management**

**Course Code: MGT 662**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course is designed to help the students integrate and apply their earlier functional courses and on-the-job experiences. The course takes the general management point of view, emphasizing the creation, implementation and evaluation of strategy in organizations. In addition to focusing on for-profit businesses, this section includes a module on strategy in non-profits as well. You will put yourselves in the shoes of top management and make the really important "Big Picture" decisions. You will develop expertise in the analysis of complex business situations and in clearly presenting your findings both orally and in writing. You will also further develop your ability to work effectively in teams.

**Recommended Books:**

1. Gregory G Dess, Gerry McNamara, Alan Eisner (2015), "Strategic Management: creating competitive advantages", 8<sup>th</sup> Ed, McGraw-Hill Irwin.

**Course Title: Operations and Production Management**

**Course Code: OPM 611**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course include concepts, problems and techniques applicable to the operations of a variety of business organizations. The emphasis is on decision making (to include business ethics) in operational areas such as: facility requirements and utilization, control and coordination of resource inputs and outputs, types of transformation / conversion processes, and performance measurements.

**Recommended Books:**

- William J Stevenson (2017), "Operations Management" 13th Ed, McGraw-Hill Education; 13th Ed.
- Jay Heizer, Barry Render, Chuck Munson (2016), "Operations Management: Sustainability and Supply Chain Management", 12<sup>th</sup> Ed, Pearson Education.
- Roberta S. Russell & Bernard W. Taylor III (1998), "Operations Management, Focusing on Quality and Competitiveness", 2<sup>nd</sup> Ed, Prentice Hall, 1998.

**Course Title: Supply Chain Management**

**Course Code: SCM 510**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course is designed to study various aspects of supply chain, its objectives, decision phases, strategies and designs, planning, forecasting, operation processes, cycle view, push/pull view, macro processes, performance achievement, strategy into action (SIA), must win battles, coordination internally & externally, uninterrupted supplies, warehousing and transportations, profit improvement plans and finally a cost effective business

**Recommended Books:**

- Robert M. Monczka and Robert B. Handfield (2015), "Purchasing and Supply chain management", 6<sup>th</sup> edition, Prentice Hall

**Course Title: Forecasting and Decision Making**

**Course Code: EMG 605**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course include how Forecasts and budgets are essential tools for successful business management. Understanding and using these management tools will facilitate effective decision making and strategic planning and ultimately support growth and development. Participants will be required to complete a pre-course assignment prior to attending the course. This assignment is designed to directly relate the course to participants' personal experience and provide practical application of the course outcomes.

**Recommended Books:**

1. David R. Anderson, Dennis J. Sweeney, Thomas A. Williams, Jeffrey D. Camm, James J. Cochran (2015), "An Introduction to Management Science: Quantitative Approaches to Decision Making" 14th Ed, Cengage Learning.
2. Raghu Nandan Sengupta, Aparna Gupta, Joydeep Dutta (2016), "Decision Sciences: Theory and Practice", 1<sup>st</sup> Ed, CRC Press.

**Course Title: Management in Global Energy Industry**

**Course Code: EMG 622**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course will enable Students to understand the role regulation plays in determining how the energy industry addresses the key energy challenges. Students would take a broad perspective across the energy industry, reviewing the activities and challenges faced by the various sectors. Work in a group on a business simulation that illustrates how risks and uncertainties have to be incorporated into the way managers guide a company. This will both bring to life a key part of the industry and illustrate the importance of effective teamwork in managerial decision-making. Students would learn to understand the concepts underlying the production/operations function. You will learn to appreciate the different nature of the tasks and issues involved in managing the production function in a manufacturing company and the operations function in a service organization.

**Recommended Books:**

1. Andrew Inkpen, Michael H. Moffett (2011), "The Global Oil & Gas Industry: Management, Strategy and Finance", PennWell Corp.

**Course Title: Business Policy and Regulations in Global Energy Industry**

**Course Code: EMG 623**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course include the understanding diverse and integrated markets for primary energy, and the essential considerations driving business leaders and policy makers in development of global energy resources. This course provides an understanding to the business of primary energy production. We will examine the nature of demand and supply in global energy markets, and business considerations for participants in those markets. Students taking this course will be able to identify the distinctive challenges facing enterprises engaged in development of primary energy resources. The course is intended to provide a broad perspective of the challenges for businesses and policy authorities engaged in diverse but integrated global energy markets.

**Recommended Books:**

- Mike Bradshaw (2013), "Global Energy Dilemmas" 1st Ed, Polity
- Thomas L. Wheelen, J. David Hunger, Alan N. Hoffman, Charles E. Bamford (2017), "Strategic Management and Business Policy: Globalization, Innovation and Sustainability", 15<sup>th</sup> Ed, Pearson.

**Course title: Traffic Engineering**

**Code: EMG 624**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course brief students about Traffic operations of roads, streets, and highways; traffic engineering studies; use of signs, signals, and pavement markings as traffic control devices; highway and intersection capacity, design and operations of traffic signals; current microcomputer models and applications. Understand the general characteristics related to main components of the highway system such as road users, vehicles, traffic and control systems, and various interactions among those components. Perform capacity analysis of rural highways, freeways, signalized intersections, and unsignalized intersections using the procedures described in the current version of the Highway Capacity Manual. Perform the capacity analysis of highway facilities by using the Highway Capacity Software. Understand highway safety related issues, calculate and interpret highway crash frequencies and rates, perform the methods to identify critical highway locations, and suggest applicable countermeasures.

**Recommended Books:**

- Roess, Prassas, & McShane, "Traffic Engineering", 3<sup>rd</sup> Ed, Pearson/Prentice Hall,
- Institute of Transportation Engineers ITE and Wolshon, Brian (2016), "Traffic Engineering Handbook", 7<sup>th</sup> Ed, Wiley.

**Course title: Urban and Regional Planning**

**Code: EMG 625**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course include Understanding urban processes and contributing to sustainable urban development, Urban transport, infrastructure and social services, quality of urban life, urban modeling, planning and evaluation approaches as well as disaster risk management, urban environmental planning, and participatory GIS are typical themes in the urban planning and management course domain. Be able to identify key concepts in urban and regional planning. Understand the general planning process. Have a basic understanding of the major planning issues and debates. Be able to understand and apply planning principles to problems in land use planning, environmental planning, and economic development. Be able to acquire and analyze the essential data used in urban and regional planning. Identify a planning problem in a city YOU are familiar with and use planning concepts to solve the problem.

**Recommended Books:**

- Eugenie L. Birch (Eds) (2009), "The Urban and Regional Planning Reader", London & New York: Routledge.
- P. Calthorpe and W. Fulton. (2001), "The Regional City: Planning for the End of Sprawl", Island Press.
- T. L. Daniels, J.W. Keller, and M. B. Lapping (1995), "The Small Town Planning Handbook", 2<sup>nd</sup> Ed. Chicago, IL.

**Course Title: Entrepreneurship and Engineering Concerns**

**Course Code: EMG 611**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course is for students who want to build creative businesses in new or existing firms; foster effective, innovative work in the people they lead; and preserve their own creativity in the face of career pressures and organizational constraints. This course is designed to help you develop your own creativity, apply creative ideas in entrepreneurial ventures, and support the creativity of the people you lead. You will learn to recognize, analyze, and support creative behavior in organizations in a wide variety of industries.

**Recommended Books:**

- Entrepreneurship: Strategies and Resources by Marc J. Dillinger, Third Edition (Pearson Education
- Essentials of Entrepreneurship and Small Business Management, Thomas W. Zimmerer, Norman M. Scarborough, Pearson Education
- Bradford, D.L. & Burke, W. W. (2005). Reinventing organization development: New approaches to change in organizations. California: Pfeiffer

**Course name: Organizational Development**

**Course Code: HRM 648**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course enables students to learn that Organization Development (OD) is an area of practice and research in Human Resource Development (HRD). According to Cummings & Worley, OD is a “process that applies a broad range of behavioural science knowledge and practices to help organizations build their capacity to change and to achieve greater effectiveness, including increased financial performance, customer satisfaction, and organization member engagement”. OD attempts to bring about change in the different levels of the organization (the individual, group and organization) using a wide variety of interventions.

This course will introduce students to the concepts of entrepreneurship so that they have the necessary skill set to explore entrepreneurial opportunities in order to create value, generate wealth and serve society. This course is for students who want to build creative businesses in new or existing firms; foster effective, innovative work in the people they lead; and preserve their own creativity in the face of career pressures and organizational constraints. This course is designed to help you develop your own creativity, apply creative ideas in entrepreneurial ventures, and support the creativity of the people you lead. You will learn to recognize, analyze, and support creative behavior in organizations in a wide variety of industries. In this course, theoretical models and the process of OD will be discussed. Students will also learn how to improve individual, group/team and organizational performance through the use of OD techniques or interventions like group dynamics, training, culture change, and work-life balance.

**Recommended Books:**

- Cummings, T. G. & Worley, C. G. (2009).Organization development and change (9th edition).Canada: South-Western Cengage Learning.
- De Guia, F. (2000). Culture change: key to organization development: A success story. Makati City: Florence de Guia& Associates
- Brown, D. R. (2011). An experiential approach to organizational development. (8th ed). New Jersey: Pearson Education, Inc.

**Course Title: Marketing Management in Engineering Concerns**

**Course Code: EMG 612**

**Credit Hours Theory: Three (3)**

**Course Outline:**

These Course brief students about Combines intermediate and advanced statistical methods with practical research applications and computer software. Develops commonly used statistical models such as Two and Three-Way Analysis of Variance as well as Multiple Linear Regression for the solution of common business and industrial research problems. The statistical models are implemented and interpreted in the context of actual data sets using available statistical software (MVPSTats, SPSS, and special purpose software).

At the conclusion of this course, the student should possess the ability to perform required statistical analyses for virtually any uni-variate application in a business / industrial setting.

Able to describe and implement management information systems, ERP and manufacturing execution systems.

**Recommended Books:**

**Course Title: Advanced Statistical Methods for Engineering Research**

**Course Code: EMG 613**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course combines intermediate and advanced statistical methods (specifically ANOVA) with practical research applications and computer software. It also explains and gives practical experience in the use commonly used statistical experimental design models including Two and Three-Way Analysis of Variance as well as Linear Regression (time permitting) for the solution of common business and industrial research problems. The statistical models are implemented and interpreted in the context of actual data sets using statistical software programs. Mandatory Prerequisites are: EMEN 5005 and EMEN 5900; OR APPM 4570/5570 and APPM 4580/5580, or the equivalent as assessed and approved solely by the instructor. The Design & Analysis of Factorial Experiments for 2 Factors - Model I, Model II, and Model III Applications; Fully Crossed and Nested Analyses - Common Transformations. The Design and Analysis of Factorial Experiments with 3 or More Factors - Model I, Model II, and Model III Applications; Fully Crossed and Nested Analyses - AET Determination - Quasi- and Pseudo-F Ratios Review of Simple regression and correlation. Additional Measures of Relationship - Special-Purpose Indices and Methods for Correlation and Association. Non-Linear Regression Analysis, Introduction to Multiple Regression Analysis.

**Recommended Books:**

- Statistical Principles of Experimental Design, 2nd Edition, by B. J. (Ben) Winer, McGraw-Hill, 1971.
- Design of Experiments in Quality Engineering, by Jeffrey Luftig & Victoria Jordan, McGraw-Hill Publishing Company, 1998.

**Course Title: Innovation and Technology Management**

**Course Code: EMG 631**

**Credit Hours Theory: Three (3)**

**Course Outline:**

The framework of this course is an evolutionary process perspective on technology management and innovation. The focus is on processes to help firms better manage technology and innovation. The fundamental ideas underlying this evolutionary perspective are 1) a firm's technology strategy emerges from its technological competencies and capabilities; 2) technology strategies shaped by external (environmental) and internal (organizational) forces; and 3) the enactment of technology strategy, through the experience it generates, serves to further develop the firm's technological competences and capabilities. We will deal with typical issues that managers in technology based firms deal with. The course takes an innovative and creative view of information technology that extends beyond the province of business applications built and used by a single organization. You will learn how organizations can commercialize their technological innovations and how the associated risks and benefits might be managed. Through the open innovation paradigm you will see how internal and external ideas can be brought together and innovations can be transferred inward and outward through licensing, joint ventures and spin-offs.

**Recommended Books:**

1. Schilling (2012). Strategic Management of Technological Innovation (4e). McGraw-Hill, New York, NY, USA.
2. Chesbrough (2003) Open Innovation (1e). Harvard Business School Press, Boston, MA, USA.
3. Osterwalder & Pigneur (2010) Business Model Generation (1e). Wiley Hoboken, NJ, USA.

**Course Title: Financial Risk Management**

**Course Code: FIN 681**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course will focus on variety of risks faced by financial managers and the tools available for managing these risks. Particularly, we shall focus on credit risk, interest rate and liquidity risks, market risk, foreign exchange risk, and country risk. We shall learn about the tools and techniques available for managing these risks such as future contracts, option contracts, swaps, value-at-risk (VaR) and other standard risk-hedging techniques, and methods of measuring volatility. Students attending this course are expected to have studied basic courses of investment and portfolio management and have good understanding of asset pricing models.

**Recommended Books:**

- Hull, John C., 2007, Risk Management and Financial Institutions (RMFI), Prentice-Hall.
- Hull, John C., 2006, Options, Futures, and Other Derivatives [OFOD], Prentice-Hall (sixth edition).
- Ross, Stephen A., Westerfield, Randolph W., Jaffe, Jeffery F., & Roberts, Gordon S., Corporate Finance, Any Edition, McGraw Hill Ryerson, 1999. [Referred to below as "RWJR"]
- Risk Management and Derivative by Rene Stulz, second edition.

**Course Outline: Engineering Laws and Contract Management**

**Course Code: SCM 513**

**Credit Hours Theory: Three (3)**

**Course Outline:**

Many of us unwittingly enter into contracts every day of our lives – when we leave our car in a car park, when we take a train or bus journey or when we shop. Entering into a business contract is altogether more complex and the implications of getting it wrong can have far reaching effects on the profitability of your business. Understand the origin and legal reasoning behind many of the contract clauses and terminology you use and understand why terms are couched in the way they are. Be better prepared to write and negotiate contract arrangements that provide sufficient protection to your company. Understand some of the core doctrines within English contract law such as the sanctity of contract, the privet of contract, the concept of reasonableness and how these have adapted over recent years. Identify the critical elements required to create a legally binding contract enforceable by law.

**Recommended Books:**

- Janet K. Yates, "Engineering and Construction Law & Contracts", 1st Edition, Pearson (2010)
- Joseph J. Corey Jr., "Contract Management and Administration For Contract and Project Management Professionals: A Comprehensive Guide to Contracts, the Contracting Process, and to Managing and Administering Contracts", CreateSpace Independent Publishing Platform (March 16, 2015)

**Course Title: Human Resource Management and Corporate Social Responsibility**

**Course Code: EMG 615**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course is designed to explore human resource management (HRM) in an international setting, on a course designed in response to the increasing internationalization and workforce diversity of organizations.

The course focuses on managing human resources in organizations that operate across national borders and the cross cultural issues of people management. It is for those wishing to develop careers in HRM at a strategic and international level within organizations operating in the international environment.

The course enables you to develop a critical understanding of the philosophies and general practices of international HRM appreciate and critically evaluate the latest theoretical concepts, principles, standards and frameworks of HRM practice develop skills in solving complex scenarios related to improving the activities and functions of modern HRM develop a holistic approach to examining issues and solving complex International HR problems. You develop your professional expertise and improve your employability and career prospects by gaining broader international business, management and leadership knowledge. We begin by introducing you to organization theory, which covers organizational design, organizational theory and methodologies for understanding complex organizations. You also develop your critical thinking on issues such as organizational change and innovation.

**Recommended Books:**

- All the electronic resources i.e. slides, handouts and books are made available on the group site
- The assignments have to be submitted in hard copy on or before the date announced

**Course Title: Systems Thinking**

**Course Code: EMG 616**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course is about to Understand that issues facing the world are complex and multi-dimensional, straddle many different factors and involve diverse multi-stakeholder systems. Understand the context in which the problems arise (culture, political systems, and values) and how disciplines or areas of interest fit into the whole. Understand how different disciplines are interconnected and interdependent. Obtain skills to address the underlying root causes rather than the symptoms of a problem. Identify positive and negative feedback

across components of a system. Obtain skills to address problems that appear to be intractable. Understand how the changing nature of the world impacts upon the way in which people and organizations make decisions.

**Recommended Books:**

**Course Title: Advanced Big Data Analytics**

**Course Code: SEN 762**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course shall provide the fundamental knowledge to equip students being able to handle those challenges. This discipline inherently involves many fields. Because of its importance and broad impact, new software and hardware tools and algorithms are quickly emerging. A data scientist needs to keep up with these ever changing trends to be able to create a state-of-the-art solution for real-world challenges.

This Big Data Analytics course shall first introduce the overview applications, market trend, and the things to learn. Then, students shall be introduced fundamental platforms, such as Hadoop, Spark, and other tools, such as IBM System G for Linked Big Data. Afterwards, the course will introduce several data storage methods and how to upload, distribute, and process them. This shall include HDFS, HBase, KV stores, document database, and graph database. The course will go on to introduce different ways of handling analytics algorithms on different platforms. Then, students shall introduce visualization issues and mobile issues on Big Data Analytics. Students will then have fundamental knowledge on Big Data Analytics to handle various real-world challenges.

Afterwards, the course will zoom in to discuss large-scale machine learning methods that are foundations for artificial intelligence and cognitive networks. The course will discuss several methods to optimize the analytics based on different hardware platforms, such as Intel & Power chips, GPU, FPGA, etc. The lectures will conclude with overview of the future challenges of Big Data, especially on the ongoing Linked Big Data issues which involves graphs, graphical models, spatio-temporal analysis, cognitive analytics, etc.

Given large amount of data, one fundamental scientific challenge is how to develop efficient and effective computational tools to analyze the data, revealing insight and make predictions. Data analytics is the science of achieving these goals. It is an inter disciplines of machine learning, data mining, statistics, and so on. This class aims to provide an overview of advanced machine learning, data mining and statistical techniques that arise in data analytic applications. In this class, you will learn and practice advanced data analytic techniques, including: parallel algorithms, online algorithm, locality sensitive hashing, topic modelling, structure learning, and time-series analysis.

**Recommended Books:**

- C. Bishop, Pattern Recognition and Machine Learning, Springer 2007.
- All of statistics: a concise course in statistical inference. Larry Wasserman. Springer, 2004

- Trevor Hastie, Robert Tibshirani, Jerome. H. Friedman. The elements of statistical learning: data mining, inference and prediction. Springer, 2009

**Course Title: Information Systems Management**

**Course Code: EMG 617**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course introduces the student to the area of computer-based information system. In this course you will study system types its components, SDLC and different models of SDLC. You will also study design methods, security, virus and threats to information system. In addition to these topics you will also learn risk management and E-commerce.

**Recommended Books:**

- Kenneth C. Laudon and Jane P. Laudon (0), "Management Information Systems", 8<sup>th</sup> Ed, Prentice Hall.

**Course Title: Enterprise System and Audit**

**Course Code: EMG 618**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course focuses on the theory and practice of implementing and utilizing enterprise-wide application systems in organizations and their audit. Few organizations attempt to build information systems on their own and many rely upon the marketplace to fulfil their information systems needs nowadays. Furthermore, the adoption of enterprise systems is usually done in the context of a larger organizational improvement and change initiative.

Enterprise systems are usually based on packaged software products, they drive for cross-functional integration and require organization-wide resources for their implementation. The lifecycle of enterprise systems including the development, the implementation, its use evaluation and audit involves company external entities (e.g. software vendors or consulting companies) as well as company internal entities (e.g. IT departments or end-users).

**Recommended Books:**

- Sawyer, S. (2001). A market-based perspective on information systems development. Communications of the ACM, 44(11), 97-102.
- Scott, J.E., Kaindl, L. (2000). Enhancing functionality in an enterprise software package. Information & Management, 37, 111-122.
- Design of Enterprise Systems: Theory, Architecture, and Methods, By Ronald E. Giachetti

**Course Title: Information system strategy and Innovation**

**Course Code: EMG 619**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course is designed to examine the way information technology is being used to influence the competitive strategy of corporations and to assess the impact of strategic deployment of information systems. Students learn to effectively manage a firm's information and

technology assets in order to meet the information needs of the organization. Topics include information systems strategies; the development of information system assets; organizational information infrastructure; databases and data management including decision making support; enterprise resource planning systems; e-business; social media use by organizations; information security and risk management; innovating with information technology; and leadership and management of information systems

Students learn to effectively manage a firm's information and technology assets in order to meet the information needs of the organization. Topics include information systems strategies; the development of information system assets; organizational information infrastructure; databases and data management including decision making support; enterprise resource planning systems; e-business; social media use by organizations; information security and risk management; innovating with information technology; and leadership and management of information system.

**Recommended Books:**

1. Rainer, Cegielski, Splettstoesser-Hogeterp, Sanchez-Rodriguez. Introduction to Information Systems. 2nd Canadian Edition, Wiley, 2011

**Course Title: Information Systems Security and Ethics**

**Course Code: EMG 630**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course provides a one-semester overview of information security. The technical content of the course gives a broad overview of essential concepts and methods for providing and evaluating security in information processing systems (operating systems and applications, networks, protocols, and so on).

In addition to its technical content, the course touches on the importance of management and administration, the place information security holds in overall business risk, social issues ethical perspective, such as individual privacy, and the role of public policy. This course will explore methods, tools, and techniques that intruders use to exploit vulnerabilities in systems. The course provides basic ethical elements of information and computer security with its risk assessment. Additionally, awareness training, countermeasures and safeguards and continuity of operations are taught.

**Recommended Books:**

- M. Whitman and H. Mattord (2005), "Principles of Information Security", 2<sup>nd</sup> Ed, Course Technology.
- Motiwalla, L. F., and J. Thompson (2009), "Enterprise Systems for Management", Pearson Prentice Hall.
- Peter Gregor (2010), "CISSP Guide to Security Essentials", 1<sup>st</sup> Ed.

**Course Title: Advanced Usability Engineering**

**Course Code: SEN 756**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course will explore primary issues relating to usability, why they are necessary, their application, and their influence on design. Students will investigate various methods of conducting usability studies for original designs through testing scenarios and heuristic

analysis. This course will give students a firm understanding of the user-centered methods and principles for the development of various kinds of interactive system, and to provide students with experience of analyzing, designing and evaluating graphical user interfaces.

**Recommended Books:**

- Jenny Preece, Helen Sharp, Yvonne Rogers (2015), "Interaction Design: Beyond Human-Computer Interaction" 4th Ed, Wiley.
- Leventhal and Bames (2007), "Usability Engineering: Process, Products, and Examples", Pearson and Prentice Hall.
- Jakob Nielsen (1993), "Usability Engineering", Academic Press.

**Course Title: Socio-Technical Systems**

**Course Code: EMG 621**

**Credit Hours Theory: Three (3)**

**Course Outline:**

We live and work in complex adaptive and evolving socio-technical systems. These systems may be complex for a variety of reasons. For example, they may be complex because there is a need to coordinate many groups, because humans are interacting with technology, because there are non routine or very knowledge intensive tasks, and so on. At the heart of this complexity is a set of adaptive agents who are connected or linked to other agents forming a network and who are constrained or enabled by the world they inhabit. Computational modelling can be used to help analyze, reason about, predict the behaviour of, and possibly control such complex systems of "networked" agents.

This course is based on the simulation of complex socio-technical systems. This course teaches the student how to design, analyze, and evaluate such computational models. It will introduce several styles of simulation including agent based and system dynamics. Examples of applications of these tools to various problems such as epidemiology, organizational adaptation, information diffusion, impact of new technology on groups, and so on, will be discussed. The course should be appropriate for graduate students in all areas. This course does not teach programming. Issues covered include: common computational approaches such as multi-agent systems, general simulation and system dynamics, heuristic based optimization procedures including simulated annealing and genetic algorithms, representation schemes for complex systems (particularly, groups, organizations, tasks, networks and technology), analysis techniques such as virtual experiments and response surface mapping, docking (model-to-model analysis), validation and verification, and social Turing tests. Illustrative models will be drawn from recent publications in a wide variety of areas including distributed artificial intelligence, knowledge management, dynamic network analysis, computational organization theory, computational sociology, computational epidemiology, and computational economics.

**Recommended Books:**

- Law & Kelton, "Simulation Modeling & Analysis", McGraw Hill.
- Carley, K. & M. Prietula (Eds) "Computational Organization Theory" Lawrence Erlbaum Associates.
- Epstein, J. & R. Axtell (1997), "Growing Artificial Societies", Boston, MA: MIT Press.
- Sterman, J. (2000), "Business Dynamics: Systems thinking and modeling for a complex world". Irwin/McGraw-Hill.

**Course: Decision Support Systems**

**Code: CSC 518**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course is about to review of the literature in the area of decision support systems (DSS) and DSS frameworks. Understanding the process of decision-making and issues involved in the design, implementation and evaluation of DSS. Additional topics include data mining, user interfaces, knowledge-based DSS, and research directions in DSS. Knowledge gained will be applied through the design and implementation of a DSS prototype.

**Recommended Books:**

- F. Burstein (2008), "Hand Book On Decision Support Systems", Springer, 2008.
- Ephraim Turban and Jay Aronson (2001), "Decision Support Systems and Intelligent Systems", Prentice-Hall.
- Robert Clemen (1996), "Making Hard Decisions", 2<sup>nd</sup> Ed, Duxbury.

**Course Title: Advanced Requirement Engineering**

**Course Code: SEN 658**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course focused on Systems engineering which is an interdisciplinary field of engineering focusing on how complex engineering projects should be designed and managed over their life cycles. Course is about importance of System engineering. Systems engineering is a well-developed body of knowledge, techniques, and methodologies in general use throughout technically complex industries. Its goal is the efficient production of high-quality products that meet the requirements of customers. All aspects of the process--from initial definition of mission requirements to test, verification, and fabrication of the product--must be carefully planned and executed.

**Recommended Books:**

**Course Title: Advanced Software and System Architecture**

**Course Code: SEN 621**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This Course is designed to give emphasizes on Systems engineering is an interdisciplinary field of engineering focusing on how complex engineering projects should be designed and managed over their life cycles. Course is about importance of System engineering. Systems engineering is a well-developed body of knowledge, techniques, and methodologies in general use throughout technically complex industries. Its goal is the efficient production of high-quality products that meet the requirements of customers. All aspects of the process--from initial definition of mission requirements to test, verification, and fabrication of the product--must be carefully planned and executed.

**Recommended Books:**

- Alexander Kossiakoff (2011), "Systems Engineering Principles and Practice".

**Course name: Advanced Software Project Management**

**Course Code: SEN 647**

**Credit Hours Theory: Three (3)**

**Course Outline:**

This course deals with managing information technology and software development projects. It is not restricted to project managers, but encompasses the art and science of using teamwork to meet project goals. The team includes the project manager, lead developers, software engineers, supporting functions, business experts and other stakeholders. Therefore, this course is directed to students across a wide range of backgrounds and interests. The student will learn how to conceptualize, initiate, plan and execute a successful project. Students will be able to recognize the principles of general management theory which transfer to software project management, apply techniques for successfully managing a project throughout its life-cycle, interpret the processes and knowledge areas in the Project Management Institute's Project Management Body of Knowledge, formulate the determination of success as a measurable organizational value and consider the human side of projects including participation in a team project.

**Recommended Books:**

- Jack Marchewka (2012), "Information Technology Project Management" 4th edition, John Wiley & Sons.
- Frederick Brooks, Jr. (2010), "The Design of Design: Essays from a Computer Scientist", Pearson Education (2010).

**REVISION OF CURRICULUM - MS (CS) PROGRAM**

**(Revision 2018)**

**MSCS PROGRAM**

**PROGRAM MISSION**

The mission of the MSCS program is to produce Computer Science graduates who are able to apply their theoretical knowledge and analytical skills to create effective and novel solutions to practical and research oriented computing problems.

**PROGRAM OBJECTIVES**

*The key objectives of the MSCS program include the following.*

1. To provide an in-depth understanding of the theory and concepts of the core Computer Science areas.
2. To prepare students for graduate level training in specialized areas of Computer Science.
3. To enable learning of the latest computing tools and technologies.
4. To enable students apply their knowledge and analytical skills to create effective and novel solutions to a wide range of computing problems.
5. To develop effective oral and written communication skills.
6. To prepare students to work effectively independently as well as in groups.

**PROGRAM LEARNING OUTCOMES**

Students graduating from the MSCS program are expected to gain:

1. Ability to apply Mathematical foundations, computational theory and algorithmic principles to solve practical as well as research oriented computing problems.
2. Ability to turn complex programming specifications into well-designed and well-tested computer programs.
3. Acquaintance with the latest computing tools and technologies.
4. Ability to communicate effectively in written and oral form.
5. Ability to pursue continuous professional development.
6. Ability to work on practical and research based problems collaboratively as well as independently.

**ELIGIBILITY CRITERIA - MS CS Program**

HEC recognized 4 years Bachelor degree in CS/SE/CE/EE/IT or equivalent with CGPA 2.5/4.0 (Semester System) or 50% marks (Annual System).

OR

MIT/MCS/M.Sc. (Computer Science) or equivalent with CGPA 2.5/4.0 (Semester System) or 50% marks (Annual System).

NTS GAT (General)/ GRE/University entry test passed with 50% marks.

The following core courses are recommended to be completed before entering the MS Computer Science Program:

- a. Computer Programming
- b. Analysis of Algorithms
- c. Computer Architecture
- d. Operating Systems
- e. Theory of Automata

#### **LIST OF COURSES - CORE COURSES**

SNo.	Course Code	Course Title	Credits
1.	CSC 503	Advanced Theory of Computation	3
2.	CSC 521	Advanced Design and Analysis of Algorithms	3
3.	CSC 720	Advanced Operating Systems	3
4.	CEN 720	Advanced Computer Architecture	3

#### **UNIVERSITY REQUIREMENT**

SNo.	Course Code	Course Title	Credits
1.	ESC 701	Research Methodology	3

#### **ELECTIVE COURSES**

Course Codes	Course Names	Credits
CSC 504	Ubiquitous Computing	3
CSC 505	Intelligent User Interface Design and Evaluation	3
CSC 515	Virtual Reality	3
CSC 516	Game Theory	3
CSC 701	Computer Supported Cooperative Work	3
SEN 720	Advanced Human Computer Interaction	3
SEN 756	Advanced Usability Engineering	3
CSC 518	Decision Support Systems	3
CSC 715	Intelligent Agents	3
CSC 719	Machine Learning	3
DSC 707	Deep Learning	3
CSC 741	Advanced Natural Language Processing	3
CEN 745	Advanced Digital Image Processing	3
CSC 749	Advanced Neural Networks and Fuzzy Logic	3
CSC 751	Pattern Recognition	3
CSC 764	Computer Vision	3
CSC 750	Intelligent Tutoring Systems	3
EET 519	Distributed Networking	3

Minutes of the 32<sup>nd</sup> ACM

EET 520	Network Administration and Management	3
EET 556	Mobile Communications and Networking	3
EET 702	Advanced Network Security	3
EET 713	Advanced Network Design	3
EET 716	Advanced Topics in Wireless Networking and Communications	3
EET 718	Network Performance Evaluation	3
EET 761	Network Protocols and Standards	3
CSC 781	Cloud Computing	3
CSC 553	Advanced Information Theory	3
CSC 746	Advanced Data Mining	3
CSC 747	Text Mining	3
CSC 752	Advanced DBMS	3
CSC 753	Distributed Databases	3
CSC 754	Object Oriented Databases	3
CSC 755	Web based DBMS	3
CSC 756	Multimedia Databases	3
CSC 760	Advanced Data Warehousing	3
CSC 514	Information Retrieval Techniques	3
SEN 764	Ontology Engineering	3
SEN 761	Semantic Web	3

**ROAD MAP - MS CS**

Course Code	Course Title	Credits
<b>Semester 1</b>		
CSC 503	Advanced Theory of Computation	3
CSC 521	Advanced Design and Analysis of Algorithms	3
ESC 701	Research Methodology (University Requirement)	3
	<b>Total</b>	<b>9</b>
<b>Semester 2</b>		
CSC 720	Advanced Operating Systems	3
CEN 720	Advanced Computer Architecture	3
	Elective I	3
	<b>Total</b>	<b>9</b>
<b>Semester 3</b>		
	Elective II	3
	Elective III	3
	Thesis I / Elective IV	3
	<b>Total</b>	<b>9</b>
<b>Semester 4</b>		
	Thesis II / Elective V	3
	<b>Total</b>	<b>3</b>
<b>Total Program Credits</b>		<b>30</b>

**COURSE OUTLINES**

<b>Advanced Theory of Computation</b>	
<b>Course Code:</b>	CSE 503
<b>Credit Hours:</b>	3
<b>Prerequisites:</b>	Theory of Automata It is assumed that students have had decent exposure to computability topics in an undergraduate-level course.
<b>Objectives:</b>	<p>The theory of computation is concerned with the theoretical limits of computability. Several mathematical models of computation have been formulated independently and under any such computational model, the existence of well-defined but unsolvable problems can be formally shown. These topics form part of the core of the mathematical foundations of computer science that will provide students and researchers with a sound theoretical view of the most fundamental concepts of computation.</p> <p>At the end of the course, the student should be able to:</p> <ul style="list-style-type: none"> <li>• Formalize mathematical models of computations;</li> <li>• Use these formalisms to explore the inherent limitations of computations; and</li> <li>• Describe some major current approaches for investigating feasible computation.</li> </ul>
<b>Course outline:</b>	<p><b>Finite Automata and Regular Languages:</b> determinism and non-determinism, checking vs. computing, properties of finite automata, regular expressions, the pumping lemma, closure properties</p> <p><b>Universal models of computations:</b> issues of computability, the Turing machine, translation between models, model independence</p> <p><b>Computability theory:</b> primitive and partial recursive functions, encoding a Turing machine, recursive and R.E. sets, Rice's theorem and the Recursion theorem, Unsolvability</p> <p><b>Complexity theory:</b> reducibility among problems, reduction and complexity classes, hierarchy theorems, model-independent complexity classes, NP-completeness, space completeness, provably intractable problems</p> <p><b>Proving problems hard:</b> NP-complete problems, P-completeness proofs, Turing reductions and search problems, the polynomial hierarchy and enumeration problems</p> <p><b>Complexity theory in practice:</b> restriction of hard problems, strong NP-completeness, the complexity of approximation, the power of randomization, complexity and constructive mathematics</p>
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Michael Sipser. <i>Introduction to the Theory of Computation, Third Edition</i>, Published by Cengage Learning, 2012.</li> <li>2. John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, <i>Introduction to Automata Theory, Languages, and Computation</i>, Addison-Wesley, 2006.</li> <li>3. Mikhail J. Atallah and Mariana Blanton (Eds.), <i>Algorithms and Theory of Computation Handbook: General Concepts and Techniques</i>, CRC Press, New York, 2009 (2nd Edition).</li> <li>4. Thomas Cormen, Charles Leiserson, Ronald Rivest, and Cliff Stein,</li> </ol>

	<p><i>Introduction to Algorithms</i>, McGraw Hill Publishing Company and MIT Press, 2009 (3rd Edition).</p> <p>5. Peter Linz, <i>An Introduction to Formal Languages and Automata</i>, Jones and Bartlett Publishers, 2006.</p> <p>6. Dexter Kozen, <i>Theory of Computation</i>, Springer, 2006.</p>
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<b>Advanced Design and Analysis of Algorithms</b>	
<b>Course Code:</b>	CSC 521
<b>Credit Hours:</b>	3
<b>Prerequisites:</b>	<p>Design and Analysis of Algorithms/Data Structures and Algorithms</p> <p>Students should have a solid background in fundamental algorithms, data structures and discrete mathematics. This background should include a working knowledge of sorting techniques, stacks, queues, lists, hash tables, heaps, binary search trees, recursion, set theory, graph theory, counting and probability theory, basic calculus, and proofs by mathematical induction.</p>
<b>Objectives:</b>	<p>Algorithm design and analysis is a fundamental and important part of computer science. This course introduces students to advanced techniques for the design and analysis of algorithms and explores a variety of application areas. Upon completion of the course, students should be able to explain the mathematical concepts used in describing the complexity of an algorithm, and design and apply algorithms appropriate to a particular situation.</p>
<b>Course outline:</b>	<p><b>Advanced algorithm analysis:</b> Asymptotic analysis, Average case analysis, Probabilistic analysis, Amortized analysis</p> <p><b>Fundamental algorithmic strategies:</b> Brute-force, Greedy, Divide-and-Conquer, Backtracking, Branch-and-Bound</p> <p><b>Advanced algorithm design:</b> NP-Completeness, Heuristic and Approximation Algorithms, Randomized Algorithms, Geometric Algorithms</p> <p><b>Parallel Algorithms:</b> The PRAM model, Design techniques for parallel algorithms, Optimality and efficiency issues of PRAM algorithms.</p> <p><b>Distributed Algorithms:</b> The Computational model, Distributed algorithms for Broadcasting, Leader Election, Message Routing, Event Ordering and Resource Allocation problems, Complexity issues.</p> <p><b>Genetic Algorithms:</b> Major elements of genetic algorithms, Genetic solutions of computationally hard problems, Parallel Genetic algorithms.</p>
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Cormen, Leiserson, Rivest, and Stein, <i>Introduction to Algorithms</i> (3rd ed.), MIT Press, 2009.</li> <li>2. M. Mitzenmacher and E. Upfal, <i>Probability and Computing</i>, Cambridge University Press, 2005.</li> <li>3. Vazirani, <i>Approximation Algorithms</i>, Springer-Verlag, 2004.</li> <li>4. Borodin and El-Yaniv, <i>Online Computation and Competitive Analysis</i>, Cambridge University Press, 1998.</li> <li>5. Direct Methods for Limit and Shakedown Analysis of Structures: Advanced Computational Algorithms and Material Modelling (Solid Mechanics and Its Applications) by Paolo Fuschi, Aurora Angela Pisano, Dieter Weichert</li> <li>6. Robert Sedgewick, <i>Analysis of Algorithms</i>, Addison Wesley, 1996.</li> </ol>

	<p>7. Motwani and Raghavan, Randomized Algorithms, Cambridge University Press, 1995.</p> <p>8. Gregory R. Andrews, Foundations of Multithreaded, Parallel and Distributed Programming, Addison Wesley, 2000.</p> <p>9. Albert Y. H. Zomaya, Parallel and Distributed Computing Handbook, McGraw Hill, 1995.</p>
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<b>Advanced Operating Systems</b>	
<b>Course Code:</b>	CSC 720
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Operating Systems, Data Structures, Computer Architecture
<b>Objectives:</b>	<p>The operating systems course is of prime importance in the curriculum of any graduate or undergraduate program in computer science. This course deals with advance concepts with relevance to the graduate level study. It has been designed using references of similar courses being offered at accredited universities. The intension is to deliver the state of art operating system concepts ranging from embedded micro kernels to popular platforms like LINUX, SOLARIS, Windows 2000 and XP. The internals, architecture, device driver writing and the distributed processing support on multi processor systems are the focus of course.</p> <p>An effort is made to conduct the course in such a way that the students get a research orientation. For this purpose state of art research articles will be reviewed and areas of further research will be identified. In some cases we may be able to come up with a research papers.</p>
<b>Course outline:</b>	<p>The course builds on the features of state of art Operating Systems like multi threading, scheduling and Inter process communication models, Concurrent programming and deadlock issues in multi core processor support.</p> <p>The Virtual Memory Management vs Distributed Shared Memory, Dynamic File systems and information security mechanisms along with distributed coordination principles and mechanisms of distributed file systems supported by case studies of NFS, ANDREW, Google file systems etc are covered in detail with exposure to areas of research.</p> <p>Device Drivers development fundamentals under Linux and Windows NT / XP operating systems and device management with specific reference to multimedia and real time operating systems are discussed</p> <p>Case studies include:</p> <p>LINUX Kernel and services architecture, Windows XP operating system a study of Kernel features, multi processing, memory management and services architecture and Solaris operating system features</p> <p>Evaluation of operating system performance, Queuing theory, Markov processes, Bench marking, Simulation and testing methods are discussed.</p>

<b>Advanced Computer Architecture</b>	
<b>Course Code:</b>	CEN 720
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Computer Architecture
<b>Objectives:</b>	This course covers the advanced concepts in computer architecture including computer organization instruction set design principles and MIPS architecture, principles of scalable performance, pipelining, instruction level parallelism, compilers, code optimization, caches, main and virtual memory. Students will also be introduced to parallel computers and storage devices.
<b>Course outline:</b>	Computer Organization review, Instruction Set Design principles and MIPS architecture, Principles of Scalable Performance, Speedup Performance laws, Scalability analysis and approaches, Pipelining: Basic pipelining, Data and control Hazards, Exceptions, Branch Prediction, Speculation, Performance Evaluation, Instruction level Parallelism, Score Board Architecture, Dynamic Scheduling ,Multiple instruction issue using superscalar approach,VLIW – software based ILP ,Compilers and code optimization, Caches, Cache basics, Techniques to reduce miss rate, Techniques to reduce miss penalty, Programming for memory performance, Main memory organization, Virtual Memory and paging, Storage devices, Parallel Computers, Multiprocessors, Parallel Architectures and applications, Synchronization Mechanisms.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. John L. Hennessy and David A. Patterson, "Computer Architecture: A quantitative approach", 4<sup>th</sup> edition 2006</li> <li>2. D. Sima, T. Fountain, P. Kacsuk, "Advanced Computer Architecture", Addison-Wesley, 1997</li> <li>3. H.S. Stone, "High-performance Computer Architecture", 3rd edition, Addison-Wesley, 1993</li> <li>4. Patterson, D. A. and Hennessy, J. L., "Computer Organization and Design: The Hardware/ Software Interface", Morgan Kaufmann, 1998</li> <li>5. Kai Hwang, "Advanced Computer Architecture", McGraw Hill, 2008</li> <li>6. William Stallings, "Computer Organization and Architecture", 5th Edition, Prentice Hall International Inc., 2000</li> <li>7. Computer Architecture, Fifth Edition: A Quantitative Approach (The Morgan Kaufmann Series in Computer Architecture and Design) 5th Edition, by David A. Patterson, 2011.</li> </ol>

<b>Research Methodology</b>	
<b>Course Code:</b>	ESC 701
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	None
<b>Objectives:</b>	This course is aimed at providing the students with an ability to undertake postgraduate level research and an appreciation of relevant ethical and professional issues. After completing this course, students will be able to: Formulate research questions and carry out research investigations, Identify various sources of information and critically analyze the collected information, Identify and apply appropriate research methods in order to plan, conduct and evaluate their research, Effectively report/publish the results of research activities and Develop and deliver presentations to disseminate research findings.
<b>Course outline:</b>	Introduction to research, Qualitative and Quantitative research, The scientific method of research, Choosing a research problem, Choosing a research advisor, Literature Review – Conducting and writing, Formulating the research question, Identifying variables and generating hypothesis, Research Design/Methodology, Information gathering and data collection, Data representation, analysis and interpretation, Writing a research proposal, Ethics of research – Plagiarism and Intellectual property rights, Organizing and managing conferences and workshops, Writing research papers/Reviewing research papers, Planning and delivering scientific presentations, Writing thesis/dissertations
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. <i>Research Methodologies – A step by step guide for beginners</i>, Ranjit Kumar, 2005.</li> <li>2. <i>Research Design: Qualitative, Quantitative, and Mixed Methods Approaches</i>, John W. Creswell, 2008.</li> <li>3. <i>How to Research</i>, L. Blaxter, C. Hughes, M. Tight, 4<sup>th</sup> Edition, 2010.</li> </ol>

<b>Ubiquitous Computing</b>	
<b>Course Code:</b>	CSC 504
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Human Computer Interaction
<b>Objectives:</b>	Ubiquitous computing integrates computation into the environment, rather than having computers as distinct objects. Embedding computation into the environment will enable people to move around and interact with computers more naturally than they currently do. Therefore, the objective of this course is to help students gain a general understanding of ubiquitous computing, ubiquitous computing field of study and interfaces for ubiquitous computing.

<b>Course outline:</b>	Introduction to ubiquitous computing, ubiquitous computing systems, privacy in ubiquitous computing, ubiquitous computing field studies, Ethnography in ubiquitous computing, interfaces for ubiquitous computing, location in ubiquitous computing, context-aware computing and processing sequential sensor data.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Ubiquitous Computing Fundamentals by John Krumm</li> <li>2. Ubiquitous Computing by Eduard Babkin ISBN 978-953-307-409-2, Publisher: InTech, Published: February 10, 2011</li> </ol>

<b>Intelligent User Interfaces Design and Evaluation</b>	
<b>Course Code:</b>	CSC 505
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Human Computer Interaction
<b>Objectives:</b>	The third wave of HCI has brought computing systems in everyday life of humans. Earlier HCI field mainly focused on cognitive aspects but now human centered computing has extended the traditional software process by extending conventional requirements engineering and evaluation processes. The objective of this course is to facilitate students to get acquainted with advanced user interface design and evaluation methodologies.
<b>Course outline:</b>	Scenarios and Personas, Mental Models and Affordances, Tangible User Interfaces, Design as Applied Perception, Information Processing and Skilled Behavior, Cognitive Dimensions of Notational Frameworks, User Mental Modeling, Activity Theory, Distributed Cognition, Interaction Design, Evaluation Studies (Controlled v/s Natural settings), Inspections, Analytics and Models, Field Evaluation Methods
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Dourish P. (2001) Where the Action Is: The Foundations of Embodied Interaction. MIT Press</li> <li>2. Readings in Intelligent User Interfaces, Mark T. Maybury, Wolfgang Wahlster, Morgan Kaufman Publishers, 1998</li> <li>3. Markus, M.L. &amp; Keil, M. (1994) If we build it, they will come: Designing information systems people want to use. Sloan Management Review</li> <li>4. Dunne, A.; Raby, F. (2001): Design Noir: The Secret Life of Electronic Objects, Birkhäuser</li> <li>5. Ehn, P. (1988): Work-Oriented Design of Computer Artifacts. Stockholm, Arbetslivscentrum.</li> <li>6. Gaver, B., Beaver, J.; Benford, S. (2003) Ambiguity as a resource for design. Proc. of CHI03. ACM Press, S. 233-240.</li> <li>7. Multimedia Interaction and Intelligent User Interfaces: Principles, Methods and Applications, by Ling Shao, Caifeng Shan, Jiebo Luo – 2010.</li> </ol>

<b>Virtual Reality</b>	
<b>Course Code:</b>	CSC 515
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	<ul style="list-style-type: none"> <li>• Computer Graphics</li> <li>• C/C++ Programming</li> </ul>
<b>Objectives:</b>	The objective of this course is to introduce students to Virtual Reality (VR). In this course, we will discuss the basics and detail of rapidly growing field of VR. At the end of the course, students should be able to understand and use virtual reality in its own domain of application and should have a clear understanding of the various possibilities of this far-reaching technology.
<b>Course outline:</b>	Understanding the basic principles of virtual reality, historical development of virtual reality, virtual reality hardware and software, applications for current virtual reality hardware and software, designing and constructing a simple virtual environment, social, philosophical, and psychological factors and implications of virtual reality.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Introduction to Virtual Reality by John Vince, Springer 2004</li> <li>2. Virtual Reality Technology by Burdea, Grigore and Coiffet, Philippe, second edition. New York: John Wiley &amp; Sons, 2003</li> <li>3. Virtual Reality Technology, John Wiley &amp; Sons, Burdea G. and P. Coiffet, 1994.</li> <li>4. Virtual Reality Photography: Creating Panoramic and Object Images, by Scott Highton, 2010.</li> </ol>

<b>Game Theory</b>	
<b>Course Code:</b>	CSC 516
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Linear Algebra
<b>Objectives:</b>	The objective of this course is to provide a foundation of game theory to help students apply game theory to problem solving in a rigorous way. At the end of this course, the students can expect to be able to model real-world situations using game theory, analyze the situations using game theoretic concepts, and design correct and robust solutions (mechanisms, algorithms, protocols) that would work for rational and intelligent agents.

<b>Course outline:</b>	Introduction to Game Theory, Extensive Form Games, Strategic Form Games, Dominant Strategy Equilibria, Pure Strategy Nash Equilibrium, Mixed Strategy Nash Equilibrium, Von Neumann - Morgenstern Utility Theory, Rationalizable Strategies, Sperner's Lemma, Fixed Point Theorems, and Existence of Nash Equilibrium, Computation of Nash Equilibrium, Complexity of Computing Nash Equilibrium, Introduction to Mechanism Design, Social Choice Functions and Mechanisms, Incentive Compatibility and Revelation Theorem, Properties of Social Choice Functions, Gibbard-Satterthwaite Theorem and Arrow Impossibility Theorem, Quasilinear Mechanisms, Vickrey-Clarke-Groves Mechanisms, Bayesian Incentive Compatible Mechanisms, Revenue Equivalence Theorem, Optimal Auctions and Myerson Auction
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Game Theory: Analysis of Conflict by Roger B. Myerson. Harvard University Press, September 1997.</li> <li>2. A Course in Game Theory by Martin J. Osborne, Ariel Rubinstein. The MIT Press, August 1994.</li> <li>3. Game Theory and Strategy by Philip D. Straffin, Jr. The Mathematical Association of America, January 1993.</li> <li>4. Fun and Games: A Text On Game Theory by Ken Binmore. D. C. Heath &amp; Company, 1992.</li> <li>5. Behavioral Game Theory: Experiments in Strategic Interaction, by Colin F. Camerer - 2011.</li> </ol>

<b>Computer Supported Cooperative Work</b>	
<b>Course Code:</b>	CSC 701
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Human Computer Interaction
<b>Objectives:</b>	The objective of the course is to impart knowledge about synchronous and asynchronous group work, workflow management systems, organizational and technology design. After completing the course students will be able to understand cooperative work processes within socio-technical systems and supported software technology. Furthermore students will understand the evaluation mechanisms for evaluating application systems for distributed and collaborative work.
<b>Course outline:</b>	Social and Scientific Foundations (ethnography, Small group research, organization theory), applications to support synchronous and asynchronous cooperation, Workflow Management Systems, Media Spaces and Cooperative Virtual Environments (CVE), Functionality to promote group awareness (awareness), Coordination, ordering Systems, Customizable groupware Systems, development of methods of cooperative systems, Integrated organization and technology design.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Schmidt, K. Cooperative Work and Coordinative Practices, 2012</li> <li>2. Koch, M. Computer Supported Cooperative Work, 2007</li> </ol>

	<p>3. Bødker, S. (2006) When second wave HCI meets third wave challenges, Proc. of NordiCHI, ACM Press, S. 1-8.</p> <p>4. Crabtree, A. (2003): Designing Collaborative Systems: A Practical Guide to Ethnography, Springer.</p>
<b>Advanced Human Computer Interaction</b>	
<b>Course Code:</b>	SEN 720
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Human Computer Interaction
<b>Objectives:</b>	The objective of this course is to highlight the importance if user interfaces design. Students will be able to learn different design theories and organizational aspects revolving around human computer interaction. After the completion of the course students will be able to employ best practices for better user interface design.
<b>Course outline:</b>	Fundamentals of interaction design from perception, working and cognitive Psychology, theories of design: Distributed Cognition, Activity Theory, structuration theory, Text, Image, video, audio and animation Job Analysis, Basics of tasks and basic technologies: web-based systems, peer-to-peer systems, Fundamentals of Software and Media Ergonomics, methods of user-centered interaction design, Organizational aspects of the design of complex interactions.
<b>Resources:</b>	<p>1. Carroll, John M.: HCI Models, Theories and Frameworks, Morgan Kaufman, 2003</p> <p>2. Blum, Bruce I.: Beyond Programming: To a New Era of Design, Oxford University Press 1996</p> <p>3. Nielsen, Jakob: User Experience Design, Academic Press, 1994</p> <p>4. Preece, J., Rogers, Y., Sharp, H.: Interaction Design, Wiley and Sons, 2002</p> <p>5. Interaction Design: Beyond Human - Computer Interaction by Yvonne Rogers, Helen Sharp, Jenny Preece, 2002</p> <p>6. Human-Computer Interaction Advanced Interaction, Modalities, and Techniques: 16th International Conference, HCI International 2014, Heraklion, Crete, Part II (Lecture Notes in Computer Science) by Masaaki Kurosu, 2014.</p>
<b>Advanced Usability Engineering</b>	
<b>Course Code:</b>	SEN 756
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Human Computer Interaction
<b>Objectives:</b>	In this course students will learn the skills of usability engineering, ethnographic research methods for data collection as well as evaluation strategies such as heuristics evaluation and user studies. Furthermore different design paradigms, different Schools of thought and the interplay of technology, people and the environment will be discussed.

<b>Course outline:</b>	Ethnographic methods to study the context of use, Usability Engineering Lifecycle, Narrative approaches to the understanding of future uses, methods of heuristic evaluation of the usability interactive system, Empirical methods for evaluating the usability of interactive systems under controlled conditions, Usability Testing, Skills of test moderator, Setting up testing environment, Variations in standard testing procedures, Designing user experience.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Dana Chisnell, Jeffrey Rubin, Jared Spool: Handbook of Usability Testing - How to Plan, Design, and Conduct Effective Tests 2008</li> <li>2. Jakob Nielsen: User Experience Design. Academic Press Inc, 1993.</li> <li>3. Mary Beth Rosson, John M. Carroll: User Experience Design:</li> <li>4. Scenario-Based Development of Human-Computer Interaction. Morgan Kaufmann, 2001.</li> <li>5. Hugh Beyer, Karen Holtzblatt: Contextual Design - Defining Customer-Centered Systems. Morgan Kaufmann, 1998.</li> <li>6. Randall, Dave, Harper, Richard, Rouncefield, Mark: Fieldwork for Design - Theory and Practice. Springer, 2007.</li> <li>7. Advances in Usability Evaluation, Francesco Rebelo, Marcelo M. Soares – 2012.</li> </ol>

<b>Decision Support Systems</b>	
<b>Course Code:</b>	CSC 518
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	None
<b>Objectives:</b>	This course should enable a student to understand managerial decisions, to participate in the decision making process, and to be able to develop models and systems to support the decision making. This course focuses on the use and application of information systems to support the decision-making process. Different types of systems are discussed as a basis for designing and developing highly effective decision support systems. Data models, interactive processes, knowledge-based approaches and integration with database systems are also described. Theoretical concepts would be applied to real-world applications.
<b>Course outline:</b>	Decision support systems overview, Decision Making, Systems, Modeling, and Support, business intelligence, Data Management, Modeling and Analysis, Decision Support System Development, Fundamentals of Expert Systems and Intelligent Systems, Collaborative Computing Technologies, Knowledge Management
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Efraim Turban and Jay E. Aronson, Decision Support Systems and Intelligent Systems, Seventh Edition, Prentice Hall Pub. M 2004.</li> <li>2. Decision Support Systems and Business Intelligence Systems. 9e. by E. Turban &amp; J. Aronson, 2010</li> </ol>

<b>Intelligent Agents</b>	
<b>Course Code:</b>	CSC 715
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	None
<b>Objectives:</b>	The primary objective of this course is to provide an introduction to the basic principles and applications of intelligent agents. The emphasis of the course is on teaching the fundamentals, and not on providing a mastery of specific commercially available software tools or programming environments. Students will be presented with a wide range of theories of relevance to their research and development to model agent's knowledge representation and learning. Emphasis will be placed on understanding concepts of thinking, planning and learning aspects of intelligent agents and using them to model and build relevant agent-based systems.
<b>Course outline:</b>	Agent, Environment, Interaction, Solving Problem by Search Algorithms, Informed Search, Constraint Satisfaction Problem, Logical Agents , Theorem Proving Algorithms (propositional logic, predicate logic), Partial Order Planning, Graph Plan, BDI Agents, Decision trees , Neural Networks, Reinforcement learning, Q- learning, Temporal Difference Learning, Monte Carlo Methods.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Stuart Russel and Peter Norvig, Artificial Intelligence, A modern Approach, 3<sup>rd</sup> Edition</li> <li>2. Michael J. Wooldridge, Reasoning about Rational Agents.</li> <li>3. Jack Minker, Logic Based Artificial Intelligence.</li> <li>4. Steven Michael LaValle, Planning Algorithms.</li> <li>5. Ethem Alpaydin, Introduction to Machine Learning.</li> </ol>

<b>Machine Learning</b>	
<b>Course Code:</b>	CSC 719
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Computer Programming Statistics
<b>Objectives:</b>	This course is an overview of concepts and techniques in machine learning, beginning with topics such as classification and linear regression and ending up with more recent topics such as boosting, support vector machines, hidden Markov models, and Bayesian networks. The course will give the student the basic ideas behind modern machine learning methods.
<b>Course outline:</b>	Introduction to Machine Learning, Concept learning, Decision tree learning, Linear models for regression, Linear models for classification, Artificial neural networks, Kernel methods, Sparse kernel machines, Mixture models and the EM algorithm, Evaluation, Combining multiple learners, Support vector machines, Bayesian networks

<b>Resources:</b>	1. C. M. Bishop, Pattern recognition and machine learning, Springer, 2006. 2. Tom M. Mitchell, Machine Learning. McGraw-Hill, 1997. 3. Python Machine Learning, Sebastian Raschka, 2015.
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<b>Deep Learning</b>	
<b>Course Code:</b>	DSC 707
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Machine Learning
<b>Objectives:</b>	The objective of this course is to acquaint the students with the state-of-the-art deep learning techniques to solve different learning problems. Students will learn to design as well as implement deep neural network architectures (through hands-on tasks) to solve various recognition problems.
<b>Course outline:</b>	Introduction to neural networks, activation functions and back-propagation; Convolutional Neural Networks: History, Convolution, Pooling, CNNs for classification, Deep learning Software, CNN Architectures; Sequence Modeling: Recurrent and Recursive Nets: Long-Short Term Memory models and variants, Language modeling and image captioning, Unsupervised learning: Restricted Boltzmann Machines and Auto-encoders; Case Studies.
<b>Resources:</b>	<ul style="list-style-type: none"> <li>• Deep Learning (Adaptive Computation and Machine Learning series), Ian Goodfellow, Yoshua Bengio, Aaron Courville, The MIT Press, 2016.</li> <li>• Deep Learning: A Practitioner's Approach, Josh Patterson and Adam Gibson, O'Reilly Media, 2017.</li> <li>• Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms, Nikhil Buduma and Nicholas Locascio, O'Reilly Media, 2017</li> <li>• Deep Learning with Python, Francois Chollet, O'Reilly Media, 2017.</li> </ul>

<b>Advanced Natural Language Processing</b>	
<b>Course Code:</b>	CSC 741
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	-
<b>Objectives:</b>	This course is intended to introduce the students to the fundamental concepts and ideas in natural language processing (NLP). Students will be acquainted with the algorithms available for the processing of linguistic information as well as the underlying computational properties of natural languages. By the end of this course the student should be able to carry out independent work with modern techniques for processing of texts.
<b>Course outline:</b>	Introduction to NLP and its applications, Grammar checkers, dictation, document generation, NL interfaces, The different analysis levels used for

	NLP, Markup, Finite state automata, Recursive and augmented transition networks, Lexical level: Error-tolerant lexical processing (spelling error correction), Transducers for the design of morphologic analyzers, Part-of-speech tagging, Representations for linguistic resources, Syntactic level: Grammars (e.g. Formal/Chomsky hierarchy, DCGs, systemic, case, unification, stochastic), Parsing (top-down, bottom-up, chart (Earley algorithm), CYK algorithm), Semantic level: Logical forms, Ambiguity resolution, Semantic networks and parsers, Procedural semantics, Montague semantics, Vector Space approaches, Pragmatic level: Knowledge representation, Reasoning, Plan/goal recognition, Speech acts/intentions, Natural language generation.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Handbook of Natural Language Processing, Nitin Indurkha and Fred J. Damerau, Chapman &amp; Hall/Crc, Second Edition, 2010.</li> <li>2. Natural Language Processing and Text Mining, Anne Kao and Steve R. Poteet, Springer, 2010.</li> <li>3. Speech and Language Processing, Daniel Jurafsky and James H. Martin, Pearson Prentice Hal, 2nd Edition, 2008.</li> <li>4. Foundations of Statistical Natural Language Processing, Christopher D. Manning, Hinrich Schuetze, The MIT Press; 1st edition, 1999.</li> <li>5. Natural Language Understanding, James Allen, Pub. Benjamin/Cummings, 2nd edition, 1995.</li> </ol>

<b>Advanced Digital Image Processing</b>	
<b>Course Code:</b>	CSC 745
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	None
<b>Objectives:</b>	This course will provide mathematical foundations and practical techniques for digital manipulation of images, image acquisition, preprocessing, segmentation. The course will expose the students to the basic theory and algorithms widely used in digital image processing. After the completion of this course the students will be able to understand the basic concepts behind the processing of digital images as well as various techniques of filtering/processing images in spatial as well as in frequency domain. The course will serve as the basis for more advance topics in Computer Vision.
<b>Course outline:</b>	<p>Introduction to Digital Image Processing Computer Vision and Pattern Recognition, Fundamentals Element of visual Perception, Image Sensing and Acquisition Image Sampling and Quantization. Pixel operations, linear &amp; Non linear operations, Image Enhancement in spatial Domain: Background, Grey level Transformations, Filtering in spatial domain.</p> <p>Image Enhancing in Frequency Domain: Frequency domain, Fourier Transform, Filtering in frequency domain, Color Image Processing,</p>

	Fundamentals of Image Compression, Lossless and lossy compression, Image Compression standards, Image Segmentation: Detection of Discontinuities, Edge and Boundary detection, Thresholding, Region Based segmentation, Morphological image processing, Representation schemes: Boundary and region descriptors.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. <i>Digital Image Processing</i>, R. C. Gonzalez and R. E. Woods, Addison Wesley, 3rd Edn., 2007.</li> <li>2. <i>Fundamentals of Digital Image Processing: A Practical Approach with Examples in Matlab</i>, Chris Solomon and Toby Breckon, 2011.</li> </ol>

<b>Advanced Neural Networks and Fuzzy Logic</b>	
<b>Course Code:</b>	CSC 749
<b>Credit Hours:</b>	3
<b>Prerequisites:</b>	Artificial Intelligence
<b>Objectives:</b>	This course presents an overview of the theory and applications of artificial neural network and fuzzy systems to computer science and software engineering applications. The objective of this course is on the understanding of various neural network and fuzzy systems models and the applications of these models to solve computing/software engineering problems.
<b>Course outline:</b>	<p>Introduction Contexts for and Motivation Neural Networks: Artificial Intelligence Artificial Neural Network overview.</p> <p>Supervised Learning: Single-Layer Networks, Perceptrons, Adalines</p> <p>Supervised Learning: Multi-Layer Networks.</p> <p>Multi-Layer Perceptrons (MLPs) , Backpropagation , Conjugate Gradient method , Levenberg-Marquardt (LM) method , Madalines , Radial-Basis Networks , Cascade-Correlation Networks , Polynomial Networks , Recurrent Networks (Time series , Backpropagation through time , Finite Impulse Response (FIR) MLP ), Temporal Differences method (TD).</p> <p>Unsupervised Learning</p> <p>Simple Competitive Networks: Winner-take-all   Hamming network , Learning Vector Quantization (LVQ), Counterpropagation Networks (CPN) , Adaptive Resonance Theory (ART) , Kohonen Self-Organizing Maps (SOMs) , Principal Component Analysis networks (PCA)</p> <p>Associative Models</p> <p>Linear Associative Memory (LAM) , Hopfield Networks , Brain-State-in-a-Box , BSB) , Boltzmann Machines and Simulated Annealing , Bi-Directional Associative Memory (BAM)</p> <p>Optimization Problems</p> <p>Neural Network Approaches, Evolutionary Programming , Fuzzy logic and its connection to NNs</p>
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Neural Networks: A Comprehensive Foundation, Simon Haykin, Prentice Hall, Upper Saddle River, NJ, SECOND EDITION, 1999</li> </ol>

	<p>2. Artificial neural networks: an introduction, by Kevin L. Priddy, Paul E. Keller-Technology &amp; Engineering-2005</p> <p>3. Neural networks: methodology and applications, by G. Dreyfus-computers-, 2005</p> <p>4. Evolving Fuzzy Systems - Methodologies, Advanced Concepts and Applications, By Edwin Lughofer, 2011.</p>
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<b>Pattern Recognition</b>	
<b>Course Code:</b>	CSC 751
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	<p>1. Probability and Statistics</p> <p>2. Linear Algebra</p>
<b>Objectives:</b>	The goal of this course is to provide an introduction to the fundamental concepts of machine learning and pattern recognition with examples from several application areas. The students will be acquainted with real world regression and classification problems and the models and classifiers to solve these problems. Students will also be introduced to dimensionality reduction and feature selection concepts. Additionally, students will be exposed to various clustering techniques. A key objective to this course is for the students to also acquire hands-on experience related to classification and clustering tasks.
<b>Course outline:</b>	Introduction to Pattern recognition and Machine learning, Matrices and vectors: Toeplitz and Vendermonde matrices, classification and regression, Bayesian Decision theory, Normal Density and decision functions for normal distribution, Maximum likelihood estimation, Dimensionality reduction – Component analysis, feature selection, Hidden Markov Models and Artificial neural networks, Non-parametric methods, Unsupervised learning and clustering: Clustering techniques.
<b>Resources:</b>	<p>1. Pattern Classification, Duda, Hart and Stork, Second Edition, Wiley, 2001.</p> <p>2. Pattern recognition and Machine Learning, Christopher M. Bishop, Springer, 2007.</p> <p>3. Introduction to Machine Learning, Ethem Alpaydin, MIT Press, 2004.</p> <p>4. The Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer, 2009.</p> <p>5. Pattern Recognition and Classification: An Introduction, by Geoff Dougherty - 2012 S. Theodoridis &amp; K. Koutroumbas, Academic Press, 2008.</p>

<b>Computer Vision</b>	
<b>Course Code:</b>	CSC 764
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Digital Image Processing
<b>Objectives:</b>	By the end of this course, the students would have developed an

	understanding of the problems in simulating human perception into machines. Students will have a thorough understanding of the state of the art computer vision methods, algorithms and results. The students will also be able to apply the tools and techniques learned to solve practical vision related problems.
<b>Course outline:</b>	Introduction to Computer Vision and related areas along with applications, Image formation and representation: imaging geometry, digitization, cameras and projections, rigid and affine transformations, Filtering: convolution, smoothing,. Segmentation: region splitting and merging; quadtree structures for segmentation; Feature detection: edge detection, corner detection, line and curve detection, SIFT and HOG descriptors, shape context descriptors. Model fitting: Hough transform, line fitting, ellipse and conic sections fitting, algebraic and Euclidean distance measures. Camera calibration: camera models; intrinsic and extrinsic parameters; affine, and perspective camera models. Epipolar geometry: introduction to projective geometry; epipolar constraints; the essential and fundamental matrices; Motion analysis: the motion field of rigid objects; motion parallax; optical flow, the image brightness constancy equation, affine flow; differential techniques; feature-based techniques; Motion tracking: the Kalman filter; Object recognition and shape representation.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Computer Vision: Algorithms and Applications, R. Szeliski, Springer, 2011.</li> <li>2. Computer Vision: A Modern Approach, D. Forsyth and J. Ponce, Prentice Hall, 2nd ed., 2011.</li> <li>3. Computer Vision: A Modern Approach, By David Forsyth, Jean Ponce, Prentice Hall, 2003.</li> <li>4. Computer Vision, By Linda G. Shapiro, George C. Stockman, Prentice Hall, 2001.</li> <li>5. Handbook of Mathematical Models in Computer Vision, By Nikos Paragios, Yunmei Chen, Olivier Faugeras, Birkhäuser, 2006</li> </ol>

<b>Intelligent Tutoring System</b>	
<b>Course Code:</b>	CSC 750
<b>Credit Hours:</b>	3
<b>Prerequisites:</b>	
<b>Objectives:</b>	The goal of this course is to survey the scientific literature pertaining to intelligent tutoring systems and design a tutoring system for functional dependencies encompassing an exercise module, a learning action tracking module, a self-assessment module for the learner and an assessment module for the educator. Data mining techniques will be used on well-designed activity logs to extract patterns to provide feedback to learners for self-assessment and global patterns for group assessment.
<b>Course outline:</b>	An Intelligent tutoring system (ITS) provides individualized computer-based instruction to students. These systems emerged from application of artificial intelligence techniques to the computer aided instruction CAI systems. The

	<p>difference is that an ITS usually compares the student's work with expert solutions or strategies, models the student's probable knowledge of a domain and provides coaching or advice, taking into account what the student's knowledge of state, preferred learning style, etc.</p>
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Advances in Intelligent Tutoring Systems by Nkambou, Riichiro Mizoguchi, Jacqueline Bourdeau – 2010</li> <li>2. Intelligent tutoring systemsb by D. Sleeman, J. S. Brown – 1982</li> <li>3. Intelligent Tutoring Systems in E-Learning Environments by Stankov, Slavomir - 2010</li> </ol>

<b>Distributed Networking</b>	
<b>Course Code:</b>	EET 519
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Computer Networks
<b>Objectives:</b>	The objective is to give students a clear overview of the problems and issues that must be dealt with in constructing robust and flexible distributed applications as well as the underlying network protocols needed to support them. The emphasis is on the conceptual basis for distributed and networked systems rather than a detailed study of particular systems and standards. Concepts will be illustrated with examples from practical systems.
<b>Course outline:</b>	Network Overview: interfaces, protocols and services, connection- oriented and connectionless services, Overview of distributed system architecture: motivation, system structures, ODP Reference model and distribution transparencies, design issues.; Interaction primitives: message passing, remote procedure call, remote object invocation; Internet Network Measurement, Network Restoration, Routing; Multicast Routing, TCP/IP; Linux Networking and related kernel, Linux-based Content Switch Design; Intel IXP Network Processor and related IDE, MLPS, IS, RSVP, Differential Services; Overview of wide area network design Erlang, 2 node voice network design, 3 node data network design; Graph Theory, Traffic and Cost Generators, Access network design; Multispeed Access Design, Multicenter Local Access Design; Mesh Network Design
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Wide Area Network Design, by Robert S. Cahn, 1998</li> <li>2. Communication Networks, Chapters 7-10, by Alberto Leon-Garcia and Indra Widjaja, 2003</li> <li>3. Distributed Networks: Intelligence, Security, and Applications by Qurban A. Memon - 2016</li> </ol>

<b>Network Administration and Management</b>	
<b>Course Code:</b>	EET 520
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Computer Communication and Networks, Operating System
<b>Objectives:</b>	This course will give an overview of systems and network administration based on both Windows and Linux environments. The objective are common system administration tasks and practices and how to implement and

	<p>maintain standard services like email, file sharing, DNS and similar. The course is primarily dealing with the Linux and Windows operating systems and especially with Linux-based servers and Window-based clients, but some information about the most fundamental differences between various Linux systems will be provided. In labs focus is on how to install, setup and maintain Linux server machine and perform various system administration and security related tasks on those machines</p>
<b>Course outline:</b>	<p>Brief introduction to the Networks, Homogenous and Heterogeneous networks ,Issues involved in the setup of Heterogeneous networks, File systems, Configuration issues, Fundamentals of Linux user interface, Installation and administration of heterogeneous networks using Windows and Linux platforms. System installation, booting and halting the system, file systems and directory permission structures, print and disk quotas, device configuration and management, user account administration, security, client administration, disk maintenance, remote access, remote administration, the use of schedulers, the use of advanced scripting to ease system administration tasks, configuration management, template implementation and cross directory implementation</p>
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Practice of System and Network Administration, the 2<sup>nd</sup> Edition by Thomas A,Limoncelli, Hogan, 2005.</li> <li>2. Windows Administration Latest Edition, Microsoft Press</li> <li>3. Linux Administration Guide Latest Edition</li> <li>4. Network Security, Administration and Management: Advancing Technology and Practice: Advancing Technology and Practice by Kar, Dular Chandra- 2011</li> </ol>

<b>Mobile Communications and Networking</b>	
<b>Course Code:</b>	EET 556
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Wireless Communication, Computer Networks, Data Communications
<b>Objectives:</b>	This course focuses on network issues for Mobile communication networks. The course will cover basic theory, namely the analysis of queues and combinatorial algorithms, and it will also include an overview of the plethora of wireless mobile communications systems under development and deployment, ranging from indoor systems to satellite personal communication systems.
<b>Course outline:</b>	History of mobile communications, fundamental definitions, characteristics of mobile communication systems, some current and proposed systems/standards. Characterization of the mobile communication channel: path loss, multipath fading, shadowing, Doppler shift, mathematical channel models, channel measurement. Techniques used for communication over fading multipath channels: forward error correction coding and interleaving, adaptive equalization, and diversity techniques. Cell layout, cell sectorization and cell splitting, Establishment of calls, handoff and power control, registration and location updating, security. Signaling between the mobile

	terminal and the network. Frequency reuse factor vs. inter-station distance for hexagonal grid, impact on system capacity, impact of sectorization on capacity. Erlang capacity. Specific topics include: Poisson processes and continuous-time, discrete state Markov models, Architecture of existing mobile communication systems and potential future systems Services, call flow scenarios in GSM including handoffs. Detail design and comparison of GSM and Mobile WiMax, mobile ad hoc networks including wireless sensor communication, mobile communication with satellites.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Jochen H. Schiller, Mobile Communications, 2nd Edition, 2003</li> <li>2. James E. Katz, Handbook of Mobile Communication Studies, 2008</li> <li>3. Christopher Cox, An Introduction to LTE: LTE, LTE-Advanced, SAE and 4G Mobile Communications, 2012</li> <li>4. Erik Dahlman, Stefan Parkvall and Johan Skold, 4G: LTE/LTE-Advanced for Mobile Broadband, 2011</li> <li>5. Sassan Ahmadi, Mobile WiMAX: A Systems Approach to Understanding IEEE 802.16m Radio Access Technology, 2010</li> <li>6. Ulysses Black, Second Generation Mobile and Wireless Networks, 1<sup>st</sup> Edition, Prentice Hall, 1998</li> </ol>

<b>Advanced Network Security</b>	
<b>Course Code:</b>	EET 702
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Computer networks
<b>Objectives:</b>	To provide overview how to design, best possible secure and efficient network depending upon users profile, applications and other requirements.
<b>Course outline:</b>	<p>Overview of Network Security ,Threat Models, Trust , Authentication, Wireless Security, Single-Host Security, Authentication, File protection, integrity; privileges, C and Shell Programming pitFalls, Programmed threats; Worms, Viruses, Trojan Horses</p> <p>Basics of cryptography, Cryptographic Protocols, General techniques, Email privacy, digital signatures, Kerberos, Digital cash, Cryptographic file systems, Secure network transactions</p> <p>IP Protocols, Firewalls, Intrusion detection, IPsec , Physical connectivity, Network management tools (NIS, NFS, Active Directory), Client/Server application security</p> <p>WWW considerations, X Windows, CMW, Firewalls</p> <p>DOS Mitigation, VPNs, Special Topics: Viruses, SPAM</p>
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Eric Cole, Network Security Bible, 2009</li> <li>2. William Stallings, Network Security Essentials: Applications and Standards, 4th Edition, 2010</li> <li>3. Kwok T. Fung, Network Security Technologies, Auerbach Publications/CRC Press, 2004</li> <li>4. M Yusuf Bhajji, Network Security Technologies and Solutions, Pearson Education, 2008</li> <li>5. C. Kaufman, Network Security, Private Communication in a Public World, Prentice Hall, 2002</li> </ol>

<b>Advanced Network Design</b>	
<b>Course Code:</b>	EET 713
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Computer Networks
<b>Objectives:</b>	In this course students will learn to architect, build and manage the next generation networks capable of supporting multimedia technologies such as Voice over IP, desktop video conferencing, presence management and other specialized real-time applications. Students will study the advanced broadband network technologies and protocols i.e. SONET/SDH, ATM, VoIP, MPLS, GMPLS xDSL, WLL etc., the services that are provided by those technologies
<b>Course outline:</b>	Principles of broadband Networks and communication, SONET, IP over SONET, Frame Relay, ATM concepts, services and applications. MPLS Traffic Engineering, QoS and Failure Recovery, Network Algorithmics, packet classification, switching, Cisco IOS operating system, QoS, packet scheduling, Reservation protocols, Endnode performance, MultiMedia systems, Compression, Multimedia system implementation, Unified systems, Presence Management, Network Traffic Analysis, Network Management of multimedia networks ATM Standards and technology for local and wide area networks. ATM adaption layer, Access switching, ATM WAN Switches. ATM Service classes, QoS, ISDN technology. VoIP, IP over ATM, xDSL,.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Priscilla Oppenheimer, Top-Down Network Design, 3rd Edition, 2010</li> <li>2. James D. McCabe, Network Analysis, Architecture, and Design, Third Edition, 2007</li> <li>3. Ulysses Black, Advanced Internet Technologies, 1<sup>st</sup> Edition, Prentice Hall, 1998</li> <li>4. William Stallings, High Speed Networks: TCP/IP and ATM Design Principles, 1<sup>st</sup> Edition, Prentice Hall, 1998</li> <li>5. Leon-Garagia and Indra Widjaja, Communication Networks, McGraw-Hill, 2003</li> </ol>

<b>Advanced Topics in Wireless Networking and communications</b>	
<b>Course Code:</b>	EET 716
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Computer Networks, Data Communications
<b>Objectives:</b>	This course is designed to give the <i>design concepts</i> of networking of different wireless communication systems.
<b>Course outline:</b>	Following topics related to wireless networking and communication will be covered: Transmission Fundamental, Antennas and Propagation, Spread Spectrum, Coding and Error control, Satellite communications, Cellular wireless Networks (1G, 2G, 3G, 4G(LTE))GSM, HSCSD, GPRS, EDGE, UMTS), Mobile IP and Wireless Access Protocol, Wireless LAN Technology, Cordless Systems and Wireless Local Loop (WIMAX), Bluetooth and IEEE 802.15, Wireless Sensor Networks, RFID
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. James T. Geier, Designing and Deploying 802.11n Wireless Networks,</li> </ol>

	2010 2. William Stallings, Wireless Communications and Networks, 2 <sup>nd</sup> Edition, 2007
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<b>Network Performance Evaluation</b>	
<b>Course Code:</b>	EET 718
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Simulation and Modeling, Computational Techniques
<b>Objectives:</b>	The objective is to give students a clear understanding of analytical modeling techniques for predicting computer system performance. Give some sort of Motivation and survey; the need for performance prediction in optimization and system design.
<b>Course outline:</b>	Basic probability theory: renewal processes; Markov processes; birth and death processes; the single server queue; Little's law; embedded Markov chain; M/G/1 queue; queues with priorities; queuing networks - open, closed, multi-class; equilibrium state space probabilities, proof for single class; normalizing constants; computation of performance measures; convolution algorithm; mean value analysis; application to multi-access systems with thrashing. Decomposition and aggregation: Norton's theorem; M/M/n queue; multiple independent parallel servers. The course also offers an introduction to performance modeling using a stochastic process algebra, eg PEPA. To include: expansion law, apparent rate, steady-state analysis, transient state analysis through uniform inaction and reward vectors
<b>Resources:</b>	1. Performance modeling of communication networks and computer architecture by Harrison, Peter G and Patel, Naresh M., 1998 2. Modeling of computer and communication systems, Mitrani, I., 1987 3. Probabilistic modeling by Mitrani, I., 1998 4. Network Performance Engineering: A Handbook on Convergent Multi-Service, by Demetres D. Kouvatsos 2011

<b>Network Protocols and Standards</b>	
<b>Course Code:</b>	EET 761
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Computer Networks
<b>Objectives:</b>	This course covers the Network Protocols and Standards used by various entities in an end-to-end Internet connection. Specifically, Bridging and Routing Protocols are taught.
<b>Course outline:</b>	Introduction, IEEE 802 LANs and LAN addressing, Protocol type multiplexing, Basic bridging concepts, Transparent Bridging, Transparent Bridges, Learning process, Spanning tree algorithm, BPDUs, Forwarding and blocked states, Root and designated bridges, Learning after STA, Aging, Bridge topology changes, Failures and additions, Bridge settable parameters, Avoiding temporary loops in spanning tree recalculation, Source routing bridges, SR-

	TB, SRT bridges, Traffic class expediting in 802.1D, Dynamic multicast filtering in IEEE 802.1D Basic and extended filtering services, GARP and GMRP, State machine for GARP's simple applicants, GARP information propagation (GIP), Virtual bridged LANs (VLANs) VLAN tags (VLAN IDs), VLAN registration and GARP VLAN registration (GVRP), Learning process, IPv4, Proxy ARP, ICMP, NAT BOOTP, BOOTP message format, DHCP, DHCP state machine, Interior gateway protocols, RIP Version2, OSPF, EGP, CIDR, Steiner trees MOSPF , PIM (SM and DM)
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Interconnections, 2nd/ed by Radia Perlman, 1999</li> <li>2. Routing in the Internet, 2nd/ed by Christian Huitema, 1999</li> <li>3. BGP4 Inter-Domain Routing in the Internet by John W. Stewart, 1998</li> <li>4. Network Security Essentials Applications and Standards (5th Edition) Mar 16, 2013, by William Stallings</li> </ol>

<b>Cloud Computing</b>	
<b>Course Code:</b>	CSC 781
<b>Credit Hours:</b>	3
<b>Prerequisites:</b>	
<b>Objectives:</b>	<ul style="list-style-type: none"> <li>• Understanding the systems, protocols and mechanisms to support cloud computing</li> <li>• Develop applications for cloud computing</li> <li>• Understanding the hardware necessary for cloud computing.</li> <li>• Design and implement a novel cloud computing application.</li> </ul>
<b>Course outline:</b>	This course introduces students to the cloud and the computing on the cloud. Initially, the focus is on the technology context, i.e. multi-core architectures, virtualization, parallel computing models and big data storage. Next, famous cloud computing models including Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS) are studied with the help of Amazon AWS (IaaS), Microsoft Azure (PaaS) and Google App Engine (SaaS). In addition to Computing models, Data and computation models, e.g. MapReduce, are an important part of this module. The theoretical concepts are explained with hand-on experience of cloud platforms supported by case studies. The course concludes with an insight into the cloud risk areas including risks with service provider, technical risks, security issues, connectivity issues, etc. and research work in these areas is also discussed.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Handbook of Cloud Computing, Borko Furht. Springer (2010) or Latest Edition.</li> <li>2. Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security, and More, Kris Jamsa Jones &amp; Bartlett Publishers, (2012) or Latest Edition</li> <li>3. Cloud Computing and SOA: Convergence in your enterprise, David Linthicum (2009), Addison Wesley (Latest Edition)</li> <li>4. Distributed File Systems: Hadoop, Lustre, Google File System, Andrew File</li> </ol>

	<p>System, Off system, Distributed File System”, Ceph. General books LLC. (2010) or Latest Edition</p> <p>5. Map Reduce Design Patterns, Donald Miner and Adam Shook. O’ Reilly and Sons, (2012) or Latest Edition.</p>
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<b>Advanced Information Theory</b>	
<b>Course Code:</b>	CSC 554
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Basic probability and linear algebra as well as a minimum of mathematical maturity are the only prerequisites. An introduction to what computer scientists mean by "information", including topics in data compression (such as zip files and mp3), error correcting codes, information entropy, cryptography, and randomness. This is an intermediate course in computer science, and as such requires some background in programming as well as math through at least pre-calculus.
<b>Objectives:</b>	This course presents the fundamentals of Information Theory, that stays at the basis of modern digital communications, data compression, lossy source coding and multiuser networks.
<b>Course outline:</b>	Asymptotic Equipartition Theorem, types, and typical sequences, Information measures and their properties: entropy, Kullback-Leibler divergence, mutual information, source coding theorem, channel coding theorem, rate distortion theory, quantization, maximum entropy principle Typical sequences and typical sets, error exponents in: hypothesis testing, source coding, and channel coding, information theory and estimation, rudiments of network information theory.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. T.M. Cover and J.A. Thomas, Elements of Information Theory, 2nd ed., Wiley, 2006;</li> <li>2. I. Csisz`ar and J. K`orner, Information theory: coding theorems for discrete memoryless systems, 2<sup>nd</sup> ed., Cambridge University Press, 2011.</li> <li>3. Codes: an introduction to information communication and cryptography by Norman Biggs, 2008</li> </ol>

<b>Advanced Data Mining</b>	
<b>Course Code:</b>	CSC 746
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Database Management System Data Structures and Algorithms
<b>Objectives:</b>	By the end of this course students will be familiar with concepts of Data Warehousing including: Strategic need of data warehousing, Building blocks of a data warehouse, Data warehouse project management, Business requirements of a data warehouse, Architectural components of a data warehouse, Data warehouse metadata management, Dimensionality Modeling, ETL & Data quality, Online Analytical Processing, as well as the following areas of data mining: Motivation for data mining, Data Preprocessing, Data mining primitives and query languages, Architectures of data mining systems, Major Data Mining Tasks, Cluster Analysis , Statistical

	measures in large databases, Classifications and Predictions, Anomaly Detection
<b>Course outline:</b>	Introduction to Data Warehouse, Planning and Requirements, Data Warehouse Architecture, Data Warehouse Infrastructure, Dimensional Modeling, Metadata, Extraction, Transformation and Loading, Online Analytical Processing, Data Preparation Techniques: outlier and missing data analysis, Data Reduction Techniques, Introduction to Data Mining, Modeling and Principal Feature Extraction, Clustering, Hierarchical Clustering, Partitional Clustering, Classification , Decision Tree Classification, Bayesian Classification, Nearest Neighbor Classification.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Data Warehousing Fundamentals for IT Professionals, Paulraj Pooniah, Wiley, 2<sup>nd</sup> Edition, 2010.</li> <li>2. Data Mining Concepts &amp; Techniques, Jaiwei Han, Micheline Kamber, 2<sup>nd</sup> Edition, 2005.</li> <li>3. Tutorial on Data Mining, Eamonn Keogh</li> </ol>

<b>Text Mining</b>	
<b>Course Code:</b>	CSC 747
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Data Mining, Databases
<b>Objectives:</b>	<p>Text Mining is aimed at extracting useful information (usually) from huge unstructured datasets by employing techniques from information retrieval, natural language processing and data mining. The objective of this module is to get a good understanding of the basic text mining techniques and study some of its applications as well.</p>
<b>Course outline:</b>	<p>Introduction: background, dealing with information overload and information overlook, unstructured vs. (semi-)structured data, evolving information needs and knowledge management issues, the business case for text mining. The text mining pipeline: information retrieval, information extraction and data mining. Fundamentals of natural language processing: linguistic foundations, levels of linguistic analysis.</p> <p>Approaches to text mining: rule-based vs. machine learning based vs. hybrid; generic vs. domain specific; domain adaptation. Dealing with real text: text types, document formats and conversion, character encodings, markup, low-level processes (sentence splitting, tokenization, part of speech tagging, chunking). Information extraction: term extraction, named entity recognition, relation extraction, fact and event extraction; partial analysis vs. full analysis.</p> <p>Data mining and visualisation of results from text mining. Evaluation of text mining systems: evaluation measures, role of evaluation challenges, usability evaluation, the U-Compare initiative. Text mining applications and services; case studies.</p>
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Text mining handbook: advanced approaches in analyzing unstructured data, Feldman, Ronen and James Sanger, Cambridge University Press, Edition: 2<sup>nd</sup>, 2008</li> </ol>

	<p>2. Text mining: classification, clustering and applications, Srivastava, Ashok and Mehran Sahami, Chapman &amp; Hall, Edition: 1<sup>st</sup>, 2009</p> <p>3. Mining Text Data by Charu C. Aggarwal, ChengXiang Zhai - 2012</p>
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<b>Advanced DBMS</b>	
<b>Course Code:</b>	CSC 752
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Introduction to Database Systems
<b>Objectives:</b>	At the end of this course, the expectation is that the students will gain competence in following areas: Databases beyond relational, Query optimization, Data marts, Data warehousing, XML, OLAP
<b>Course outline:</b>	Object-Oriented Databases, Object-Relational Databases, Mobile Databases, Temporal, Spatial and Geographic Databases, Distributed Database Design, Distributed Multimedia Database Systems, Data Warehouse and OLAP Systems, Business Intelligence, XML Data Models, XML Documents and DTD, XML Query Languages, Current Research and Development Trends of Database Analysis, Design, Modeling and Applications.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. An Advanced Course in Database Systems: Beyond Relational Databases, S. W. Dietrich and S. D. Urban, Prentice Hall, 2005.</li> <li>2. Database Management Systems, Ramakrishnan R &amp; Gehrke J, 3<sup>rd</sup> edn, McGraw Hill, New York, 2003.</li> <li>3. ADVANCED DATABASE MANAGEMENT SYSTEM by Rini Chakrabarti, Shilbhadra Dasgupta - 2011</li> </ol>

<b>Distributed Databases</b>	
<b>Course Code:</b>	CSC 753
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Database Management Systems
<b>Objectives:</b>	Be familiar with the currently available models, technologies for and approaches to building distributed database systems; have developed practical skills in the use of these models and approaches, so that they will be able to select and apply the appropriate tools for a particular case; be aware of the current research directions in the field and their possible outcomes; be able to carry out research and be able to apply learned skills to solving practical distributed database related tasks.
<b>Course outline:</b>	Distributed database architecture, Distributed database design, Distributed query processing, Query decomposition and optimization of distributed queries, Distributed transaction management and concurrency control, Distributed DBMS reliability, Distributed database operating systems, Distributed multidatabase systems, Client/Server database systems.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Oszu, T. and Valduriez, P. <i>Principles of Distributed Database Systems</i>, 2nd ed., Prentice-Hall, 1999</li> <li>2. Coronel, Morris &amp; Rob, <i>Database Systems Design, Implementation, and Management</i> (9th Edition), Cengage Learning: Boston, MA, 2011</li> </ol>

	3. Latest research papers will be used.
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<b>Object Oriented Databases</b>	
<b>Course Code:</b>	CSC 754
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Introduction to Database Systems
<b>Objectives:</b>	<p>This course covers advanced aspects of object technology. The course teaches a variety of approaches to advanced issues important in real world applications. Particular attention is given to topics that improve the precision and quality of developed systems. The course shows how to use Rational Software Architect to document and aid the advanced design concepts. The course covers a variety of techniques encountered in complex mission critical applications today and guides students through the best practices of complex system development. Particular attention is given to topics that present the most productive solutions and identify approaches that may cause deficiencies during the lifetime of the system. In addition, the course covers areas of object storage and retrieval, distributed systems, business rules and objects and introduces architecture for supportable systems. Emphasizing productivity and quality, the course concludes with pragmatic guidelines on how to incorporate testing and quality assurance into the development process of object-oriented systems.</p>
<b>Course outline:</b>	Introduction to Object-Oriented Databases (General Issues, Concurrency Control, Transactions, Triggers and Notifiers, Distribution, Versions and Configurations), Data Model Issues (Object Identity, Data Models, Inheritance, Polymorphism, Genericity, Extensibility, Integrity Constraints, Composition, Relationship Support, Access to Meta-information, Data Sharing, Authorization), Language Issues (Persistence, Impedance Mismatch). Software Engineering Issues, Host Languages), Query Issues (Query Language, Indexing, Query Optimization), Database Evolution(Schema Changes, Effects of Changes, Database Conversion), Storage Management (Storage Schemes, Buffer Management, Clustering, Interoperability), Research Issues in Object Oriented Databases
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Introduction to Object-Oriented Databases, Won Kim, 2008</li> <li>2. Index Data Structures in Object-Oriented Databases by Thomas A. Mueck, Martin L. Polaschek – 2012</li> </ol>

<b>Web based DBMS</b>	
<b>Course Code:</b>	CSC 755
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Introduction to Database Systems
<b>Objectives:</b>	Learn new ways to model data, Implement a DBMS, Become familiar with the expanding role of database technology.
<b>Course outline:</b>	This course introduces concepts, techniques, technologies and APIs for web application development, The main focus of the course is on the Model-View-Controller design pattern employed by modern full-stack web frameworks. Concepts and techniques covered include client/server programming.

	database abstraction APIs, and asynchronous javascript. Examples of full-stack MVC frameworks include Ruby-on-Rails (written in Ruby), Django and TurboGears (written in Python)
<b>Resources:</b>	1. Database System Concepts, Korth and Silbershatz, 2010 2. Oracle 11g: SQL John Casteel Second Edition Cengage, 2009 ISBN: 978-1-439-04128-4

<b>Multimedia Databases</b>	
<b>Course Code:</b>	CSC 756
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Introduction to Database Systems
<b>Objectives:</b>	Introduction; Overview of Relational and Object-Relational Data Representations; Text/Document Databases; Multidimensional Data Structures, similarity based search (spatial, image, audio); XML Databases; Temporal Data Models; Logical Frameworks.
<b>Course outline:</b>	Introduction to Multimedia Databases, Multimedia Data, The Human Sensory System and Multimedia, An Introduction to SQL and Multimedia, Querying Multimedia Data, Modeling Multimedia Databases, Using Multimedia Metadata, Multimedia Database Architecture and Performance, Multimedia and the Internet, Dealing with Text Databases Dealing with Image Databases, Dealing with Video Databases
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Principles of Multimedia Database Systems, by V.S. Subrahmanian, Morgan Kaufmann Publishing Company, San Francisco, CA. 1998.</li> <li>2. Principles of Database Query Processing for Advanced Applications (Morgan Kaufmann Series in Data Management Systems), by Clement T. Yu, Weiyi Meng, 1998.</li> <li>3. Databases and Transaction Processing, An Application-Oriented Approach, Philip M. Lewis, Arthur Bernstein, and Micheal Kifer. Addison Wesley Publishers, 2002.</li> <li>4. Intelligent Big Multimedia Databases by Andreas Wichert – 2015</li> </ol>

<b>Advance Data Warehousing</b>	
<b>Course Code:</b>	CSC 760
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Database Management System Data Structures and Algorithms
<b>Objectives:</b>	By the end of this course students will be familiar with concepts of Data Warehousing including: Strategic need of data warehousing, Building blocks of a data warehouse, Data warehouse project management, Business requirements of a data warehouse, Architectural components of a data warehouse, Data warehouse metadata management, Dimensionality Modeling, ETL & Data quality, Online Analytical Processing, as well as the following areas of data mining: Motivation for data mining, Data Preprocessing, Data mining primitives and query languages, Architectures of data mining systems, Major Data Mining Tasks, Cluster Analysis , Statistical measures in large databases, Classifications and Predictions, Anomaly

	Detection
<b>Course outline:</b>	Introduction to Data Warehouse, Planning and Requirements, Data Warehouse Architecture, Data Warehouse Infrastructure, Dimensional Modeling, Metadata, Extraction, Transformation and Loading, Online Analytical Processing, Data Preparation Techniques: outlier and missing data analysis, Data Reduction Techniques, Introduction to Data Mining, Modeling and Principal Feature Extraction, Clustering, Hierarchical Clustering, Partitional Clustering, Classification , Decision Tree Classification, Bayesian Classification, Nearest Neighbor Classification.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Data Warehousing Fundamentals for IT Professionals, Paulraj Pooniah, Wiley, 2<sup>nd</sup> Edition, 2010.</li> <li>2. Data Mining Concepts &amp; Techniques, Jaiwei Han, Micheline Kamber, 2<sup>nd</sup> Edition, 2005.</li> <li>3. Tutorial on Data Mining, Eamonn Keogh</li> </ol>

<b>Information Retrieval Techniques</b>	
<b>Course Code:</b>	CSC 514
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	Database Management Systems
<b>Objectives:</b>	Information retrieval is aimed at obtaining information resources relevant to an information need. Search engines are a typical example of information retrieval systems. This course studies the theory, design, and implementation of (text-based) information retrieval systems.
<b>Course outline:</b>	<p>Introduction to Information Retrieval. Inverted indices and Boolean queries. Query optimization. The nature of unstructured and semi-structured text. The term vocabulary and postings lists. Text encoding: tokenization, stemming, lemmatization, stop words, phrases. Optimizing indices with skip lists. Proximity and phrase queries. Positional indices.</p> <p>Index construction. Postings size estimation, sort-based indexing, dynamic indexing, positional indexes, n-gram indexes, distributed indexing, real-world issues.</p> <p>Index compression: lexicon compression and postings lists compression. Gap encoding, gamma codes, Zipf's Law, variable-byte encoding. Blocking. Extreme compression.</p> <p>Dictionaries and tolerant retrieval. Dictionary data structures. Wild-card queries, permuterm indices, n-gram indices. Spelling correction and synonyms: edit distance, soundex, language detection.</p> <p>Results summaries: static and dynamic. Evaluating search engines. User happiness, precision, recall, F-measure. Creating test collections: kappa measure, inter-judge agreement. Relevance, approximate vector retrieval.</p>

<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Introduction to information retrieval, Manning, Christopher D., Prabhakar Raghavan and Hinrich Schutze, Cambridge University Press , 2008</li> <li>2. Modern information retrieval, R. Baeza-Yates and B. Ribeiro-Neto, ACM Press, 2009</li> <li>3. Information Retrieval Techniques for Pattern Matching: Managing and Searching Textual and XML Information in 21st Century Applications, by Riccardo Martoglia, LAP Lambert Acad. Publ., 2010.</li> </ol>
<b>Ontology Engineering</b>	
<b>Course Code:</b>	SEN 764
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	
<b>Objectives:</b>	<p>This Course provides students with a theoretical and practical understanding of leading edge solutions for the Semantic Web. It introduces students to the W3C standard Web Ontology Language, OWL, its underlying Description Logics, establishing patterns to avoid the pitFalls in using OWL. The course provides an opportunity to become familiar with a widely used environment for developing and an API for applying OWL ontologies, and making use of reasoning services accessible via both. Ontology provide rich, repressive vocabularies of terms describing a domain (e.g. medicine, astronomy, music, etc.). They are key to information exchange, data integration and search.</p>
<b>Course outline:</b>	<p>Introduction to Description Logics and Reasoning, concepts of semantic interoperability, integration and automation; concept of metadata and ontology; RDF and RDFS, Ontology Web Language (OWL) and Ontology Engineering Methodologies.</p>
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Ontology Engineering in a Networked World, by Mari Carmen Suárez-Figueroa, Asunción Gómez-Pérez, Enrico Motta – 2012</li> <li>2. Ontological Engineering: with examples from the areas of Knowledge Management, e-Commerce and the Semantic Web. First Edition - Asunción Gómez-Pérez, Mariano Fernandez-Lopez, Oscar Corcho, 2010.</li> <li>3. D. Allemang and J. Hendler: Semantic Web for the Working Ontologist. Morgan Kaufmann (2008).</li> </ol>
<b>Semantic Web</b>	
<b>Course Code:</b>	SEN 761
<b>Credit Hours:</b>	3+0
<b>Prerequisites:</b>	
<b>Objectives:</b>	<p>Semantic Web is a group of methods and technologies to allow machines in understanding the meaning – or “semantics” – of information on the Web. The participants of this course will get the core concepts as well as application development using Semantic Web Technologies. This course includes XML with Document Type Definitions and Schemas: transformation/inference rules in XSLT, Rule ML, and the W3C rule language RIF; metadata with RDF (Resource Description Framework); metadata taxonomies with RDF Schema; description logic and the W3C ontology language OWL 2: as well as integrating these techniques for ontology/rule-based multi-agent systems.</p>
<b>Course</b>	To sketch the overall architecture of the Semantic Web, identify the

<b>outline:</b>	component technologies of the Semantic Web and explain their roles, illustrate the design principles of the Semantic Web by applying the technologies, understand certain limitations of the Semantic Web technologies, and be aware of the kinds of services it can and cannot deliver.
<b>Resources:</b>	<ol style="list-style-type: none"> <li>1. Allemang, D., &amp; Hendler, J. (2011). Semantic Web for the working ontologist. 2nd Edition, Morgan&amp;Kaufmann Publisher. [ISBN:978-0-12-385965-5]</li> <li>2. Heath, T., &amp; Bizer, C. (2011). Linked Data: Evolving the Web into a Global Data Space. Morgan&amp;Claypool Publisher.</li> <li>3. Daconts, M.C., Orbst, L.J., &amp; Smith, K.T.(2003). The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management. New York: Wiley. [ISBN: 0-471-43257-1]</li> <li>4. Antoniou, G., &amp; van Harmelen, F. (2004). A Semantic Web Primer. Cambridge, MA: MIT Press. [ISBN: 0-262-01210-3]</li> </ol>

## Appendage 3221

### **REVISION OF CURRICULUM – MS INFORMATION SECURITY PROGRAM**

**(Revision 2018)**

**MSIS Program**

#### **Program Mission**

The mission of the MSIS program is to produce knowledgeable, highly skilled and competitive Information Security graduates who are able to play an effective role in the efforts to make cyberspace reliable and secure for National and International communities.

#### **Program Objectives**

The key objectives of the MSIS program include the following.

1. To provide exposure to the knowledge and skills required to protect information assets.
2. To enable understanding of current threats and vulnerabilities and finding ways of developing effective countermeasures.
3. To contribute to the growing needs of information security professionals to protect and secure information assets.
4. To enable students design and implement effective security mechanisms for organizations using the latest tools and technologies.
5. To develop effective oral and written communication skills
6. To prepare students to work effectively independently as well as in groups.

#### **Program Learning Outcomes**

Students graduating from the MSIS program are expected to gain:

1. Understanding of the information security challenges in networks and software systems.
2. Ability to perform risk assessment of an organization's information assets.
3. Ability to apply the knowledge and skills acquired during the program to design and implement secure networked, software and distributed systems.
4. Acquaintance with the latest information security tools and technologies.
5. Ability to communicate effectively in written and oral form.
6. Ability to pursue continuous professional development.
7. Ability to work on practical and research based problems collaboratively as well as independently.

#### **Eligibility Criteria - MS Information Security Program**

HEC recognized 4 years Bachelor degree in CS/SE/CE/EE/IT or equivalent with CGPA 2.5/4.0 (Semester System) or 50% marks (Annual System).

OR

MIT/MCS/M.Sc. (Computer Science) or equivalent with CGPA 2.5/4.0 (Semester System) or 50% marks (Annual System).

NTS GAT (General)/ GRE/University entry test passed with 50% marks.

**Core Courses**

S. No	Course Code	Course Title	Credit Hours
1	ISC 511	Number Theory	03
2	CSC 521	Advanced Design and Analysis of Algorithms	03
3	ISC 512	Computer and Network Security	03
4	CSC 704	Advanced Cryptography	03

**Elective Courses**

Sr. No	Course Code	Course Title	Credit Hours
1	ESC 500	Thesis	06
2	EEN 510	Stochastic Process	03
3	EET 519	Distributed Networking	03
4	EET 520	Network Administration and Management	03
5	EET 553	Information theory and coding	03
6	EET 556	Mobile Communication and Networking	03
7	ISC 732	Advance Computer Security	03
8	ISC 733	Information Hiding	03
9	ISC 734	Wireless Network Security	03
10	ISC 735	Cloud Computing Security	03
11	ISC 736	Cyber Warfare	03
12	ISC 737	Computer and Network Forensics	03
13	ISC 738	Ethical Hacking	03
14	ISC 739	Cyber Crimes and Laws	03
15	ISC 740	Quantum Cryptography	03
16	ISC 747	Advanced Cryptanalysis	03
16	ISC 741	Algebraic Cryptanalysis	03
17	ISC 742	Intrusion Detection and Prevention	03
18	ISC 743	Penetration Testing and Vulnerability Analysis	03
19	EET 710	Advanced Computer Networks	03
20	CSC 720	Advanced Operating Systems	03
21	ISC 731	Information Security Management	03
22	ISC 748	Blockchain Essentials	03

**Proposed Roadmap - MSIS****Semester-wise Breakdown: MS Information Security****Semester 1**

Course Code	Course Title	Credit Hours
ISC 511	Number Theory	03
CSC 521	Advanced Design and Analysis of Algorithms	03
ISC 512	Computer and Network Security	03
	Total	09

**Semester 2**

Course Code	Course Title	Credit Hours
Elective Code	Elective-I	03
ISC 746	Advanced Cryptography	03

ESC 701	Research Methodology	03
	Total	09

**Semester 3**

Course Code	Course Title	Credit Hours
Elective Code	Elective-II	03
ESC 500 / Elective Code	Thesis-I / Elective-III	03
Elective Code	Elective-IV	03
	Total	09

**Semester 4**

Course Code	Course Title	Credit Hours
ESC 500 / Elective Code	Thesis-II / Elective-V	03
	Total	03
	<b>TOTAL CREDIT HOURS</b>	<b>30</b>

**University Requirement**

Sr. No	Course Code	Course Title	Credit Hours
1	ESC 701	Research Methodology	03

**Description of Courses****Course Title:** **Number Theory**

Course Code: ISC 511

Pre-Requisite: None

**Objectives:**

The objective of this course is to introduce number theory that is an ongoing rich area of mathematical exploration and is noted for its theoretical depth, with connections and applications relating to physics and cryptography. The course will give in-depth knowledge of number primes, congruence's, and Diophantine equations and their usage in real-world problems. Also, the course will provide mathematical foundation for advance cryptographic techniques using elliptic curves.

**Contents:**

Time estimates for doing arithmetic, Divisibility and the Euclidean algorithm, Congruence, applications to factoring, Finite Fields and Quadratic Residues, Finite fields, Quadratic residues and reciprocity, cryptography: Some simple cryptosystems, Enciphering matrices, Public Key: The idea of public key cryptography, RSA, Discrete log, Knapsack, Zero-knowledge protocols and oblivious transfer. Primality and Factoring: Pseudo primes, The rho method, Fermat factorization and factor bases, The continued fraction method, The quadratic sieve method. Elliptic Curves: Basic facts, Elliptic curve cryptosystems, Elliptic curve primality test, Elliptic curve factorization.

**Text Books:**

Introduction to Number Theory by Anthony Vazzana, Martin Erickson, David Garth published by Chapman & Hall/CRC, 2007, ISBN 9781584889373.

Elementary Number Theory by David Burton, 2016, ISBN-13: 978-0073383149

**Reference Books:**

Number Theory: Structures, Examples, and Problems by TituAndreescu, AndricaDorin published by BIRKHAUSER BOSTON INC, 2009, ISBN: 9780817632458

**Course Title:** **Computer and Network Security**

Course Code: ISC 512

Pre-Requisite: None

**Objectives:**

The course will provide an optimal description of the concepts, methods, principles and applications of computer network security in particular, and cyberspace security in general. The understanding give awareness regarding security situations based on a constant security threat, the core and best practices their solutions currently in use. It is an essential security course for students, practitioners in networks, and professionals who develop and maintain secure computer network systems.

**Contents:**

Computer and network security essentials, Network Security: security attacks, TCP/IP & OSI model, security services, threats in networks, security in networks, data security, integrity measures, message authentication code, user authentication, basics of symmetric and public key cryptosystems, transport level security, SSL, TLS, HTTPS, network security measures: firewalls and IDS, ACLs and capabilities, Access control models, Computer Security: Programming-Language Security, Buffer-overflow attacks, defenses and counterattacks, SQL injection, web security (XSS/CSRF attacks), Web attacks and defenses, Privacy/Anonymity: Database privacy.

**Text Books:**

Guide to Computer Network Security, by Joseph Migga Kizza published by Springer, 3<sup>rd</sup> edition, 2015.

Elementary Information Security, by Richard E. Smith, 2<sup>nd</sup> edition, 2013, ISBN: 978-1284055931

**Reference Books:**

Network Security: The Complete Reference, by Bragg published by McGraw Hill Professional, 2012.

Computer Network Security by Authors: Kizza, Joseph Migga published by Springer, ISBN 978-0-387-25228-5, 2005

Security in Computing, Charles P. Pfleeger and Shari P. Pfleeger, Fourth Edition, Pearson Education, 2011

**Course Title:** **Advanced Computer Networking**

Course Code: EET 710

Pre-Requisite: None

**Objectives:**

The objective of this course is to study advance concepts related to core networking technologies of wired and wireless networks. The core wired networking technologies include ATM, MPLS and NGNs where wireless networking technologies include WiFi, Vehicular networks, Sensor networks and ZigBee networks. Therefore, this core course is designed to address latest networking trends and advancements and trends in both wired and wireless networks.

**Contents:**

Advanced networking core technologies: Asynchronous Transfer Mode (ATM), Multiprotocol Label Switching (MPLS), and Next Generation Networks (NGN). Advance technologies: IPv6, mobility management (mobile IP and Proxy Mobile IP), Border Gateway Protocol (BGP). Wireless Ad hoc networks: Taxonomy of wireless networks, necessity for new protocols in wireless networks, IEEE 802.11, IEEE 802.15.4, Ad hoc routing protocols (AODV, DSR, DSDV, ZRP), Advancements in TCP for Ad hoc networks, Wireless Sensor Networks, Vehicular Networks, Multimedia Networks, Cross layer design issues and protocols.

**Text Books:**

Computer Networks: A Systematic Approach by Peterson and Davie, 4<sup>th</sup> edition.

Ad Hoc Wireless Networks: Architectures and Protocols, by C. Siva Ram Murthy and B. S. Manoj, published by PrenticeHall.

**Reference Books:**

Computer Networks and Internets" by Douglas E. Comer

Computer Networks" (4th Edition) by Andrew S. Tanenbaum

**Course Title:** **Advanced Operating Systems**

Course Code: CSC 720

Pre-Requisite: None

**Objectives:**

To address the advance concepts ranging from embedded micro kernels to popular platforms like LINUX, SOLARIS, Windows 2000 and XP. Distributed processing and synchronization, Real time and Multimedia support along with Fault tolerant computing are introduced. A major objective of this course is to introduce the vulnerabilities within operating system design that are used by different malwares.

**Contents:**

The course is designed to deliver the state of art operating system concepts ranging from embedded micro kernels to popular platforms like LINUX, SOLARIS, Windows 2000 and XP. The focus will be on the internals, architecture, device driver writing and the distributed processing support on multi-processor systems. Fault tolerant computing, presentation for multimedia and time critical applications. Apart from core OS concepts basic security aspects of OS will be covered like: Understanding the operations of Viruses and Worms, Vulnerability Analysis, Exploits: Buffer Overflows, Heap Overflow, Integer Overflow

**Text Books:**

Operating Systems Principles (8th Edition), by Silberschatz, Galvin.

LINUX Kernel Internals, by M.Beck, H. Boeme.

**Reference Books:**

Operating Systems, by Garry Nutt

Modern Operating Systems, by Andrew S. Tanenbaum

Advanced Windows NT, byJeffery Richter

Writing Device Drivers for Windows NT, byAnthony Mason

**Course Title:** Advanced Cryptography

**Course Code:** ISC 746

**Pre-Requisite:** Number Theory

**Objectives:**

The course covers in detail all major areas of cryptography from classical to modern cryptosystems. The objectives of the course are to understand the following: Block Ciphers, Stream Ciphers, Hash Functions and MACs, Asymmetric Techniques and RSA, Discrete Logarithm Cryptosystems, Elliptic Curve Crypto-systems, Identity - Based Encryption, Identification Schemes and Lattice Cryptosystems.

**Contents:**

Block cipher principles: Cryptology and its domains, cryptanalysis basics, Kirchhoff's principle, Confidentiality taxonomy, Classical Cipher Techniques and their cryptanalysis: Substitution (mono-alphabetic, homophonic, poly-alphabetic and Polygram ciphers), Permutation ciphers and Product ciphers, Modern Symmetric Ciphers and cryptanalysis: DES, AES, Two fish, block cipher operation, stream ciphers (RC4 and A5/1), Zero knowledge protocols and proofs of knowledge, public key cryptography: RSA, Diffie-Hellman key exchange, digital signature standard, X.509 Certificates, Elliptic curve and Hyper-elliptic curve based cryptographic protocols, Pairing Based Cryptography, Lattice-based cryptography.

**Text Books:**

Introduction to Modern Cryptography, by Jonathan Katz, Yehuda Lindell, published by CRC Press, 2015.

Cryptography and Network Security, William Stallings, Fifth Edition, Pearson Education, 2011

**Reference Books:**

Cryptography Engineering: Design Principles and Practical Applications by Niels Ferguson, Bruce Schneier, and Tadayoshi Kohno, published by Wiley, 2011.

Understanding Cryptography: A Textbook for Students and Practitioners by Christof Paar, Jan Pelzl, and Bart Preneel published by Springer, 1st ed. 2010.

**Course Title:** Research Methodology

**Course Code:** ESC 501

**Pre-Requisite:** None

**Objectives:**

The key objectives of this course include familiarization with research and its type, familiarization with the criteria for choosing research problem and research advisor, effective conduct of literature search, review and literature writing. Making students learn writing of research proposals, research thesis and research papers, acquaint students with plagiarism and its consequences, and equip students with different metrics to quantify research and researchers. Enable students make and deliver effective presentations.

**Contents:**

The course equips the students with the terminologies, skills, tools and practices involved in effective conduct of research. The major topics covered during the course include research and research types, choosing research problems and research advisors, How to carry out research, Formulation – Problem statement, Literature Review, Design – Methodology and Analysis - Data analysis and interpretation, Ethics of research and Presenting and publishing research.

**Text Books:**

Research Methodologies – A step by step guide for beginners, Ranjit Kumar

Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, John W. Creswell

**Reference Books:**

How to Research, Loraine Blaxter, C. Hughes, M. Tight

**Course Title:** **Information Security Management**

Course Code: ISC 731

Pre-Requisite: None

**Objectives:**

Objective of this course is to introduce information security and assurance using both domestic and international standards with a management perspective. The course will familiarize students with foundational and technical components of information security, focusing on access control models, information security governance, and information security program assessment and metrics. The aim of the course is to provide strong foundation to students for identifying and addressing business risks through a disciplined security management process as specified by ISO 27001.

**Contents:**

Security Management - Systems, Models and Frameworks, IS 27001 - Information Security Management for Business Benefit, Governance and security policy, threat and vulnerability management, incident management, risk management, information leakage, sensitive data, contingency planning, business continuity, legal and compliance, security awareness and security implementation considerations, Internal Control, Audit and Security, CRAMM 5.0 (CCTA Risk Analysis and Management Method).

**Text Books:**

Information Security Management Handbook, 6th Edition by Harold F. Tipton

Management of Information Security by Michael E. Whitman

**Reference Books:**

Information Security Management: Concepts and Practice by Bel G. Raggad

IT Governance: An International Guide to Data Security and ISO27001/ISO27002 by Alan Calder

**Course Title:** **Advance Computer Security**

Course Code: ISC 732

Pre-Requisite: Advanced Operating Systems

**Objectives:**

The objective is to study advance computer system security concepts related to operating systems and programming languages. The course will unravel the complex topic of computer security by examining the variety of competing security systems and what makes them different from one another. The course aims to focus on Unix security, Windows security, database security, web security, and software security

**Contents:**

OS-level Memory Protection, Binary Code Reusing, Binary Code/Data Representation, Program Representation, Dynamic Binary, Principles of Program Analysis, Revealing Internals of Executable File Format Compiler, Linker, Loader. Library Interposition, Virtualization Technology and Applications, Virtual Machine Monitor (QEMU/ VirtualBox/Xen/KVM), Symbolic Execution and Whitebox Fuzzing, Vulnerability Analysis, Exploits: Buffer Overflows,

Heap Overflow, Integer Overflow and Robust Exploits: ROP shellcode, Heap Spray, Fighting for Malware: Unpack, Disassemble, Decompile. Understanding the Threats such as Viruses and Worms, Logging, Auditing and Recovery. Honeypots and Honeyfarm.

**Text Books:**

Computer Security by Dieter Gollmann published by Wiley, 2011

**Reference Books:**

Computer Security Handbook, by Seymour Bosworth

Computer Architecture and Security: Fundamentals of Designing Secure Computer Systems 1st Edition by Shuangbao Paul Wang (Author), Robert S. Ledley

**Course Title:** **Information Hiding**

Course Code: ISC-733

Pre-Requisite: None

**Objectives:**

The aim of this course is to introduce techniques for hiding digital information by means of various obfuscatory and steganographic methods. The course aims to introduce cryptographic and non-cryptographic information hiding techniques including encryption, compression, data embedding and watermarking, data mimicry, and scrambling. Also, this course will emphasize on the applications of said techniques that facilitate message confidentiality and user identity authentication, and helps to ensure the integrity and security of computer passwords, ATM card information, digital signatures, information content, and electronic commerce.

**Contents:**

Framing information, reasons for secrecy, common techniques of information hiding, encryption and white noise, Secret sharing: splitting techniques, public key, stenographic file systems; compression techniques, Grammar and mimicry, turning and reverse, hiding information in images, anonymous remailers, ordering and re-ordering, spreading, watermarks, stenographic analysis, obfuscation

**Text Books:**

Disappearing Cryptography, Third Edition: Information Hiding: Steganography & Watermarking by Peter Wayner

Information Hiding: Steganography and Watermarking - Attacks and Countermeasures by Neil Johnson, Zoran Duric, Sushil Jajodia

**Reference Books:**

Information Hiding by Stefan Katzenbeisser, Fabien Petitcolas

**Course Title:** **Wireless Network Security**

Course Code: ISC 734

Pre-Requisite: Advanced Computer Networking

**Objectives:**

The objectives of the course are to introduce the theory and practices used in wireless networks including IEEE 802.11, Bluetooth, ZigBee and cellular networks. The course will familiarize students with theory and practical knowledge of WiFi security featuring discovery and profiling, attacks, bypass techniques for popular authentication mechanisms, encryption keys cracking using special techniques.

**Contents:**

Wireless networking background: IEEE 802.11, Bluetooth, ZigBee and Cellular networks, Wireless Security background: WEP security model and issues, RC4, IEEE 802.11i, Robust

security network in WPA-2, TSN/RSN encryption; discovering wireless networks, WiFi attacks: authentication flooding, CTS attacks, beacon flooding, disassociation attacks; Bypassing simple authentication, cracking WEP security, attacks on WPA/WPA2. Bluetooth and ZigBee security models, attacks and countermeasures, Security issues in cellular networks: network model, authentication, encryption and attacks. Security issues in smart environments

**Text Books:**

Hacking Wireless Networks - The ultimate hands-on guide by Mr Andreas Kolokithas

Hacking Exposed: Wireless Security Secrets & Solutions by Joshua Wright (Author), Johnny Cache

**Reference Books:**

Wireless Network Security A Beginner's Guide by Tyler Wrightson

**Course Title:** **Cloud Computing Security**

Course Code: ISC 735

Pre-Requisite: None

**Objectives:**

To understand the fundamentals of cloud architectures and their risk assessment. To understand how the cloud offers flexibility, adaptability, scalability, and the case of security-resilience. The course will present the strengths and weaknesses of securing your company's information with different cloud approaches. Also, the aim of this course will be to introduce the common attacks that can occur on your infrastructure, communications network, data, or services. Finally, to understand the secure cloud frameworks necessary to secure your business' assets while making the most of this new technology.

**Contents:**

Cloud computing basics, NIST cloud definition of cloud: SaaS, PaaS, IaaS, private cloud, public cloud, community and hybrid clouds, Virtualization. Cloud security fundamentals: Upside and downside security, risk management framework, trust, identity. Infrastructure security, data security and storage, Identity and access management, security mechanisms in cloud, privacy, audit and compliance, Security as a service.

**Text Books:**

Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance (Theory in Practice) by Tim Mather, Subra Kumaraswamy, Shahed Latif

**Reference Books:**

Securing the Cloud: Cloud Computer Security Techniques and Tactics by Vic (J.R.) Winkler

Cloud Computing: From Beginning to End by Mr. Ray J Rafaels

**Course Title:** **Cyber Warfare**

Course Code: ISC 736

Pre-Requisite: None

**Objectives:**

The objective of this course is to understand the principles, techniques, psychology, effects and legal aspects of cyber-attacks. The course focuses on the world of cyber-warfare through the use of recent case studies. It is aimed at teaching not only the issues related to cyber warfare from a computer science perspective but from military, sociological, and scientific perspectives as well. In this course students will learn how cyber-warfare has been performed in the past as well as why various actors rely on this new means of warfare and what steps can be taken to prevent it.

**Contents:**

The domain of cyber warfare: cyber espionage, cyber-crime, future threats, awareness and infrastructure. Legal status of cyber warfare: treaties and laws, the law of armed conflict, the Antarctic treaty and space law. Cyber-attacks: vulnerabilities, denial of service, defacement, attacker detection, important cyber-attacks in recent times. Cyber espionage and exploitation: purpose, strategies, cyber espionage doctrine, espionage against corporate world and military usage, social network exploitation. Cyber operations for infrastructure attacks; industry based attacks, methods, reasons and benefits. Organized crimes in cyber space, role of cyber warfare in military doctrine, cyber early warning networks

**Text Books:**

Introduction to Cyber-Warfare: A Multidisciplinary Approach by Paulo Shakarian

Inside Cyber Warfare: Mapping the Cyber Underworld by Jeffrey Carr

**Reference Books:**

Cybercrime and Cyber Warfare by Igor Bernik

**Course Title:** **Computer and Network Forensics**

Course Code: ISC 737

Pre-Requisite: Computer and Network Security

**Objectives:**

The objectives of this course are to study computer and network security principles and practices for crime investigations and other legal actions. The students will learn how to use forensically-sound methodologies and software to acquire admissible electronic evidence with coverage areas of networks, computer, email forensics and cell phone forensics.

**Contents:**

Forensics Essentials and Criminalistics, Essentials of OS and Networking (Review), Forensic Modelling and Principles, Forensic Duplication, Forensics Analytics, File Carving, Cyber Forensics Tools and the Testing Thereof, Email forensics, Mobile Device Forensics, Network Surveillance and Accountability, Network Attack Trace back and Attribution, Multicast Fingerprinting, Multimedia Forensics, Intrusion and Online Frauds Detection, Steganography & Steganalysis, Anonymity/ Pseudonymity/ P3P, Cyber Law, Security and Privacy Policies and Guidelines, Ethical issues, Court Testimony and Report Writing Skills.

**Text Books:**

Guide to Computer Forensics and Investigations by Bill Nelson

Network Forensics: Tracking Hackers through Cyberspace by Sherri Davidoff

**Reference Books:**

Computer Forensics: Investigating Network Intrusions and Cyber Crime published by EC-Council Press

Computer Forensics: Principles and Practices by Linda Volonino

**Course Title:** **Ethical Hacking**

Course Code: ISC 738

Pre-Requisite: Computer and Network Security

**Objectives:**

The basic objective of this course is to introduce ethical hacking and to provide hands-on experience to students for replicating and launching common well known programming, web, database, network and operating systems based attacks. Remote access to system using

malwares and use of on-shelf tools for hacking along with identifying weaknesses in administrative and security policies are the basic objectives of this course.

**Contents:**

Introduction to Penetration Testing, Legal and Ethical Considerations, Creating and Implementing a Test Plan, Social Engineering, Host Reconnaissance, Session Hijacking, Web Server Attacks, Database Attacks, Password Cracking, Network Devices & Attacks, Wireless Network Attacks, Trojans and Backdoor Applications, OS Specific Attacks, Denial of Service Attacks, System administration and secure policies.

**Text Books:**

Hands-On Ethical Hacking and Network Defence by Michael T. Simpson

**Reference Books:**

Gray Hat Hacking the Ethical Hacker's Handbook, Fourth Edition by Daniel Regalado

Basic Security, Penetration Testing and How to Hack by Isaac Sharpe

**Course Title:** **Cyber Crimes and Laws**

Course Code: ISC 739

Pre-Requisite: None

**Objectives:**

The objectives of this course are to impart in-depth knowledge of cyber threats and crimes, along with the national and international laws protecting against cyber-crimes. The course is also aimed to address the procedure of digital data collection, evidence handling and analysis. Another objective of this course is to create an awareness of individual's rights over digital information, public safety practises and ethical issues related to cyber laws.

**Contents:**

Cyber space, cyber terrorism, definition and types of cybercrimes: categorization, methods and tools, investigating cybercrimes (decision making, problem solving, conviction), advance investigations and forensics tools and techniques, seizing, imaging, and analysing digital evidence, case studies, national and internationals laws against cybercrimes, roles of agencies and national response centre's for cybercrimes, impact of social media on cybercrimes and awareness

**Text Books:**

Cyber Crime and Cyber Terrorism Investigator's Handbook by BabakAkhgar, Andrew Staniforth, Francesca Bosco

**Reference Books:**

Future Crimes: Everything Is Connected, Everyone Is Vulnerable and What We Can Do About It by Marc Goodman

**Course Title:** **Quantum Cryptography**

Course Code: ISC 740

Pre-Requisite: Advanced Cryptography

**Objectives:**

The objective of this course is to introduce the principles of quantum cryptography (or quantum key distribution) that is a state-of-the-art technique that exploits properties of quantum mechanics to guarantee the secure exchange of secret keys. The course will focus on the principles and techniques of quantum cryptography, setting it in the wider context of cryptography and security, with specific focus on secret-key distillation.

**Contents:**

Classical cryptography, information theory (classical and quantum), and applications of quantum cryptography, secret-key distillation, privacy amplification and reconciliation techniques, principles of quantum cryptography, algebraic attacks on quantum cryptography, post-quantum cryptography and future trends.

**Text Books:**

Quantum Cryptography and Secret-Key Distillation by Gilles van Assche

**Reference Books:**

Quantum Computation and Quantum Information: 10th Anniversary Edition by Michael A. Nielsen

**Course Title:** **Advanced Cryptanalysis**

Course Code: ISC 747

Pre-Requisite: Advanced Cryptography

**Objectives:**

The objective of this course is to study cryptanalysis techniques that are applied on classical and modern cryptosystems. The course will cover a variety of ways to break, fix/repair and to measure/evaluate the security of cryptographic primitives. Study of major computational hard problems in cryptography (symmetric and public key). Step by step analysis of mathematical/algebraic/statistical attacks, methods and algorithms in cryptanalysis.

**Contents:**

Historical cryptanalysis, LFSR-based stream ciphers, Modern block ciphers (DES/AES/other), Differential cryptanalysis, linear cryptanalysis, algebraic cryptanalysis in block and stream ciphers. Self-similarity attacks. Groups, finite fields. Number theory. Attacks on public key cryptosystems. RSA, factoring, discrete logarithms, elliptic curves, lattice attacks. Protocol/mode/initialization attacks, Side channel attacks.

**Text Books:**

Modern Cryptanalysis: Techniques for Advanced Code Breaking, by Christopher Swenson published by John Wiley, 2012

Advanced Linear Cryptanalysis of Block and Stream Ciphers, by P Junod, A. Canteaut published by IOS press, 2011

**Reference Books:**

Cryptography and Network Security, William Stallings, Fifth Edition, Pearson Education, 2011  
Introduction to Modern Cryptography, by Jonathan Katz, Yehuda Lindell, published by CRC Press, 2015.

**Course Title:** **Algebraic Cryptanalysis**

Course Code: ISC 741

Pre-Requisite: Advanced Cryptography

**Objectives:**

The objective of the course is to understand how to reduce the attacks on ciphers (cryptosystems) to systems of polynomial equations over finite fields and subsequent heuristics for efficiently solving these systems. The course of algebraic cryptanalysis will bridge the gap between ciphers and understanding how to break ciphers (code breaking). The course will allow students to turn ciphers into a system of equations and using techniques like finite field linear algebra, polynomial systems of equations, and graph colouring solve complex problems.

**Contents:**

Review of ciphering techniques, basics of linear algebra, complexity of GF-2 Matrix operations, exponent of certain matrix operations, quadratic sieve: Factoring integers via the quadratic sieve, with its applications to the cryptanalysis of RSA. Strategies for polynomial systems, algorithms for solving polynomial systems, block ciphers with small blocks, polynomial and graph colouring algorithms

**Text Books:**

Algebraic Cryptanalysis by Gregory Bard

**Reference Books:**

Cryptanalysis: Techniques for Advanced Code Breaking by Christopher Swenson

Quantum Attacks on Public-Key Cryptosystems by Song Y. Yan

**Course Title:** **Intrusion Detection and Prevention**

Course Code: ISC 742

Pre-Requisite: None

**Objectives:**

To introduce theory and practical knowledge related to network intrusion detection and prevention with concise information on different types of attacks, theoretical foundation of attack detection approaches, implementation, data collection, evaluation, and intrusion response. The objective also includes a review of commercially/publicly available intrusion detection and response systems.

**Contents:**

Network attacks review: Probes, DDoS, Worms attack, routing attacks. Intrusion detection approaches: Pattern matching, rule-based, state-based, data-mining based approaches, statistical models, biological and learning models. Data Collection: host and network based models. Foundations of detection: fuzzy logic, neural networks support vector machines, association rules and classification. Architecture and implementations, alert management and correlation, evaluation criteria and Intrusion response.

**Text Books:**

Network Intrusion Detection and Prevention: Concepts and Techniques by Ali A. Ghorbani, Wei Lu, Mahbod Tavallaei

**Reference Books:**

Intrusion Detection and Prevention by Carl Endorf, Gene Schultz, Jim Mellander

The Practice of Network Security Monitoring: Understanding Incident Detection and Response by Richard Bejtlich

**Course Title:** **Penetration Testing and Vulnerability Analysis**

Course Code: ISC 743

Pre-Requisite: Computer and Network Security

**Objctives:**

Penetration testers simulate cyber-attacks to find security weaknesses (vulnerabilities) in networks, operating systems, and applications. Therefore, the objective to teach how to properly utilize and interpret the results of modern day hacking tools, which are required to complete a penetration test. Tool coverage includes Backtrack and Kali Linux, Google reconnaissance, MetaGooFil, DNS interrogation, Nmap, Nessus, Metasploit, the Social Engineer Toolkit (SET), w3af, Netcat, post exploitation tactics, the Hacker Defender rootkit, and more.

**Contents:**

Definitions, concepts, and phases of vulnerability assessments, legal statutes and issues of vulnerability finding, Network Surveying, Port Scanning, System Identification / OS Fingerprinting, Vulnerability assessment and ethical hacking methodologies, technologies, and techniques and from a defensive and offensive perspective, Examining an organization for weaknesses and exploiting vulnerabilities remotely, Vulnerability Research and Verification, Service Identification, Internet Application Testing, Implementing appropriate countermeasures to thwart malicious hacking, Employing tools & exploits; Back Track, Core Impact, DDOS, Sniffers, Spoofing, Session Hijacking, Buffer Overflows, Hacking Web Servers and Applications, Google Hacking, Network and host monitoring and traffic analysis, Reading, interpreting, and analysing network traffic and log files, Foot printing, scanning, enumeration and escalation.

**Text Books:**

The Basics of Hacking and Penetration Testing by Patrick Engebretson

**Reference Books:**

Mastering Kali Linux for Advanced Penetration Testing by Robert W. Beggs

**Course Title:**      **Stochastic Process**

Course Code:      EEN 510

Pre-Requisite:      None

**Objectives:**

Objectives of the course are to introduce basic and advance probability theory, extend the knowledge related to random signal processes. Associating and linking the concepts of random signal processes with telecommunication networks, communications and signal processing through examples and assignments.

**Contents:**

Set theory, Introduction to probability, Joint and conditional probability, Independent events, Combined experiments, The Random Variables, Distribution Function, Density Function, Gaussian Random Variable, Other Random Variables, Conditional Distribution and Density Functions, Introduction to expectation and moments, Expectation, Moments, Inequalities, Transformation of a random variable, Computer generation of one random variable, Introduction to multiple random variables, Joint distribution, Joint density, Conditional distribution and density, Statistical independence, Distribution and density of sum of random variables, Introduction to operations on multiple random variables, Joint characteristic functions, Jointly Gaussian random variables, Transformation of multiple random variables, Linear transformation of Gaussian random variables, Limit theorems, Random processes, Stationary and independence, Ergodicity, Correlation function, Gaussian random process, Poisson random process.

**Text Books:**

P. Peebles, "Probability, Random Variables, and Random Principles, 4/e, McGraw Hill

**Reference Books:**

Probability, Random Variables and Stochastic Processes By: Athanasios Papoulis and S. Pillai , 4th edition

Alberto Leon-Garcia, Probability, Statistics, and Random Processes for Electrical Engineering, Prentice Hall, 2008

**Course Title:** **Advanced Design and Analysis of Algorithms**

**Course Code:** CSC 521

**Pre-Requisite:** None

**Objectives:**

The objective of this course is to study broad range of algorithms in depth and understand the design and analysis of various complex algorithms. The course will provide understanding of basic as well as advanced algorithms used in variety of applications and systems starting with probabilistic analysis, randomized algorithms, linear programming to more advance algorithm designs including dynamic programming, greedy algorithms, new notion of edge-based flows and approximation algorithms.

**Contents:**

Computing Computational Complexity, Divide and Conquer, Dynamic Programming, Graphs, Network Flow, Ford-Fulkerson Algorithms, Stable Matching, Image Segmentation, Problem Session, Heuristics, Data Visualisation, Genetic Algorithms, Randomised Algorithms, Complexity Theory, NP Completeness, Reducibility, Approximation Algorithms

**Text Books:**

Introduction to Algorithms by Thomas H. Cormen

Algorithm Design by Jon Kleinberg

**Reference Books:**

An Introduction to Genetic Algorithms by Melanie Mitchell

Algorithms by Papa Dimitrios

Approximation Algorithms by Rajeev Motwani

**Course Title:** **Information theory and coding**

**Course Code:** EET 553

**Pre-Requisite:** None

**Objectives:**

Information theory is used in areas of contemporary science and engineering - communication, signal processing, data mining, machine learning, pattern recognition, computational neuroscience, bioinformatics, and cryptography. It is therefore the objective of this course to learn basic and advance concepts of Information theory alongside practical communication systems and examples.

**Contents:**

Introduction, Error detection code: independent errors, burst errors, redundancy and error detection. Repetition and Hamming codes, Data compression: Trees and codes, Kraft inequality, Huffman, types of codes. Probabilities and Inference, Sparse graph codes, Entropy and Shannon's coding theorem: binary entropy, bounds of entropy, trees, coding of information source. Mutual information and channel capacity: System entropy, mutual information, capacity of binary information system, Shannon's channel coding theorem.

**Text Books:**

Information Theory, Inference and Learning Algorithms by David J. C. MacKay

A Student's Guide to Coding and Information Theory by Stefan M. Moser, Po-Ning Chen

**Reference Books:**

Information Theory and Coding by Example by Mark Kelbert, Yuri Suhov

**Course Title:** **Mobile Communication and Networking**  
**Course Code:** EET 556  
**Pre-Requisite:** None

**Objectives:**

The objectives of this course are: to understand the basics of mobile communications and the use of wireless technologies in telecom industry, to understand basic wireless channel models and implement the functionality of wireless systems, to have a comprehensive knowledge of cellular mobile technologies in different applications and to learn the latest and future mobile and wireless technologies and their applications in everyday life.

**Contents:**

The course will start with an introduction of the fundamental architectures and principles of mobile and wireless networks and their relationships with the backbone Internet. This is followed by the detailed examinations of a number of most recently developed mobile wireless networking technologies and architectures. Several types of widely employed mobile wireless networks and research topics are investigated in-depth as the further applications of the newly developed wireless networking techniques. Topics like cellular networks and architectures (2G, 3G, 4G and beyond), roaming, handovers, mobile IP and PMIP, WLANs and Vehicular networks are covered in this course.

**Text Books:**

T. Rappaport: "Wireless Communications Principle & Practice" Prentice Hall.  
Stallings, Wireless Communications and Networks, Prentice Hall

**Reference Books:**

Lee, William C. Y., Mobile Communication Engineering  
Parsons, J.D., Mobil Radio Propagation Channel

**Course Title:** **Network Administration and Management**  
**Course Code:** EET 520  
**Pre-Requisite:** None

**Objectives:**

This course provides a comprehensive survey of essential aspects of system administration. A broad skillset required in this profession will be covered by providing students with an opportunity to develop hands-on skills on top of broad theoretical base. Objectives of the course include: describing a number of key system administration concepts and applying them to complex network environments, analysing various system administration problems and their solutions, and articulating solutions for large-scale client/server installations.

**Contents:**

This course expands on topics covered including operating system and file system concepts, software installation and package management, configuration management, TCP/IP networking, user management, host management, analytical system administration, user level services, network level services, SNMPv3 - USM: User-based Security Model, SNMPv3 -VACM: View Access Control Model, Multi-Protocol Label Switching (MPLS), Data Centres, Network Administration and Management in Cloud Systems, Network Administration and Management in IoTs.

**Text Books:**

Network Warrior, 2nd Ed., 2011, by Gary A. Donabue  
The Practice of System and Network Administration, 2nd Ed., 2007 by Limoncelli, Hogan and Chalup

Essential SNMP, 2nd Ed. 2005, by Douglas R. Mauro & Kevin J. Schmidt

**Reference Books:**

UNIX and Linux System Administration Handbook, 4th Ed., by Nemeth, Snyder, Hein and Whaley

Principles of Network and System Administration, 2nd Ed., by Mark Burgess

Network Management Concepts and Practice: A Hands-on Approach, Pearson Education 2004, by J Richard Burke

**Course Title:** **Distributed Networking**

Course Code: EET 519

Pre-Requisite: Advanced Computer Networking

**Objectives:**

This course is design to teach how distributed networks are designed and implemented in real systems and provides detail on basic topics like communication, replication, fault systems, tolerance, and security. Students will be given real life examples of Distributed Networks such as Ad hoc, sensor and delay tolerant networks

**Contents:**

Communication, Processes, Synchronization, Consistency and replication, Scalability, Caching and replication, Fault tolerance and security, Naming in Distributed environments, Distributed file systems and coordination-based systems, Middleware models, Distributed networks: Ad Hoc Networks, Sensor Networks, Delay-Tolerant Networks, Peer to Peer Networks

**Text Books:**

Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems: Principles and Paradigms, Pearson Education.

Kenneth P. Birman, Reliable Distributed Systems: Technologies, Web Services, and Applications.

**Reference Books:**

David Culler, Anoop Gupta, J.P. Singh, Parallel Computer Architecture: A Hardware/ Software Approach, Morgan Kaufmann.

George Coulouris, Jean Dollimore, Tim Kindberg, Distributed System Concepts and Design, Addison Wesley, 2001

**Course Title:** Blockchain Essentials

Course Code: ISC 748

Pre-Requisite: None

**Objectives:**

The objective of this course it to understand Concepts, features, and functionality of Bitcoin and the blockchain. Bitcoin is starting to come into its own as a digital currency, but the blockchain technology behind it could prove to be much more significant. Therefore, the course shall not be limited to bitcoins instead how blockchain can be used in other domains such as health, inventory, business etc shall be explored.

**Contents:** What is blockchain and why It's needed, how block chain works: planning the block chain, documenting ownership, hashing data, hashing & its issues, protecting user accounts, storing transactions, protecting data store, distributing data among peers. Bitcoin Protocol and Consensus: Bitcoin History: From the Cypherpunk Movement to JPMorgan Chase, Bitcoin

## Minutes of the 32<sup>nd</sup> ACM

Mechanics and Optimizations: A Technical Overview, Bitcoin IRL: Wallets, Mining, and More, Ethereum & Smart Contracts: Enabling a Decentralized Future, Game Theory and Network Attacks: How to Destroy Bitcoin, Scaling Blockchain: Cryptocurrencies for the Masses, Enterprise Blockchains, Real-World Applications and future

### **Text Books:**

Blockchain Basics by Deaniel Drescher Published by Apress, 1st edition, 2017.

Blockchain Technology Explained by Alan T. Norman, published by CreateSpace, 2017

### **Reference Books:**

Bitcoin and Cryptocurrency Technologies by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, published by Princeton University press, 2016.

**REVIEW OF ROAD MAP - MS DATA SCIENCE****ELIGIBILITY CRITERIA – MS DS Program**

HEC recognized 4 years Bachelor degree in CS/SE/CE/EE/IT/Statistics/Mathematics or equivalent with CGPA 2.5/4.0 (Semester System) or 50% marks (Annual System).

OR

MIT/MCS/M.Sc. (Computer Science) / MPhil Mathematics/ MPhil Statistics or equivalent with CGPA 2.5/4.0 (Semester System) or 50% marks (Annual System).

NTS GAT (General)/ GRE/ University entry test passed with 50% marks.

The following core courses are recommended to be completed before entering the MS Data Science Program:

- a. Programming Fundamentals
- b. Data Structures & Algorithms OR Design & Analysis of Algorithms
- c. Database Systems

**Semester-wise Breakdown: MS Data Science****Semester 1**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
DSC 500	Tools and Techniques in Data Science	03
DSC 501	Statistical and Mathematical Methods for Data Analysis	03
ESC 701	Research Methodology	03
	Total	09

**Semester 2**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
DSC 700	Big Data Analytics	03
CSC 719	Machine Learning	03
	Elective-I	03
	Total	09

**Semester 3**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
DSC 707	Deep Learning	03
	Elective-II	03
	Thesis-I / Elective – III	03
	Total	09

**Semester 4**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
	Thesis-II / Elective – IV	03
	Total	03
	<b>TOTAL CREDIT HOURS</b>	<b>30</b>

<b>Elective Courses – MS Data Science</b>			
<b>Sr. No</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
1.	DSC 703	Data Visualization	3
2.	DSC 704	Distributed Data Engineering	3
3.	DSC 706	Unstructured Data Processing	3
4.	CSC 518	Decision Support Systems	3
5.	CSC 715	Intelligent Agents	3
6.	CSC 741	Advanced Natural Language Processing	3
7.	CEN 745	Advanced Digital Image Processing	3
8.	CSC 749	Advanced Neural Networks and Fuzzy Logic	3
9.	CSC 751	Pattern Recognition	3
10.	CSC 764	Computer Vision	3
11.	CSC 781	Cloud Computing	3
12.	CSC 554	Advanced Information Theory	3
13.	CSC 747	Text Mining	3
14.	CSC 752	Advanced DBMS	3
15.	CSC 760	Advanced Data Warehousing	3
16.	SEN 764	Ontology Engineering	3
17.	ESC 500	Thesis	6

### **MS Data Science Curriculum**

**Course Title:** Tools and Techniques in Data Science

**Course Code:** DSC 500

**Pre-Requisite:** None

**Objectives:**

This course is aimed at introducing the students to the foundations of data science with hands-on exercises using the latest data science tools.

**Contents:**

Introduction to Data Science, Data Science Life cycle & Process (Asking Right Questions, Obtaining Data, Understanding Data, Building Predictive Models, Generating Visualizations) For Building Data Products, Introduction to Data (Types of Data and Datasets), Data Quality (Measurement and Data Collection Issues), Data pre-processing Stages (Aggregation, Sampling, Dimensionality Reduction, Feature subset selection, Feature creation etc.), Algebraic & Probabilistic View of Data, Introduction to Python Data Science Stack (Python, Numpy, Pandas, Matplotlib), Relational Algebra & SQL, Scraping & Data Wrangling (assessing, structuring, cleaning & munging of data), Basic Descriptive & Exploratory Data Analysis, Introduction to Text Analysis (Stemming, Lemmatization, Bag of Words, TF-IDF), Introduction to Prediction and Inference (Supervised & Unsupervised) Algorithms, Introduction to Scikit Learn, Bias-Variance Tradeoff, Model Evaluation & Performance Metrics (Accuracy, Contingency Matrix, Precision-Recall, F-1 Score, Lift, etc.), Introduction to Map-Reduce paradigm

**Text Books:**

- Python for Data Analysis, 1st Edition, William McKinney, 2012
- Data Science from Scratch, 1st Edition, Joel Grus, 2015

**Reference Books:**

- An Introduction to Statistical Learning with Applications in R, 1st Edition, G. James, D. Witten, T. Hastie and R. Tibshirani, 2013
- Computational and Inferential Thinking: The Foundations of Data Science, 1st Edition, A. Adhikari and J. DeNero, 2017
- Doing Data Science, 1st Edition, Cathy O'Neil and Rachel Schutt, 2013
- Introduction to Data Science. A Python Approach to Concepts, Techniques and Applications, 1st Edition, Laura Igual, 2017

Course Title: Statistical and Mathematical Methods for Data Analysis

Course Code: DSC 502

Pre-Requisite: None

**Objectives:**

This course is designed to teach learners the basic math you will need in order to be successful in almost any data science stat and math course and was created for learners who have basic math skills but may not have taken Stat, algebra or pre-calculus. Also, it brings students up to speed with mathematical and statistical concepts from discrete mathematics, calculus and elementary linear algebra - all with a view of data science, statistics and machine learning applications that follow. Data Science Math and Stat skills introduces the core math that data science is built upon, with no extra complexity, introducing unfamiliar ideas and math symbols one-at-a-time.

**Contents:**

Students learn the skills of set theory, including Venn diagrams, properties of the real number line, interval notation and algebra with inequalities, uses for summation and sigma notation, math on the cartesian (x,y) plane, slope and distance formulas, graphing and describing functions and their inverses on the x-y plane, probability distributions (How to judge the probability of an event, based on certain conditions), statistical significance, hypothesis testing, and regression, Basics of Linear Regression . The concept of instantaneous rate of change and tangent lines to a curve, Exponents, logarithms, and the natural log function.

**Text Books:**

- Mathematical Problems in Data Science: Theoretical and Practical Methods, Book by Bo Jiang, Li Chen, and Zhixun Su, December 15, 2015, Springer

**Reference Books**

- Digital and Discrete Geometry: Theory and Algorithms, Book by Li. M. Chen. ISBN 978-3-319-12098-0, 2014, Springer
- Convexity and Discrete Geometry Including Graph Theory, Book by Karim Adiprasito, Imre Barany, Costin Vilcu, ISSN 2194-1009, Springer, 2016

Course Title: Research Methodology

Course Code: ESC 701

Pre-Requisite: None

**Objectives:**

This course is aimed at providing the students with an ability to undertake postgraduate level research and an appreciation of relevant ethical and professional issues. After completing this course, students will be able to: Formulate research questions and carry out research investigations, identify various sources of information and critically analyze the collected information, Identify and apply appropriate research methods in order to plan, conduct and evaluate their research, Effectively report/publish the results of research activities and Develop and deliver presentations to disseminate research findings.

**Contents:**

Introduction to research, Qualitative and Quantitative research, The scientific method of research, Choosing a research problem, Choosing a research advisor, Literature Review – Conducting and writing, Formulating the research question, Identifying variables and generating hypothesis, Research Design/Methodology, Information gathering and data collection, Data representation, analysis and interpretation, Writing a research proposal, Ethics of research – Plagiarism and Intellectual property rights, Organizing and managing conferences and workshops, Writing research papers/Reviewing research papers, Planning and delivering scientific presentations, Writing thesis/dissertations.

**Text Books:**

- How to Research, L. Blaxter, C. Hughes, M. Tight, 4th Edition, 2010.

**Reference Books:**

- Research Methodologies – A step by step guide for beginners, Ranjit Kumar, 2005.
- Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, John W. Creswell, 2008.

Course Title: Big Data Analytics

Course Code: DSC 700

Pre-Requisite: None

**Objectives:**

Analyzing data is a challenging task as it has to be figured out which type of data analytics are to be used, as well as defeat the challenges that come up when it comes to analyzing data. This course is focused on learning analytics for big data using real-world scenarios.

**Contents:**

This course covers advanced topics in big data analytics including association analysis, nearest neighbor search in high dimensional data, link analysis, page rank, dimensionality reduction, mining stream data and working with very large graphs. The risks of data analytics, the types of data analytics that are out there in the world, the benefits of using data analytics and also the real-world examples that show how to take this knowledge and apply it to everyday life. Big data modeling and big data management systems also make part of the contents.

**Text Books:**

- Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting by EMC Education Services (Editor), Data 1st Edition, 2015. ISBN-13: 978-1118876138

- Big Data Science & Analytics: A Hands-On Approach Paperback by Arshdeep Bahga, Vijay Madisetti, Published by Arshdeep Bahga, 1st Edition, 2016. ISBN: 978-0996025539

**Reference Books:**

- Data Analytics: Become a Master in Data Analytics by Richard Dorsey , Publisher: Eric Morrison, 2<sup>nd</sup> Edition, 2016.
- Big Data Analytics by Venkat Ankam, Published by Venkat Ankam, 1st Edition, 2016.

Course Title: Machine Learning

Course Code: CSC 719

Pre-Requisite: None

**Objectives:**

This course is an overview of concepts and techniques in machine learning, beginning with topics such as classification and linear regression and ending up with more recent topics such as boosting, support vector machines, hidden Markov models, and Bayesian networks. The course will give the student the basic ideas behind modern machine learning methods.

**Contents:**

Introduction to Machine Learning, Concept learning, Decision tree learning, Linear models for regression, Linear models for classification, Artificial neural networks, Kernel methods, Sparse kernel machines, Mixture models and the EM algorithm, Evaluation, Combining multiple learners, Support vector machines, Bayesian networks.

**Text Books:**

- Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies by John D. Kelleher, Brian Mac Namee, Aoife D'Arcy, MIT Press, 1st Edition, 2017. ISBN-13: 978-0262029445
- Machine Learning: Fundamental Algorithms for Supervised and Unsupervised Learning With Real-World Applications by Joshua Chapmann (Author, Publisher), 2nd Edition, 2017.

**Reference Books:**

- Machine Learning with R - Second Edition by Brett Lantz, Packt Publishing, Second Edition, 2015. ISBN: 978-1-78439-390-8
- Machine Learning with Python: Understanding Machine Learning with Python in the World of Data Science by Robert Wilson (Author, Publisher), 1st Edition, 2016.

Course Ti: Deep Learning

Course Code: DSC 707

Pre-Requisite: Machine Learning

**Objectives:**

The objective of this course is to acquaint the students with the state-of-the-art deep learning techniques to solve different learning problems. Students will learn to design as well as implement deep neural network architectures (through hands-on tasks) to solve various recognition problems.

**Contents:**

Introduction to neural networks, activation functions and back-propagation; Convolutional Neural Networks: History, Convolution, Pooling, CNNs for classification, Deep learning Software, CNN Architectures; Sequence Modeling: Recurrent and Recursive Nets: Long-Short Term Memory models and variants, Language modeling and image captioning, Unsupervised learning: Restricted Boltzmann Machines and Auto-encoders; Case Studies.

**Books:**

**Text Book:**

- Deep Learning (Adaptive Computation and Machine Learning series), Ian Goodfellow, Yoshua Bengio, Aaron Courville, The MIT Press, 2016.

**Reference Books:**

- Deep Learning: A Practitioner's Approach, Josh Patterson and Adam Gibson, O'Reilly Media, 2017.
- Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms, Nikhil Buduma and Nicholas Locascio, O'Reilly Media, 2017
- Deep Learning with Python, Francois Chollet, O'Reilly Media, 2017.

Course Title: Data Visualization

Course Code: DSC 703

Pre-Requisite: None

**Objectives:**

The course is about effective data analysis involves learning how to synthesize data, especially big data, into a story and present that story in a way that resonates with the audience. The course is about how to analyze large amounts of data, communicate complex data in a meaningful way, and quickly slice data into various views. Also, explain how to automate redundant reporting and analyses, create eye-catching visualizations, and use statistical graphics and thematic cartography.

**Contents:**

Students learn the skills of data visualization in parallel with the soft skills of communicating with a non-technical audience and core Data Science leadership skills. Emphasis is placed on enabling students to listen to articulated business needs or problem cases and learn how to propose as well as execute Data Science solutions to effectively meet these needs.

**Text Books:**

- Data Visualisation: A Handbook for Data Driven Design by Andy Kirk (Author), SAGE Publishing, 1st Edition, 2017. ISBN: 978-14739-1213-7
- Effective Data Visualization: The Right Chart for the Right Data by Stephanie D. H. Evergreen (Author), SAGE Publishing, 1st Edition, 2016. ISBN: 978-1506303055

**Reference Books:**

- Data Visualization with Python and JavaScript: Scrape, Clean, Explore & Transform Your Data by Kyran Dale (Author), 2nd Edition, O'Reilly Media, 2017. ISBN: 978-1491920510
- Machine Learning for Absolute Beginners: A Plain English Introduction by Oliver Theobald (Author, Publisher), 1<sup>st</sup> Edition, 2017.

Course Title: Distributed Data Engineering

Course Code: DSC 704

Pre-Requisite: None

**Objectives:**

The course is about well-designed conceptual and logical data models that the design has been built with flexibility and extensibility leading to high application agility and low maintenance costs. A detailed data flow diagrams means a concrete understanding of the business' value chain exists and is documented. The wish to understand how we think means excellent team dynamics while analyzing, designing, and building the application.

**Contents:**

This course will introduce students to working with distributed systems for efficiently collecting and analyzing large quantities of varied data. This is a survey-style course covering common data platforms and analysis patterns including Postgres (SQL), Hadoop (MapReduce), Spark, Kafka (logs), Lambda Architecture (streaming), and Cassandra (NoSQL).

**Text Books:**

- Data Engineering Perfect by Brian Shive, Technics Publications, LLC, 2nd Edition, 2017. ISBN: 978-1935504603
- Measurement and Data Analysis for Engineering and Science by Patrick F. Dunn (Author), CRC Press, 3rd Edition, 2016. ISBN: 978-1439825686

**Reference Books:**

- Data Visualization with Python and JavaScript: Scrape, Clean, Explore & Transform Your Data by Kyran Dale (Author), 2nd Edition, O'Reilly Media, 2017. ISBN: 978-1491920510
- Machine Learning with Python: Understanding Machine Learning with Python in the World of Data Science by Robert Wilson (Author, Publisher), 1st Edition, 2016.

Course Title: Unstructured Data Processing

Course Code: DSC 706

Pre-Requisite: None

**Objectives:**

This course is aimed at extracting useful information (usually) from huge unstructured datasets by employing techniques from information retrieval, natural language processing and data mining. The objective of this module is to get a good understanding of the basic text mining techniques and study some of its applications as well.

**Contents:**

Essential Data Science skills involved in working with unstructured data include transforming it into structured data types able to be analysed, processed and used for Machine Learning and Information Retrieval algorithms. The focus is on Natural Language Processing and classification techniques used in Text Mining. Dealing with information overload and information overlook, unstructured vs. (semi-) structured data, evolving information needs and knowledge management issues, the business case for text mining. The text mining pipeline: information retrieval, information extraction and data mining. Fundamentals of natural language processing: linguistic foundations, levels of linguistic analysis.

**Text Books:**

- Text mining handbook: advanced approaches in analyzing unstructured data, Feldman, Ronen and James Sanger, Cambridge University Press, Edition: 3<sup>rd</sup>, 2015
- Text mining: classification, clustering and applications, Srivastava, Ashok and Mehran Sahami, Chapman & Hall, Edition: 1st , 2009

**Reference Books:**

- Mining Text Data by Charu C. Aggarwal, ChengXiang Zhai – 2012
- Machine Learning for Absolute Beginners: A Plain English Introduction by Oliver Theobald (Author, Publisher), 2017

Course Title: Decision Support Systems  
Course Code: CSC 518  
Pre-Requisite: None

**Objectives:**

This course should enable a student to understand managerial decisions, to participate in the decision making process, and to be able to develop models and systems to support the decision making. This course focuses on the use and application of information systems to support the decision-making process. Different types of systems are discussed as a basis for designing and developing highly effective decision support systems. Data models, interactive processes, knowledge-based approaches and integration with database systems are also described. Theoretical concepts would be applied to real-world applications.

**Contents:**

Decision support systems overview, Decision Making, Systems, Modelling, and Support, business intelligence, Data Management, Modelling and Analysis, Decision Support System Development, Fundamentals of Expert Systems and Intelligent Systems, Collaborative Computing Technologies, Knowledge Management.

**Text Books:**

- Efraim Turban and Jay E. Aronson, Decision Support Systems and Intelligent Systems, Seventh Edition, Prentice Hall Pub. M 2004.
- Decision Support Systems and Business Intelligence Systems. 9e. by E. Turban & J. Aronson, 2010

**Reference Books:**

- Machine Learning with Python: Understanding Machine Learning with Python in the World of Data Science by Robert Wilson (Author, Publisher), 1st Edition, 2016.

Course Title: Intelligent Agents  
Course Code: CSC 715  
Pre-Requisite: None

**Objectives:**

The primary objective of this course is to provide an introduction to the basic principles and applications of intelligent agents. The emphasis of the course is on teaching the fundamentals, and not on providing a mastery of specific commercially available software tools or programming environments. Students will be presented with a wide range of theories of relevance to their research and development to model agent's knowledge representation and learning. Emphasis will be placed on understanding concepts of thinking, planning and learning aspects of intelligent agents and using them to model and build relevant agent-based systems.

**Contents:**

Agent, Environment, Interaction, Solving Problem by Search Algorithms, Informed Search, Constraint Satisfaction Problem, Logical Agents , Theorem Proving Algorithms (propositional logic, predicate logic), Partial Order Planning, Graph Plan, BDI Agents, Decision trees , Neural Networks, Reinforcement learning, Q- learning, Temporal Difference Learning, Monte Carlo Methods.

**Text Books:**

- Stuart Russel and Peter Norvig, Artificial Intelligence, A modern Approach, 3rd Edition
- Michael J. Wooldridge, Reasoning about Rational Agents.

**Reference Books:**

- Jack Minker, Logic Based Artificial Intelligence.
- Steven Michael LaValle, Planning Algorithms.

Course Title: Advanced Natural Language Processing

Course Code: CSC 741

Pre-Requisite: None

**Objectives:**

This course is intended to introduce the students to the fundamental concepts and ideas in natural language processing (NLP). Students will be acquainted with the algorithms available for the processing of linguistic information as well as the underlying computational properties of natural languages. By the end of this course the student should be able to carry out independent work with modern techniques for processing of texts.

**Contents:**

Introduction to NLP and its applications, Grammar checkers, dictation, document generation, NL interfaces, The different analysis levels used for NLP, Markup, Finite state automata, Recursive and augmented transition networks, Lexical level: Error-tolerant lexical processing (spelling error correction), Transducers for the design of morphologic analyzers, Part-of-speech tagging, Representations for linguistic resources, Syntactic level: Grammars (e.g. Formal/Chomsky hierarchy, DCGs, systemic, case, unification, stochastic), Parsing (top-down, bottom-up, chart (Earley algorithm), CYK algorithm), Semantic level: Logical forms, Ambiguity resolution, Semantic networks and parsers, Procedural semantics, Montague semantics, Vector Space approaches, Pragmatic level: Knowledge representation, Reasoning, Plan/goal recognition, Speech acts/intentions, Natural language generation.

**Text Books:**

- Handbook of Natural Language Processing, Nitin Indurkha and Fred J. Damerau, Chapman & Hall/Crc, Second Edition, 2010.
- Natural Language Processing and Text Mining, Anne Kao and Steve R. Poteet, Springer, 2010.

**Reference Books:**

- Speech and Language Processing, Daniel Jurafsky and James H. Martin, Pearson Prentice Hal, 2nd Edition, 2008.
- Foundations of Statistical Natural Language Processing, Christopher D. Manning, Hinrich Schuetze, The MIT Press; 1st edition, 1999.

Course Title: Advanced Digital Image Processing

Course Code: CEN 745

Pre-Requisite: None

**Objectives:**

This course will provide mathematical foundations and practical techniques for digital manipulation of images, image acquisition, pre-processing, and segmentation. The course will expose the students to the basic theory and algorithms widely used in digital image processing. After the completion of this course the students will be able to understand the

basic concepts behind the processing of digital images as well as various techniques of filtering/processing images in spatial as well as in frequency domain. The course will serve as the basis for more advance topics in Computer Vision.

**Contents:**

Introduction to Digital Image Processing Computer Vision and Pattern Recognition, Fundamentals Element of visual Perception, Image Sensing and Acquisition Image Sampling and Quantization. Pixel operations, linear & non-linear operations, Image Enhancement in spatial Domain: Background, Grey level Transformations, Filtering in spatial domain. Image Enhancing in Frequency Domain: Frequency domain, Fourier Transform, Filtering in frequency domain, Color Image Processing, Fundamentals of Image Compression, Lossless and lossy compression, Image Compression standards, Image Segmentation: Detection of Discontinuities, Edge and Boundary detection, Thresholding, Region Based segmentation, Morphological image processing, Representation schemes: Boundary and region descriptors.

**Text Books:**

- Digital Image Processing, R. C. Gonzalez and R. E. Woods, Addison Wesley, 3rd Edn., 2007.
- Fundamentals of Digital Image Processing: A Practical Approach with Examples in Matlab, Chris Solomon and Toby Breckon, 2011.

**Reference Books:**

- Machine Learning with Python: Understanding Machine Learning with Python in the World of Data Science by Robert Wilson (Author, Publisher), 1st Edition, 2016.

Course Title: Advanced Neural Networks and Fuzzy Logic

Course Code: CSC 749

Pre-Requisite: Artificial Intelligence

**Objectives:**

This course presents an overview of the theory and applications of artificial neural network and fuzzy systems to computer science and software engineering applications. The objective of this course is on the understanding of various neural network and fuzzy systems models and the applications of these models to solve computing/software engineering problems.

**Contents:**

Artificial Intelligence Artificial Neural Network overview, Supervised Learning: Single-Layer Networks , Perceptrons , Adalines Supervised Learning: Multi-Layer Networks, Multi-Layer Perceptrons (MLPs) , Backpropagation , Conjugate Gradient method , Levenberg-Marquardt (LM) method , Madalines , Radial-Basis Networks , Cascade-Correlation Networks , Polynomial Networks , Recurrent Networks (Time series , Backpropagation through time , Finite Impulse Response (FIR) MLP ), Temporal Differences method (TD). Unsupervised Learning, Simple Competitive Networks: Winner-take-all | Hamming network , Learning Vector Quantization (LVQ), Counterpropagation Networks (CPN) , Adaptive Resonance Theory (ART) , Kohonen Self-Organizing Maps (SOMs) , Principal Component Analysis networks (PCA), Associative Models, Linear Associative Memory (LAM) , Hopfield Networks , Brain-State-in-a-Box , BSB , Boltzmann Machines and Simulated Annealing , Bi-Directional Associative Memory (BAM), Optimization Problems, Neural Network Approaches, Evolutionary Programming , Fuzzy logic and its connection to NNs

**Text Books:**

- Neural networks: methodology and applications, by G. Dreyfus-computers-, 2005

- Evolving Fuzzy Systems - Methodologies, Advanced Concepts and Applications, By Edwin Lughofer, 2011.

**Reference Books:**

- Neural Networks: A Comprehensive Foundation, Simon Haykin, Prentice Hall, Upper Saddle River, NJ, SECOND EDITION, 1999
- Artificial neural networks: an introduction, by Kevin L. Priddy, Paul E. Keller-Technology & Engineering-2005

Course Title: Pattern Recognition

Course Code: CSC 751

Pre-Requisite: None

**Objectives:**

The goal of this course is to provide an introduction to the fundamental concepts of machine learning and pattern recognition with examples from several application areas. The students will be acquainted with real world regression and classification problems and the models and classifiers to solve these problems. Students will also be introduced to dimensionality reduction and feature selection concepts. Additionally, students will be exposed to various clustering techniques. A key objective to this course is for the students to also acquire hands-on experience related to classification and clustering tasks.

**Contents:**

Introduction to Pattern recognition and Machine learning, Matrices and vectors: Toeplitz and Vendermonde matrices, classification and regression, Bayesian Decision theory, Normal Density and decision functions for normal distribution, Maximum likelihood estimation, Dimensionality reduction – Component analysis, feature selection, Hidden Markov Models and Artificial neural networks, Non-parametric methods, Unsupervised learning and clustering: Clustering techniques.

**Text Books:**

- The Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer, 2009.
- Pattern Recognition and Classification: An Introduction, by Geoff Dougherty, S. Theodoridis & K. Koutroumbas, Academic Press, 2012.

**Reference Books:**

- Pattern recognition and Machine Learning, Christopher M. Bishop, Springer, 2007.
- Introduction to Machine Learning, Ethem Alpaydin, MIT Press, 2004.

Course Title: Computer Vision

Course Code: CSC 764

Pre-Requisite: None

**Objectives:**

By the end of this course, the students would have developed an understanding of the problems in simulating human perception into machines. Students will have a thorough understanding of the state of the art computer vision methods, algorithms and results. The students will also be able to apply the tools and techniques learned to solve practical vision related problems.

**Contents:**

Introduction to Computer Vision and related areas along with applications, Image formation and representation: imaging geometry, digitization, cameras and projections, rigid and affine transformations, Filtering: convolution, smoothing. Segmentation: region splitting and merging; quadtree structures for segmentation; Feature detection: edge detection, corner detection, line and curve detection, SIFT and HOG descriptors, shape context descriptors. Model fitting: Hough transform, line fitting, ellipse and conic sections fitting, algebraic and Euclidean distance measures. Camera calibration: camera models; intrinsic and extrinsic parameters; affine, and perspective camera models. Epipolar geometry: introduction to projective geometry; epipolar constraints; the essential and fundamental matrices; Motion analysis: the motion field of rigid objects; motion parallax; optical flow, the image brightness constancy equation, affine flow; differential techniques; feature-based techniques; Motion tracking: the Kalman filter; Object recognition and shape representation.

**Text Books:**

- Computer Vision: Algorithms and Applications, R. Szeliski, Springer, 2011.
- Computer Vision: A Modern Approach, D. Forsyth and J. Ponce, Prentice Hall, 2nd ed., 2011.

**Reference Books:**

- Computer Vision: A Modern Approach, By David Forsyth, Jean Ponce, Prentice Hall, 2003.
- Handbook of Mathematical Models in Computer Vision, By Nikos Paragios, Yunmei Chen, Olivier Faugeras, Birkhäuser, 2006

Course Title: Cloud Computing

Course Code: CSC 781

Pre-Requisite: None

**Objectives:**

Understanding the systems, protocols and mechanisms to support cloud computing, Application architectures for cloud computing, understanding the hardware necessary for cloud computing and design and implementation of cloud computing application

**Contents:**

This course introduces students to the cloud and the computing on the cloud. Initially, the focus is on the technology context, i.e. multi-core architectures, virtualization, parallel computing models and big data storage. Next, famous cloud computing models including Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS) are studied with the help of Amazon AWS (IaaS), Microsoft Azure (PaaS) and Google App Engine (SaaS). In addition to computing models, Data and computation models, e.g. MapReduce, are an important part of this module. The theoretical concepts are explained with hand-on experience of cloud platforms supported by case studies. The course concludes with an insight into the cloud risk areas including risks with service provider, technical risks, security issues, connectivity issues, etc. and research work in these areas is also discussed.

**Text Books:**

- Handbook of Cloud Computing, Borko Furht. Springer, 2010.
- Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security, and More, Kris Jamsa Jones & Bartlett Publishers, 2012

**Reference Books:**

- Cloud Computing and SOA: Convergence in your enterprise, David Linthicum. Addison Wesley, 2009

- Distributed File Systems: Hadoop, Lustre, Google File System, Andrew File System, Off system, Distributed File System, Ceph. General books LLC, 2010

Course Title: Advanced Information Theory

Course Code: CSC 554

Pre-Requisite: None

**Objectives:**

This course presents the advance concepts of Information Theory, that stays at the basis of modern digital communications, data compression, lossy source coding and multiuser networks. Details of what computer scientists mean by "information", including topics in data compression (such as zip files and mp3), error correcting codes, information entropy, cryptography, and randomness.

**Contents:**

Asymptotic Equipartition Theorem, types, and typical sequences, Information measures and their properties: entropy, Kullback-Leibler divergence, mutual information, source coding theorem, channel coding theorem, rate distortion theory, quantization, maximum entropy principle Typical sequences and typical sets, error exponents in: hypothesis testing, source coding, and channel coding, information theory and estimation, rudiments of network information theory.

**Text Books:**

- T.M. Cover and J.A. Thomas, Elements of Information Theory, 2nd ed., Wiley, 2006;
- Csisz'ar and J. Körner, Information theory: coding theorems for discrete memoryless systems, 2nd ed., Cambridge University Press, 2011.

**Reference Books:**

- Codes: an introduction to information communication and cryptography by Norman Biggs, 2008

Course Title: Text Mining

Course Code: CSC 747

Pre-Requisite: Data Mining

**Objectives:**

Text Mining is aimed at extracting useful information (usually) from huge unstructured datasets by employing techniques from information retrieval, natural language processing and data mining. The objective of this module is to get a good understanding of the basic text mining techniques and study some of its applications as well.

**Contents:**

Dealing with information overload and information overlook, unstructured vs. (semi-)structured data, evolving information needs and knowledge management issues, the business case for text mining. The text mining pipeline: information retrieval, information extraction and data mining. Fundamentals of natural language processing: linguistic foundations, levels of linguistic analysis. Approaches to text mining: rule-based vs. machine learning based vs. hybrid; generic vs. domain specific; domain adaptation. Dealing with real text: text types, document formats and conversion, character encodings, markup, low-level processes (sentence splitting, tokenization, part of speech tagging, chunking). Information extraction: term extraction, named entity recognition, relation extraction, fact and event extraction; partial analysis vs. full analysis. Data mining and visualisation of results from text mining.

Evaluation of text mining systems: evaluation measures, role of evaluation challenges, usability evaluation, the U-Compare initiative. Text mining applications and services; case studies.

**Text Books:**

- Text mining handbook: advanced approaches in analyzing unstructured data, Feldman, Ronen and James Sanger, Cambridge University Press, Edition: 2nd ,2008
- Text mining: classification, clustering and applications, Srivastava, Ashok and Mehran Sahami, Chapman & Hall, Edition: 1st , 2009

**Reference Books:**

- Mining Text Data by Charu C. Aggarwal, ChengXiang Zhai - 2012

Course Title: Advanced DBMS

Course Code: CSC 752

Pre-Requisite: Database Management System

**Objectives:**

At the end of this course, the expectation is that the students will gain competence in following areas: Databases beyond relational, Query optimization, Data marts, Data warehousing, XML, OLAP.

**Contents:**

Object-Oriented Databases, Object-Relational Databases, Mobile Databases, Temporal, Spatial and Geographic Databases, Distributed Database Design, Distributed Multimedia Database Systems, Data Warehouse and OLAP Systems, Business Intelligence, XML Data Models, XML Documents and DTD, XML Query Languages, Current Research and Development Trends of Database Analysis, Design, Modeling and Applications.

**Text Books:**

- An Advanced Course in Database Systems: Beyond Relational Databases, S. W. Dietrich and S. D. Urban, Prentice Hall, 2005.
- Advanced Database Management Systems by Rini Chakrabarti, Shilbhadrab Dasgupta - 2011

**Reference Books:**

- Database Management Systems, Ramakrishnan R & Gehrke J, 3rd edn, McGraw Hill, New York, 2003.

Course Title: Advanced Data Warehousing

Course Code: CSC 760

Pre-Requisite: None

**Objectives:**

By the end of this course students will be familiar with concepts of Data Warehousing including: Strategic need of data warehousing, Building blocks of a data warehouse, Data warehouse project management, Business requirements of a data warehouse, Architectural components of a data warehouse, Data warehouse metadata management, Dimensionality Modeling, ETL & Data quality, Online Analytical Processing, as well as the following areas of data mining: Motivation for data mining, Data Preprocessing, Data mining primitives and query languages, Architectures of data mining systems, Major Data Mining Tasks, Cluster Analysis , Statistical measures in large databases, Classifications and Predictions, Anomaly Detection.

**Contents:**

Data Warehouse: Planning and Requirements, Data Warehouse Architecture, Data Warehouse Infrastructure, Dimensional Modeling, Metadata, Extraction, Transformation and Loading, Online Analytical Processing, Data Preparation Techniques: outlier and missing data analysis, Data Reduction Techniques, Introduction to Data Mining, Modeling and Principal Feature Extraction, Clustering, Hierarchical Clustering, Partitional Clustering, Classification , Decision Tree Classification, Bayesian Classification, Nearest Neighbor Classification.

**Text Books:**

- Data Warehousing Fundamentals for IT Professionals, Paulraj Pooniah, Wiley, 2nd Edition, 2010.

**Reference Books:**

- Data Mining Concepts & Techniques, Jaiwei Han, Micheline Kamber, 2nd Edition, 2005.

Course Title:              Ontology Engineering

Course Code:              SEN 764

Pre-Requisite:              None

**Objectives:**

This Course provides students with a theoretical and practical understanding of leading edge solutions for the Semantic Web. It introduces students to the W3C standard Web Ontology Language, OWL, its underlying Description Logics, establishing patterns to avoid the pitFalls in using OWL. The course provides an opportunity to become familiar with a widely used environment for developing and an API for applying OWL ontologies, and making use of reasoning services accessible via both. Ontology provide rich, repressive vocabularies of terms describing a domain (e.g. medicine, astronomy, music, etc.). They are key to information exchange, data integration and search.

**Contents:**

Introduction to Description Logics and Reasoning, concepts of semantic interoperability, integration and automation; concept of metadata and ontology; RDF and RDFS , Ontology Web Language (OWL) and Ontology Engineering Methodologies.

**Text Books:**

- Ontology Engineering in a Networked World, by Mari Carmen Suárez-Figueroa, Asunción Gómez-Pérez, Enrico Motta – 2012
- D. Allemang and J. Hendler: Semantic Web for the Working Ontologist. Morgan Kaufmann (2008).

**Reference Books:**

- Ontological Engineering: with examples from the areas of Knowledge Management, e-Commerce and the Semantic Web. First Edition - Asunción Gómez-Pérez, Mariano Fernandez-Lopez, Oscar Corcho, 2010.

**Appendage 3223****REVIEW OF ROADMAP - BEE 2018****Curriculum 2018**

Campus:	<u>Islamabad/Karachi</u>
Department:	<u>Department of Electrical Engineering</u>
Program Title:	<u>BEE</u>
Program Level:	<u>Bachelors</u>
Total Duration of Program:	<u>4 years</u>
Total Number of semesters:	<u>8 semesters</u>
Total Number of Credit Hours:	<u>136</u>
Number of Credit Hours per Semester:	<u>16-18</u>
Engineering Courses:	<u>28 Courses, 95 Cr Hrs, 69.9 % of total</u>
Non-Engineering Courses:	<u>15 Courses, 41 Cr Hrs, 30.1 % of total</u>

**Courses of Non-Engineering Domain**

Knowledge Area	Sub Area	Name of Course	Lec. Cr. Hrs	Lab Cr. Hrs	Total Cr. Hrs.	Total Courses	Total Credits	% Area	% Overall
<b>Humanities and Social Sciences</b>	English	Functional English	2	0	2	3	7	17	5.1
		Comm. Skills	2	0	2				
		Technical Report Writing & Present. Skills	3	0	3				
	Culture	Islamic Studies	2	0	2	2	4	9.7	2.9
		Pakistan Studies	2	0	2				
	Social Sciences	Social Sciences Elective 1	3	0	3	2	6	14.6	4.4
		Social Sciences Elective 2	3	0	3				
<b>Management Sciences</b>		Management Sciences Elective 1	2	0	2	2	5	12.2	3.7

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		Management Sciences Elective 2	3	0	3				
<b>Natural Sciences</b>	Math	Applied Calculus and Analytical Geometry	3	0	3	4	12	29.2	8.8
		Linear Algebra	3	0	3				
		Differential Equations	3	0	3				
		Complex Variable and Transform	3	0	3				
	Physics	Applied Physics	3	1	4	1	4	9.8	2.9
	Electives	Elective 1	2/3	1/0	3	1	3	7.3	2.2
<b>Total</b>			39/ 40	2/1	41	15	41	100%	30.1%

Courses of Engineering Domain

Knowledge Area	Name of Course	Lec. Cr. Hrs.	Lab Cr. Hrs.	Total Cr. Hrs.	Total Courses	Total Cr. Hrs.	% Area	% Overall
<b>Computing</b>	Introduction to Computing	1	1	2	3	9	9.5	6.6
	Programming Fundamentals	2	1	3				
	Computing Elective	3	1	4				
<b>Electrical Engineering Foundation</b>	Linear Circuit Analysis	3	1	4	9	28	29.5	20.6
	Electrical Network Analysis	3	1	4				
	Workshop Practice	0	1	1				
	Signals and Systems	3	1	4				
	Electronic Devices & Circuits	3	1	4				
	Digital Logic Design	3	1	4				
	Electromagnetic field theory	3	0	3				
	Probability Methods in Engineering	3	0	3				
	Engineering Drawing & CAD	0	1	1				

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<b>Electrical Engineering Core (Breadth)</b>	Communication Systems	3	1	4	7	28	29.5	20.6
	Embedded system design	3	1	4				
	Electrical Machines	3	1	4				
	Linear Control Systems	3	1	4				
	Electronic Circuit Design	3	1	4				
	Breadth Core 1	3	1	4				
	Breadth Core 2	3	1	4				
<b>Electrical Engineering Core (Depth)</b>	Depth Elective 1	3	1	4	5	19	20	13.9
	Depth Elective 2	3	1	4				
	Depth Elective 3	3	1	4				
	Depth Elective 4	3	1	4				
	Depth Elective 5	3	0	3				
<b>IDEE</b>	IDEE-1	2	0	2	2	5	5.2	3.8
	IDEE-2	3	0	3				
<b>Senior Design Project</b>	Project 1	0	3	3	2	6	6.3	4.4
	Project 2	0	3	3				
<b>Internship (Summer)</b>			0	0	0	0	0	0
<b>Total</b>					28	95	100	69.9%

**Semester-1**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	None	GSC 110	Applied Calculus and Analytical Geometry	3+0	3	0
2	None	CSC 111	Introduction to Computing	1+1	1	1
3	None	ENG 104	Functional English	2+0	2	0
4	None	ISL 101	Islamic Studies	2+0	2	0
5	None	XXXX	IDEE-1	2+0	2	0
6	None	GSC 113	Applied Physics	3+1	3	1
7	None	EEL 112	Workshop Practice	0+1	0	1
<b>Total Credit Hours in Semester-1</b>				16	13	3

**Semester-2**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	None	EEL 121	Engineering Drawing & CAD	0+1	0	1
2	GSC 110	GSC 210	Differential Equations	3+0	3	0

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3	CSC 111	CSC 112	Programming Fundamentals	2+1	2	1
4	None	EEN 110	Linear Circuit Analysis	3+1	3	1
5	None	CEN 120	Digital Logic Design	3+1	3	1
6	None	PAK 101	Pakistan Studies	2+0	2	0
<b>Total Credit Hours in Semester-2</b>				17	13	4

**Semester-3**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	None	HSS 118	Communication Skills	2+0	2	0
2	EEN 110	EEN 224	Electronic Devices and Circuits	3+1	3	1
3	EEN 110	EEN 211	Electrical Network Analysis	3+1	3	1
4	CSC 112	CSC XXX	Computing Elective	3+1	3	1
5	GSC 110	GSC 220	Complex Variables and Transforms	3+0	3	0
<b>Total Credit Hours in Semester-3</b>				17	14	3

**Semester-4**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	None	GSC 121	Linear algebra	3+0	3	0
2	None	HSS XXX	Humanities & Social Sciences Elective -1	3+0	3	0
3	GSC 220	EEN 313	Signals and Systems	3+1	3	1
4	EEN 224	EEN 225	Electronic Circuit Design	3+1	3	1
5	GSC 110	EEN 226	Probability Methods in Engineering	3+0	3	0
<b>Total Credit Hours in Semester-4</b>				17	15	2

**Semester-5**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	GSC 110	EEN 311	Electromagnetic Field Theory	3+0	3	0
2	CEN 120	CEN 440	Embedded systems Design	3+1	3	1
3	XXXX	XXXX	Natural Science Elective	3+0/2+1	3/2	0/1

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4	EEN 313	EET 321	Communication Systems	3+1	3	1
5	EEN 211	EEN 312	Electrical Machines	3+1	3	1
<b>Total Credit Hours in Semester-5</b>				18	15/14	3/4

**Semester-6**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	XXXX	EEXXXX	Breadth Core- 1	3+1	3	1
2	EEN 313	EEN 412	Linear Control Systems	3+1	3	1
3	None	MGT XXX /HSS XXX	Management Science Elective 1	2+0	2	0
4	XXXX	EEXXXX	Depth Elective 1	3+1	3	1
5	XXXX	EEXXXX	Breadth Core-2	3+1	3	1
<b>Total Credit Hours in Semester-6</b>				18	14	4

**Semester-7**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	None	ESC 498	Project – 1	0+3	0	3
2	None	HSS 320	Tech. Writing & Presentation Skills	3+0	3	0
3	XXXX	EEXXX	Depth Elective 2	3+1	3	1
4	XXXX	EEXXX	Depth Elective 3	3+1	3	1
5	XXXX	XXXX	IDEE-2	3+0	3	0
<b>Total Credit Hours in Semester-7</b>				17	12	5

**Semester-8**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	XXXX	ESC 499	Project-2	0+3	0	3
2	None	HSS XXX	Humanities & SS Elective-2	3+0	3	0
3	None	MGT XXX	Management sciences Elective - 2	3+0	3	0
4	XXXX	EEXXXX	Depth Elective 4	3+1	3	1
5	XXXX	EEXXXX	Depth Elective 5	3+0	3	0
<b>Total Credit Hours in Semester-8</b>				16	12	4

**List of Elective Courses - Non-Engineering Domain Electives****A. Humanities and Social Sciences Electives**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	None	HSS 422	Engineering Ethics	3+0	3	0
2	None	HSS 202	Introduction to Sociology	3+0	3	0
3	None	BES 103	Critical Thinking	3+0	3	0
4	None	HSS 456	Organizational Behavior	3+0	3	0
5	None	PSY 401	Professional Psychology	3+0	3	0
6	None	HSS 111	Introduction to International Relations	3+0	3	0

**B. Management Science Electives**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	None	HSS 423	Entrepreneurship	2+0	2	0
2	None	MGT 421	Leadership	2+0	2	0
3	None	MGT 422	Personal Grooming	2+0	2	0
4	None	MGT 111	Principles of Management	3+0	3	0
5	None	MGT 423	Engineering Management	3+0	3	0
6	None	MGT 424	Engineering Economics	3+0	3	0
7	None	MGT 425	Project Management in Engineering	3+0	3	0

**C. Natural Sciences Electives**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	GSC 110	GSC 211	Multivariable Calculus	3+0	3	0
2	GSC 210	GSC 320	Numerical Analysis	3+0	3	0
3	None	GSC 221	Discrete Mathematics	3+0	3	0
4	None	GSC 340	Chemistry	2+1	2	1

**Engineering Domain Electives****A. Computing Electives**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	CSC 112	CSC 210	Object Oriented Programming	3+1	3	1
2	CSC 112	CSC 221	Data structure and Algorithm	3+1	3	1

**B. Breadth Core Electives****1. Power Engineering**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	EEN 211	EEP 331	Power System Analysis (Breadth Core 1)	3+1	3	1
2	EEN 219	EEN 433	Power Distribution and Utilization (Breadth Core 2)	3+1	3	1

**2. Electronics Engineering**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	EEN 224	EEP 468	Power Electronics (Breadth Core 1)	3+1	3	1
2	EEN 313	EEN 325	Digital Signal Processing (Breadth Core 2)	3+1	3	1

**3. Telecommunication Engineering**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	None	CEN 223	Computer Communication & Networks (Breadth Core 1)	3+1	3	1
2	EEN 313	EEN 325	Digital Signal Processing (Breadth Core 2)	3+1	3	1

**C. Depth Electives****1. Communication/ Telecommunication Engineering**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	EEN 311	EEN 431	RF and Microwave Engineering	3+1	3	1
2	None	EET 463	Optical Fiber Communication	3+1	3	1
3	EEN 311	EET 447	Radar Systems	3+1	3	1
4	EET 321	EEN 436	Wireless and Mobile Communication	3+1	3	1
5	EET 321	EET 449	Satellite Communications	3+1	3	1
6	EEN 311	EET 451	Wave Propagation and Antennas	3+1	3	1
7	CEN 223	EET 452	Multimedia Communications	3+1	3	1
8	None	CSC 453	Information Theory	3+1	3	1
9	CEN 223	EEN 434	Computer Networks	3+1	3	1
10	EET 321	EET 411	Digital Communications	3+1	3	1
11	None	EET 456	Telecom Transmission and Switching Systems	3+0	3	0
12	CEN 223	CEN 444	Digital Image Processing	3+0	3	0
13	EEN 325	CEN 441	FPGA- Based System Design	3+1	3	1
14	CEN 120 CEN 440	EEN 469	Linear Integrated Circuits and Applications	3+1	3	1
15	EEN 224	EEN 316	Instrumentation and measurement	3+1	3	1
16	None	EET 471	Emerging Wireless Technologies and RF planning	3+0	3	0
17	None	EET 472	Telecommunication policies and standards	3+0	3	0

**2. Electronic Engineering**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	EEN 224	EEN 316	Instrumentation and measurement	3+1	3	1

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2	EEN 224	EEN 462	Integrated Electronics	3+1	3	1
3		EEN 441	Industrial Process Control	3+1	3	1
4	EEN 224	EEN 442	Digital Electronics	3+1	3	1
5	EEN 224	EEN 444	Opto Electronics	3+1	3	1
6	EEN 224	CEN 452	VLSI Design	3+1	3	1
7	EEN 224	EEN 445	Industrial Electronics	3+1	3	1
8	CEN 120	CEN 442	Digital System Design	3+1	3	1
9	EEN 224	EEN 469	Linear Integrated Circuits & Applications	3+1	3	1
10	EEN 224	EEN 466	Introduction to Nano Technology	3+0	3	0
11	EEN 311	EET 451	Wave Propagation and Antennas	3+1	3	1
12	EEN 325	CEN 444	Digital Image Processing	3+0	3	0
13	EEN 224	EEN 435	Solid State Devices	3+1	3	1
14	EEN 412	EEN 437	Digital Control Systems	3+1	3	1
15	EEN 219	EEN 433	Power Distribution and Utilization	3+1	3	1
16	CEN 120	CEN 441	FPGA- Based System Design	3+1	3	1
17	EEN 219	EEN 420	Industrial Automation	3+1	3	1
18	EEN 224	EEN 471	Microelectronics Technology	3+0	3	0
19	EEN 311	EEN 431	RF and Microwave Engineering	3+1	3	1
20	EEN 325	ESC 471	Biomedical Instrumentation	3+0	3	0
21	None	CEN 223	Computer Communication & Networking	3+1	3	1
22	None	ESC 472	Medical Robots	3+0	3	0

### 3. Power Engineering

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	EEN 224	EEN 316	Instrumentation and Measurements	3+1	3	1
2	EEN 219	EEP 441	Advanced Electrical Machines	3+1	3	1
3	EEN 219	EEP 442	Power Generation	3+1	3	1
4	EEN 433	EEP 443	Electrical Power Transmission	3+1	3	1
5	EEN 224	EEP 468	Power Electronics	3+1	3	1
6	EEP 331	EEP 444	Power System Protection	3+1	3	1

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7	EEP 331	EEP 445	Power System Stability & Control	3+0	3	0
8	EEN 219	EEP 471	Electrical Machine Design and Maintenance	3+1	3	1
9	EEN 211	EEP 446	High Voltage Engineering	3+1	3	1
10		EEP 448	Renewable Energy Systems	3+0	3	0
11	EEN 313	EEN 325	Digital Signal Processing	3+1	3	1
12	EEN 224	EEP 472	Industrial Drives	3+1	3	1
13	EEP 331	EEP 475	FACTS and HVDC Transmission	3+0	3	0
14	None	CEN 223	Computer Communication & Networking	3+1	3	1
15	None	EEP 474	Smart Grid	3+0	3	0
16	EEN 412	EEN 437	Digital Control System	3+1	3	1
17	EET 321	EET 474	Digital Communication System	3+1	3	1
18	EEN 224	EEN 469	Linear Integrated Circuits and Applications	3+1	3	1
19	EEN 224	EEP 474	PLC and Industrial Drives	3+1	3	1
20	EEN 224	EEN 445	Industrial Electronics	3+1	3	1
21	None	EEN 434	Computer Networks	3+1	3	1

**D. IDEE Electives**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	None	ESC111	Basic Mechanical Engineering	2+0	2	0
2	None	GSC104	Surveying and Leveling	2+0	2	0
3	None	GSC486	Geographical Information System	2+0	2	0
4	None	ENV 440	Energy and Environment	2+0	2	0
5	None	EEA 430	Introduction to Mechatronics	3+0	3	0
6	None	EEN 438	Introduction to Biomedical Engineering	3+0	3	0
7	None	CSC 320	Operating Systems	3+0	3	0
8	None	CSC 419	Introduction to Machine Learning	3+0	3	0

## Course Outlines of Newly Added Courses

**Course Title:** Professional Psychology

**Course Code:** PSY 401

**Credit Hours:** (3)

**Pre-Requisite:** None

### Objectives:

This course will help increase in self-awareness, set and pursue meaningful goals, and develop positive personal qualities such as self-esteem, a positive attitude, self-discipline, and self-motivation. Furthermore, exploring personality, interests and values to increase self-understanding and select an appropriate major and career. Examine adult stages of development and develop a plan for wellness and living a long and healthy life. Learn strategies for motivation and stress management.

### Contents:

The History and Methods of Psychology, The Nature and Nurture of Behavior, Sensation, Perception, and Consciousness, Learning and Memory, Development, Social Psychology, Psychopathology

### Recommended Book(s):

- 1) Basic psychology, 5th edition by Henry Gleitman, Alan J. Fridlund and Daniel Reisberg.
- 2) Psychology by David G Myers.

### Reference Book(s):

- 1) Born to win by Muriel Dorothy Jongeward.
- 2) Transaction Analysis counseling in action, 2nd edition by Ian Stewart.
- 3) Psychology, 3rd edition by Robert J. Stenberg.
- 4) The Psychology of conflict and conflict management in organization by Carsten K W De Dreu and Michele J Gelfard.

**Course Title:** Leadership

**Course Code:** MGT 421

**Credit Hours:** (2)

**Pre-Requisite:** None

### Objectives:

In this course our purpose in learning about leaders and leadership would be to enable each one of us to become a better leader. The focus of the course is on leadership, and not on management. The thesis of the course is that all of us have the potential to be an authentic leader and all of us should commence the journey of leadership. The purpose is to explore who each individual is as a leader and on how they use different set of tools or techniques to develop leadership skills.

**Contents:** Basics of Leadership, Trait Approach, Skills Approach, Leadership Philosophies, Team Leadership, Advanced Leadership Skills, Supporting Skills.

### Recommended Book(s):

- 1) Northhouse, Peter, G. (2010) Leadership, 5th Ed., London: Sage.
- 2) Lussier, R. L. (2013) Effective Leadership, 5th Ed., Ohio: Thomson South-Western
- 3) Harvard Business Review Articles, Cases and Interview

**Reference Book(s):**

- 1) Kouzes, J. M. and Posner, B. Z. (2007), The Leadership Challenge, 4th Ed., CA: John Wiley & Sons, Inc.

**Course Title: Personal Grooming**

**Course Code: MGT 422**

**Credit Hours: (2)**

**Pre-Requisite: None**

**Objectives:**

The personal grooming course is a holistic approach to living a successful and composed life. Self-grooming is a broad term but encompasses some quite complex skills and understandings that only come with guidance, training, opportunity and experience.

**Contents:** Introduction to Personal-Grooming and Life Skills, Developing Self Awareness, Introduce Emotional Intelligence. Habits of Highly Effective People, Principles of self-management.

**Recommended Book(s):**

- 1) Strengths Finder 2.0, 2007. Tom Rath
- 2) The Seven Habits of Highly Effective People, 1989. Stephen R Covey

**Reference Book(s):**

- 3) HBR's 10 Must Reads on Managing Yourself, 2011

**Course Title: Engineering Economics**

**Course Code: MGT 424**

**Credit Hours: (3)**

**Pre-Requisite: None**

**Objectives:**

This course emphasizes the strong correlation between engineering design and manufacturing of products/systems and the economic issues they involve. The basic concepts of the time value of money and economic equivalence is applied throughout the course. Each engineering problem/project progressively incorporates different cash flows, the cost of funds, capital, operational and maintenance costs, salvage value, depreciation, amortization, and taxation.

**Contents:** Engineering Economic Decisions, Interest Rate and Economic Equivalence, Understanding Money and Its Management, Present Worth Analysis, Annual Equivalent-Worth Analysis, Rate of Return Analysis, Cost Concepts Relevant to Decision Making, Depreciation and Corporate Taxes, Developing Project Cash Flows, Project Risk and Uncertainty.

**Recommended Book(s):**

- 1) Contemporary Engineering Economics by Chan S. Park, 6th edition, Pearson 2015, ISBN: 978-0134105598
- 2) Engineering Economic Analysis by Donal G. Newnan, Jerome P. Lavelle, Ted G. Eschenbach, 12<sup>th</sup> edition, Oxford University Press, ISBN: 978-0199339273
- 3) Engineering Economy by Leland T. Blank and Anthony Tarquin

**Reference Book(s):**

- 4) Chan S. Park, Contemporary Engineering Economics, 5th ed., Pearson Prentice Hall, 2010.

**Course Title: Project Management in Engineering**

**Course Code:** MGT 425

**Credit Hours:** (3)

**Pre-Requisite:** None

**Objectives:**

This course provides engineering students with a comprehensive understanding of how to plan, optimize and efficiently manage projects (or tasks) to implement products, services or developments. This includes building the structure, processes, components and linkages with a team for successful project delivery within schedule, budget and quality requirements.

**Contents:** Introduction to Project Management, Project Quality Management, Project Stakeholder Management, Project Cost Management, Project HRM and Communication Management, Project Integration, Time Management, Cost Management, Risk Management and Project Closure Management.

**Recommended Book(s):**

- 1) Project Management: A System Approach to Planning Scheduling and Controlling by Harold Kerzner, 11th edition, John Willey 2013, ISBN: 978-1-118-02227-6.
- 2) Project Management: A managerial approach 7th edition, Jack R. Meredith and Samuel J. Mantel, Jr. John Wiley and Sons, Inc. Project Management for Business, ISBN: 13 978-0-470-22621-6

**Reference Book(s):**

- 3) P.D. Gardiner, Project Management - A Strategic Planning Approach, Palgrave Macmillan, 2005.
- 4) J.R. Meredith and S.J. Mantel Project management: a managerial approach (9th Edition), Wiley, Chichester, 2015.

**Course Title: Engineering Management**

**Course Code:** MGT 423

**Credit Hours:** (3)

**Pre-Requisite:** None

**Objectives:**

This course includes group decision-making, the development of the individual, and the importance of communication and interpersonal skills in the engineering environment. Students gain an understanding of work preferences and personal interactions through self-analysis, experience and reflection. In addition students are introduced to a range of business management topics including, but not limited to, contract law, competition law and professional ethics.

**Contents:** Teamwork Sessions, Organization strategy and project selection, Strategy and Long-Term Planning, Financial Reporting.

**Recommended Book(s):**

Engineering Design, Planning, and Management – Hugh Jack

**Reference Book(s):**

Gemba Kaizen: A Common sense Approach to a Continuous Improvement Strategy, Second Edition 2nd Edition - Masaaki Imai

**Course Title: Introduction to Machine Learning**

**Course Code:** CSC 419

**Credit Hours:** (3)

**Pre-Requisite:** None

**Objectives:**

This course will provide a basic introduction to machine learning and statistical pattern recognition. Algorithms based on machine learning will be discussed in this course. In this course recent applications of machine learning, such as to robotic control, data mining, etc. will also be discussed.

**Contents:** Supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, neural networks). Unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning). Best practices in machine learning (bias/variance theory; innovation process in machine learning and AI).

**Recommended Book(s):**

- 1) Machine Learning: a Probabilistic Perspective by Kevin Patrick Murphy.

**Reference Book(s):**

- 1) Understanding Machine Learning by Shai Shalev-Shwartz and Shai Ben-David
- 2) Pattern Recognition and Machine Learning by Christopher Bishop.

**Policy for Registration & Completion of Deficiency Courses in MS Degree Programs of Engineering & Computer Science Departments – Faculty of Engineering Sciences**

1. Pre-requisite/deficiency course(s) are to be assigned by the Admission Committee (as per the approved roadmap of the concerned program) and notified by the department to student, Dir Campus, Dir PGP, Dir Admission, Dir Exam and Dean ES.
2. The student must register deficiency course(s) with the undergraduate degree programs of Bahria University.
3. The student shall be offered provisional admission in the relevant MS program subject to successful completion of deficiency course(s) within a maximum duration of 1 year.
4. The provisional admission of the student will be cancelled, if he/she is unable to complete deficiency course(s) within one year.
5. The student shall pay deficiency courses fee as per undergraduate program fee structure.
6. The deficiency courses shall be recorded on transcript as PASS / FAIL. The passing marks for the deficiency courses shall be as per BU undergraduate rules.
7. The students shall also be required to complete (register and pass) the lab component of the course separately, if assigned by the admission committee.
8. The deficiency course(s) shall not be included in CGPA calculations of the degree program.
9. The UG semester rules shall be applicable to the student including registration, attendance, examinations etc.
10. The Student can register and complete their deficiency course(s) by adopting either of the following methods:

**Method – 1 (Completion of deficiency courses prior to starting MS degree)**

- i. A student can't register in MS degree program until (s)he successfully completes the deficiency course(s).
- ii. Temporary enrollment shall be assigned to the student for the completion of deficiency course(s).
- iii. The duration to complete deficiency course(s) shall not be considered (counted) towards maximum duration for completion of the MS degree program.
- iv. The student completing their deficiency course(s) prior to starting MS degree shall be eligible for honors and awards as per BU rules.

**Method – 2 (Completion of deficiency courses along with MS degree)**

- i. Based on Admission Committee recommendations, student can register in those MS courses for which (s)he has already studied the pre-requisites in their previous degree.
- ii. To complete deficiency course(s) within one year of registering in the MS program, the student shall be allowed to register four courses per semester.
- iii. The student registering in deficiency course(s) along with MS degree shall not be eligible for honors and awards of MS degree program.

**Appendage 3225****REVIEW OF COURSE CODE - BS MEDIA STUDIES**

Campus: Karachi  
 Department: Media Studies  
 Program Title: Media Studies  
 Program Level: BS / MS  
 Total Duration of Program: 4 years / 2 Years  
 Total Number of semesters: 8 semesters / 4 Semesters

**Semester – 1**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 101	Functional English	3	✓	-
2		MED 103	Pakistan Studies	2	✓	-
3		MED 105	International Relations*	3	✓	-
4		MED 107	Introduction to Mass Communication	3	✓	✓
5		MED 109	Computer Skills for Mass Communication	3	✓	✓
6		MED 111	Photography	3	✓	✓
<b>Total Credit Hours in Semester -1</b>				<b>17</b>		

\*MED – Elective General

**Semester – 2**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 102	Writing and Presentation Skills	3	✓	✓
2		MED 104	Islamic Studies	2	✓	-
3		MED 106	Mathematics	3	-	-
4		MED 108	Sociology	3	-	-
5		MED	ELECTIVE FOUNDATION	3	-	-
6		MED	ELECTIVE FOUNDATION	3	-	-
<b>Total Credit Hours in Semester -2</b>				<b>17</b>		

**Semester – 3**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 201	Statistics	3	-	-
2		MED 203	Communication Skills	3	✓	✓
3		MED 205	Political Science	3	-	-
4		MED 207	Social Psychology	3	-	-
5		MED 209	Journalistic Language	3	✓	✓
6		MED 211	Introduction to Broadcast Media	3	✓	✓
<b>Total Credit Hours in Semester -3</b>				<b>18</b>		

**Semester – 4**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 202	Functional Urdu*	3	✓	✓
2		MED 204	Introduction to Advertising and Public Relations	3	✓	✓
3		MED 206	Current Affairs	3	✓	✓
4		MED 208	Introduction to Digital Media	3	✓	✓
5		MED 210	News Writing and Reporting	3	✓	✓
6		MED 212	Philosophy*	3	✓	-
<b>Total Credit Hours in Semester -4</b>				<b>18</b>		

\*MED – Elective General

**Semester – 5**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 301	Sub Editing and Page Designing	3	✓	✓
2		MED 303	Mass Communication Theories	3	✓	-
3		MED 305	Script Writing and Editing	3	✓	✓
4		MED 307	Elements of Advertising	3	✓	✓
5		MED	ELECTIVE I	3	-	-
6		MED	ELECTIVE II	3	-	-
<b>Total Credit Hours in Semester -5</b>				<b>18</b>		

**Semester – 6**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 302	Feature, Column, and Editorial Writing	3	✓	✓
2		MED 304	Research Methods	3	✓	-
3		MED 306	Photojournalism	3	✓	✓
4		MED	ELECTIVE I	3	✓	✓
5		MED	ELECTIVE II	3	✓	✓
6		MED	ELECTIVE III	3	✓	✓
<b>Total Credit Hours in Semester -6</b>				<b>18</b>		

**Semester – 7**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 401	Online Journalism	3	✓	✓
2		MED 403	Media Ethics and Law	3	✓	-
3		MED 405	Economics	3	✓	-
4		MED 407	Statistical Analysis of Social Data*	3	✓	✓
5		MED	SPECILIZATION COURSE I	3	✓	✓
6		MED	SPECILIZATION COURSE II	3	✓	✓
<b>Total Credit Hours in Semester -7</b>				<b>18</b>		

\*MED – Elective General

**Semester – 8**

Sr. No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1		MED 402	Research Report/Final Project/Research Article	3	-	✓
2		MED 404	Development Support Communication	3	✓	✓
3		MED	SPECILIZATION COURSE III	3		
4		MED	SPECILIZATION COURSE IV	3		
<b>Total Credit Hours in Semester -8</b>				<b>12</b>		

**MED 461: Internship (Non-Credited) to be completed from 6<sup>th</sup> to 8<sup>th</sup> Semester CSP Hours to be completed before 8<sup>th</sup> Semester.**

Semester	Course Title	Course Code	Credit Hours
<b>SEMESTER III &amp; SEMESTER IV (COMPULSARY)</b>			
	Thesis Proposal Writing / Literature Review / Thesis Writing	MSM 608 & MSM 609	6
<b>Gross Total Credit Hors</b>			<b>30</b>

**List of HEC Suggested Compulsory and Elective (Optional) Courses**

**Compulsory Courses as per HEC**

S. No	Course Code	Course Title	Credit Hours
1	MSM 600	Approaches to Mass Communication - I	3
2	MSM 601	Approaches to Mass Communication - II	3
3	MSM 602	Communication Research Methods - I	3
4	MSM 603	Communication Research Methods - II	3
5	MSM 607	M. Phil Seminar	3
S. No	Course Code	Course Title	Credit Hours
1	MSM 610	Mass Media, Culture & Society	3
2	MSM 604	International Communication	3
3	MSM 611	Researches in Development Communication	3
4	MSM 612	Philosophy of Social Sciences	3
5	MSM 613	Media Effect: Advances in theory and Practice	3
6	MSM 614	Media and Politics	3
7	MSM 615	Researches in Digital Media	3
8	MSM 616	Semiotics	3

**Review of Road Map - LLM International and Maritime Laws**

Bahria University, Islamabad

Campus:	BUIC
Department:	LAW
Program Title:	LL.M International and Maritime Law
Program Level:	Post graduate Program
Total Duration of Program:	2 Years Program
Total Number of semesters:	4 Semesters

**Semester-1**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	Not Applicable	LLM 700	RESEARCH METHODOLOGY	3	Nil	Nil
2	Not Applicable	LLM 714	INTERNATIONAL TRADE LAW	3	Nil	Nil
3	Not Applicable	LLM 741	INTERNATIONAL MARITIME LAW	3	Nil	Nil
4	Not Applicable	LLM 742	CARRIAGE OF GOODS BY SEA	3	Nil	Nil
<b>Total Credit Hours in Semester-1</b>				12		

**Semester-2**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	Not Applicable	LLM ***	Elective-I	3	Nil	Nil
2	Not Applicable	LLM ***	Elective-II	3	Nil	Nil
3	Not Applicable	LLM ***	Elective-III	3	Nil	Nil
4	Not Applicable	LLM ***	Elective-IV	3	Nil	Nil
<b>Total Credit Hours in Semester-2</b>				12		

**Semester-3**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	Not	LLM 725	THESIS-I	3	Nil	Nil

	Applicable					
			<b>Total Credit Hours in Semester-3</b>	3		

**Semester-4**

Sr.No.	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1	Not Applicable	LLM 725	THESIS-II	3	Nil	Nil
			<b>Total Credit Hours in Semester-4</b>	3		

**List of Elective Courses**

Sr.No	Pre-requisite course code	Course Code	Course Title	Credit Hours	Theory	Practical
1.	N/A	LLM 701	ADMINISTRATIVE LAW	3	Nil	Nil
2.	N/A	LLM 702	ALTERNATE DISPUTE RESOLUTION	3	Nil	Nil
3.	N/A	LLM 703	BANKING BLAW	3	Nil	Nil
4.	N/A	LLM 704	COMMERCIAL/BUSINESS LAW	3	Nil	Nil
5.	N/A	LLM 705	COMPANY/ CORPORATE LAW	3	Nil	Nil
6.	N/A	LLM 706	COMPARATIVE CONSTITUTIONAL LAW	3	Nil	Nil
7.	N/A	LLM 707	COMPARATIVE ENVIRONMENTAL LAW	3	Nil	Nil
8.	N/A	LLM 708	COMPARATIVE HUMAN RIGHTS LAW	3	Nil	Nil
9.	N/A	LLM 709	COMPARATIVE STUDY OF ISLAMIC AND WETERN JURISPRUDENCE	3	Nil	Nil
10.	N/A	LLM 710	CONSTITUTIONAL LAW OF PAKISTAN	3	Nil	Nil
11.	N/A	LLM 711	CRIMINOLOGY	3	Nil	Nil
12.	N/A	LLM 712	INTELLECTUAL PROPERTY LAWS	3	Nil	Nil

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13.	N/A	LLM 713	INTERNATIONAL ECONOMIC LAW	3	Nil	Nil
14.	N/A	LLM 715	ISLAMIC LAW	3	Nil	Nil
15.	N/A	LLM 716	LABOUR LAW	3	Nil	Nil
16.	N/A	LLM 717	LAW AND POLITICS	3	Nil	Nil
17.	N/A	LLM 718	LAW AND SOCIETY IN SOUTH ASIA	3	Nil	Nil
18.	N/A	LLM 719	LAW OF EVIDENCE	3	Nil	Nil
19.	N/A	LLM 720	LAW OF INTERNATIONAL INSTITUTIONS	3	Nil	Nil
20.	N/A	LLM 721	LAW OF TAXATION	3	Nil	Nil
21.	N/A	LLM 722	LEGAL HISTORY OF PAKISTAN AND INDIA	3	Nil	Nil
22.	N/A	LLM 723	SHIPPING LAW	3	Nil	Nil
23.	N/A	LLM 724	WESTERN JURISPRUDENCE AND LEGAL THEORY	3	Nil	Nil
24.	N/A	LLM 726	CYBER SPACE LAW: INTERNET JURISDICTION AND DISPUTE RESOLUTION	3	Nil	Nil
25.	N/A	LLM 727	CYBERCRIME: INTERNATIONAL COOPERATION AND DIGITAL INVESTIGATIONS	3	Nil	Nil
26.	N/A	LLM 728	E-COMMERCE LAWS	3	Nil	Nil
27.	N/A	LLM 729	MEDIA LAWS	3	Nil	Nil
28.	N/A	LLM 730	GLOBAL SECURITY & HUMAN RIGHTS LAW	3	Nil	Nil
29.	N/A	LLM 731	INTERNATIONAL REFUGEE LAW	3	Nil	Nil
30.	N/A	LLM 732	INTERNATIONAL INVESTMENT LAW	3	Nil	Nil
31.	N/A	LLM 733	COMPARATIVE CRIMINAL JUSTICE	3	Nil	Nil
32.	N/A	LLM 734	INTERNATIONAL HUMANITARIAN LAW	3	Nil	Nil
33.	N/A	LLM 735	IMMIGRATION LAW	3	Nil	Nil

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34.	N/A	LLM 736	LAW OF TREATISE	3	Nil	Nil
35.	N/A	LLM 737	ISLAMIC LAW OF WAR AND PEACE	3	Nil	Nil
36.	N/A	LLM 738	INTERNATIONAL CRIMINAL LAW	3	Nil	Nil
37.	N/A	LLM 739	ENERGY AND CLIMATE CHANGE LAW	3	Nil	Nil
38.	N/A	LLM 743	INTERNATIONAL COMMERCIAL ARBITRATION	3	Nil	Nil
39.	N/A	LLM 744	COMMERCIAL CONFLICT OF LAWS	3	Nil	Nil
40.	N/A	LLM 745	SHIPPING CONTRACTS	3	Nil	Nil
41.	N/A	LLM 746	MARINE INSURANCE	3	Nil	Nil
42.	N/A	LLM 747	LAW OF MARINE ENVIRONMENT	3	Nil	Nil
43.	N/A	LLM 748	CRIMES AT SEA	3	Nil	Nil
44.	N/A	LLM 749	ADMIRALTY AND JURISDICTION	3	Nil	Nil

**COURSE DESCRIPTION**

Name of Course: **Islamic Approaches to Psychology and Psychotherapy**  
 Credit Hour: 03  
 Course Code: IPP 450

This course examines the emergence of Islamic thought and the development of psychological perspectives in both historical and contemporary aspects involving the understanding of human nature and personality development in the Islamic context. Mental health and healing will be explored through Islamic perspectives and clinical areas of mental health interviewing, case conceptualization, assessment and psychotherapy will be focused through the Islamic Counseling Practice Model. Special Issues with reference to Islamic Approaches to Wellness and a comparison of Islamic versus Western Medical Ethics are also included.

**COURSE OBJECTIVES**

- To identify and describe Islamic models of the self.
- To describe the therapeutic relationship from an Islamic perspective.
- To identify a range of Islamic perspectives on mental health diagnosis
- To identify therapeutic aims and objectives of Islamic psychology/counselling.

**COURSE OUTCOMES**

After completing this course students will:

- Be able to apply Islamic models of the self for self-growth and development
- Ascribe and foster therapeutic relationships from an Islamic perspective.
- Proficiently use Islamic perspectives for the diagnosis of mental health symptoms
- Apply therapeutic principles of Islamic psychology/counselling in therapeutic settings.

Weeks	Topics
<b>1<sup>st</sup> Week</b>	<b>Emergence of Islamic Psychology</b> <ul style="list-style-type: none"> <li>• Historical Perspectives</li> <li>• Contributions of Early Muslim Scholars</li> <li>• Challenges to Contemporary Muslim Psychologists</li> </ul>
<b>2<sup>nd</sup> Week</b>	<b>Understanding Human Nature and Personality Development in the Islamic Context</b>
<b>3<sup>rd</sup> &amp; 4<sup>th</sup> Weeks</b>	<b>Conceptualizations of Mental Health, Illness and Healing in the Islamic Perspective</b>
<b>5<sup>th</sup> &amp; 6<sup>th</sup> Weeks</b>	<b>Islamic Principles of the Mental Health Interview and Case Conceptualization</b> <ul style="list-style-type: none"> <li>• Coping and Positive Emotions</li> <li>• Cultural Formulation</li> </ul>
<b>7<sup>th</sup> &amp; 8<sup>th</sup> Weeks</b>	<b>Psychological Testing and Assessment</b>

<b>MIDTERM EXAMINATION</b>	
<b>Weeks</b>	<b>Topics</b>
<b>10<sup>th</sup> Week</b>	<b>Psychotherapy, Religiosity and Spirituality</b>
<b>11<sup>th</sup> &amp; 12<sup>th</sup> Weeks</b>	<b>Islamic – Based Interventions</b> <ul style="list-style-type: none"> <li>• The Islamic ABC Strategy</li> <li>• Towards an Islamic Counseling Practice Model</li> </ul>
<b>13<sup>th</sup> &amp; 14<sup>th</sup> Weeks</b>	<b>Special Issues and Islamic Approaches to Wellness</b> <ul style="list-style-type: none"> <li>• Substance Abuse</li> <li>• Domestic Violence</li> <li>• Sexuality and Sexual Dysfunctions</li> </ul>
<b>15<sup>th</sup> &amp; 16<sup>th</sup> Weeks</b>	<b>Islamic versus Western Medical Ethics</b>

**REFERENCE BOOKS:**

- Ahmed, S. & Amer, M.M. (Eds.) (2012). Counseling Muslims: Handbook of Mental Health Issues and Interventions. Routledge. Taylor and Francis Group.
- Badri, M.(2018). Culture and Islamic Adaptation Psychology. Humanology.
  - Husain, A. (2006). Islamic Psychology: Emergence of a New Field. Global Vision Publishing House
  - Koenig H.G. (2005). Faith and Mental Health. Religious Resources for Healing. Templeton Foundation Press.

**GRADING PLAN:**

▪ Quizzes	15%
▪ Assignments / Presentations	25%
▪ Mid Term Exam	25%
▪ Final Exam	40%
▪ Total	100%

**IMPORTANT NOTE:**

Attendance: - Maximum absences allowed is 20% More than 20% will earn the student a failing grade.

**COURSE DESCRIPTION**

Name of Course: **Maritime Psychology**

Credit Hour: **03**

Course Code: **MPY 439**

This course equips students with the knowledge and skills to help them analyze psychological aspects of the maritime and offshore industries. It includes areas relevant to overall conceptualization including Scope of Maritime Psychology and the Human Impact on Ecosystems while providing greater focus on Health and Mental Health related aspects of seafaring. Psychological assessment of Mariners will be examined while interventions of Positive Psychology, Wellbeing, and Sailing as an Intervention will also be explored. Additionally, the course will also include Safety – Critical learning and Risk Communication and Management during Maritime Disasters.

**COURSE OBJECTIVES**

1. To analyze psychological aspects of the maritime and offshore industries.
2. To understand and work with interpersonal and international cultural skills in the maritime industries.

**COURSE OUTCOMES**

After completing this course students will:

1. Have the necessary knowledge and skills to help them analyze psychological factors of the maritime and offshore industries
2. Be able to work with interpersonal and international cultural skills essential for professional involvement in the maritime industries

Weeks	Topics
<b>1<sup>st</sup> Week</b>	<b>Maritime Psychology</b> <ul style="list-style-type: none"> <li>• Conceptualization</li> <li>• Scope of Maritime Psychology</li> </ul> <b>Psychology of Ship Design</b>
<b>2<sup>nd</sup> Week</b>	<b>Human Impact on Marine Ecosystems</b>
<b>3<sup>rd</sup> &amp; 4<sup>th</sup> Weeks</b>	<b>Health Issues in Seafaring</b> <ul style="list-style-type: none"> <li>• Occupational Stress</li> <li>• Motion Sickness Susceptibility and Management at Sea</li> <li>• Risk factors for Fatigue and Preventive Intervention</li> </ul>
<b>5<sup>th</sup> &amp; 6<sup>th</sup> Weeks</b>	<b>Seafaring and Mental Health Issues</b>
<b>7<sup>th</sup> &amp; 8<sup>th</sup> Weeks</b>	<b>Psychometric Assessment of Mariners</b>

**MIDTERM EXAMINATION**

Weeks	Topics
<b>10<sup>th</sup> &amp; 11<sup>th</sup> Week</b>	<b>Positive Psychology and Wellbeing in Seafaring</b>
<b>12<sup>th</sup> Week</b>	<b>Sailing as an Intervention</b>
<b>13<sup>th</sup> &amp; 14<sup>th</sup> Weeks</b>	<b>Transferring Learning Across Safety - Critical Industries</b>
<b>15<sup>th</sup> &amp; 16<sup>th</sup> Weeks</b>	<b>Risk Communication and Management During Maritime Disasters</b>

**REFERENCE BOOKS:**

MacLachlan, M. (2017). **Maritime Psychology: Research in Organizational & Health Behavior at Sea.** Springer.

- Stadler, M. (1987). The Psychology of Sailing: The Sea's Effects on Mind and Body. International Marine Publishing Company.

Relevant Links

- [http://www.un.org/depts/los/global\\_reporting/WOA\\_RPROC/Chapter\\_54.pdf](http://www.un.org/depts/los/global_reporting/WOA_RPROC/Chapter_54.pdf)

**GRADING PLAN:**

▪ Quizzes	15%
▪ Assignments / Presentations	25%
▪ Mid Term Exam	25%
▪ Final Exam	40%
▪ Total	100%

**IMPORTANT NOTE:**

Attendance: - Maximum absences allowed is 20% More than 20% will earn the student a failing grade.

**Appendage 3229****CHANGE OF FORMAT OF MBA (PHARMACEUTICAL & HEALTH MANAGEMENT) 2.0 YEARS WEEKEND TRIMESTER TO BI-SEMESTER****SEMESTER 1**

S. No	Course Code	Course Title	Credit Hours
1	MKT 523	Principles of Marketing	3
2	ACC 501	Financial Accounting	3
3	MGT 501	Theories and Practices of Management	3
4	BCM 512	Business Communication	3

**SEMESTER 2**

S. No	Course Code	Course Title	Credit Hours
1	ECO 520	Economics	3
2	FIN 502	Financial Management	3
3	MGT 541	Human Resource Management	3
4	QTM 520	Bio Statistics	3

**SEMESTER 3**

S. No	Course Code	Course Title	Credit Hours
1	MGT 653	Corporate Leadership and Social Responsibilities	3
2	RMT 620	Methods In Business Research	3
3	MGT 662	Strategic Management	3
4	FIN 622	Project Management	3

**SEMESTER 4**

S. No	Course Code	Course Title	Credit Hours
1	HBM 615	Principles of Health Care Management	3
2	HBM/PBM 620	Regularity Affairs & Health Care Ethics	3
3		Elective – 1	3

**SEMESTER 5**

S. No	Course Code	Course Title	Credit Hours
1	HBM/PBM 630	MIS in Health Care Management	3
2	PBM 635	Pharmaceutical Business Development & Global Business Environment	3
3		Elective – 2	3

**SEMESTER 6**

S. No	Course Code	Course Title	Credit Hours
1		Elective – 3	3
2	SDW 699	Project/Thesis	3

**REVISED ROAD MAP ON BI-SEMESTER BASIS****MBA 2 YEARS (PHARMACEUTICAL & HEALTH MANAGEMENT), WEEKEND, 60 Cr. Hrs****SEMESTER 1**

S. No	Course Code	Course Title	Credit Hours
1	MKT 522	Principles of Marketing	3
2	ACC 501	Financial Accounting	3
3	MGT 501	Theories and Practices of Management	3
4	BCM 512	Business Communication	3
5	ECO 520	Economics	3

**SEMESTER 2**

S. No	Course Code	Course Title	Credit Hours
1	FIN 502	Financial Management	3
2	MGT 541	Human Resource Management	3
3	QTM 520	Bio Statistics	3
4	FIN 611	Project Management	3
5	RMT 620	Methods In Business Research	3

**SEMESTER 3**

S. No	Course Code	Course Title	Credit Hours
1	MGT 653	Corporate Leadership and Social Responsibilities	3
2	MGT 662	Strategic Management	3
3	HBM/PBM 630	MIS in Health Care Management	3
4	HBM 615	Principles of Health Care Management	3
5		Elective - 1	3

**SEMESTER 4**

S. No	Course Code	Course Title	Credit Hours
1	PBM 635	Pharmaceutical Business Development & Global Business Environment	3
2	HBM/PBM 620	Regularity Affairs & Health Care Ethics	3
3		Elective - 2	3
4		Elective - 3	3
5	SDW 699	Project/Thesis	3

**CHANGE OF FORMAT OF MBA (LOGISTICS & MARITIME MANAGEMENT) AND EMBA  
(LOGISTICS & PORT MANAGEMENT) WEEKEND FROM TRIMESTER TO BI-SEMESTER**

**Semester 1**

SNO	Course code	Course Title	Credit Hours
1	MTM 501	Fundamentals of Maritime Sector	3
2	MTM 503	Port Development, Operations& Management	3
3	MTM 514	Admiralty, Shipping &Marine Environmental Law	3
4	BCM 512	Business Communication	3
5	ACC 501	Financial Accounting	3

**Semester 2**

6	MTM 504	Shipping Operations& Management	3
7	MGT 510	Theories & practices of Mgt	3
8	MKT 510	Principles of Marketing	3
9	QTM 503	Stats & Maths for Management	3
10	MGT 541	Human Resource Management	3

**Semester 3**

11	MGT 626	Project Management	1.5
12	MTM 508	Logistics, Supply Chain Management & Methods	1.5
13	RMT 620	Methods in Business Research	3
14	ECO 520	Economics	3
15		Maritime Elective 1	3
16	RMT 698	Dissertation-I (Proposal Development)	3

**Semester 4**

17	MKT 630	International Business Analysis	3
18	MGT 662	Strategic Management	3
19		Maritime Elective 2	3
20		Maritime Elective 3	3
21	RMT 698	Dissertation-II (Thesis Composition)	3

**OLD ROADMAP MBA (LOGISTICS & MARITIME MANAGEMENT)  
2.0 YEARS – 60 CREDIT HOURS**

**Semester 1**

SNO	Course code	Course Title	Credit Hours
1	MTM 501	Fundamentals of Maritime Sector	3
2	MTM 503	Port Development, Operations& Management	3

Minutes of the 32<sup>nd</sup> ACM

3	MTM 514	Admiralty, Shipping & Marine Environmental Law	3
4	BCM 512	Business Communication	3

**Semester 2**

5	MTM 504	Shipping Operations & Management	3
6	ACC 501	Financial Accounting	3
7	MGT 510	Principles of Management	3
8	MKT 510	Principles of Marketing	3

**Semester 3**

9	MTM 508	Logistics, Supply Chain Management & Methods	3
10	QTM 503	Stats & Maths for Management	3
11	ECO 520	Economics	3
12	MGT 541	Human Resource Management	3

**Semester 4**

13	MKT 630	International Business Analysis	3
14	RMT 620	Methods in Business Research	3
15	MGT 662	Strategic Management	3
16		Maritime Elective 1	3

**Semester 5**

17	MGT 626	Project Management	3
18		Maritime Elective 2	3
19		Maritime Elective 3	3

**Semester 6**

20	RMT 698	Project/Thesis	3
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**REVISED ROADMAP MBA (LOGISTICS & MARITIME MANAGEMENT)**

**3 ½ YEARS – 96 CREDIT HOURS**

**Semester 1**

SNO	Course code	Course Title	Credit Hours
1	BEN 511	Business English	3
2	MGT 510	Theories & practices of Mgt	3
3	ACC 501	Financial Accounting	3
4	MKT 510	Principles of Marketing	3
5	ECO 520	Economics	3

**Semester 2**

6	MTM 514	Fundamentals of Maritime Sector	3
7	MTM 501	Admiralty, Shipping & Marine Environmental Law	3
8	MTM 503	Port Development, Operations & Management	3
9	MKT 522	Marketing Management	3
10	BCM 512	Business Communication	3

**Semester 3**

11	MTM 504	Shipping Operations& Management	3
12	MTM 508	Logistics, Supply Chain Management & Methods	3
13	MGT 508	Corporate Law	3
14	MGT 530	Organizational Behaviour	3
15	MKT 640	Stats and Maths for Management	3

**Semester 4**

16	MKT 630	International Business Analysis	3
17	MGT 541	Human Resource Management	3
18	MKT 640	Entrepreneurship	3
19	MGT 615	Total Quality Management	3
20	RMT 620	Methods in Business Research	3

**Semester 5**

21	RMT 621	Operations Research	3
22	MGT 652	Leadership	3
23	HRM 652	People & Organizations	3
24	MKT 600	Contemporary Issues in Business	3
25		Maritime Elective 1	3

**Semester 6**

26	MGT 626	Project Management	3
27	MGT 662	Strategic Management	3
28		Maritime Elective 2	3
29		Maritime Elective 3	3
30		Dissertation-I (Proposal Development)	2

**Semester 7**

31		Maritime Elective 4	3
32	RMT 698	Dissertation-II(Thesis write-up & defense)	4

**OLD ROADMAP MBA (LOGISTICS & MARITIME MANAGEMENT)**

**3 ½ YEARS – 96 CREDIT HOURS**

**Semester 1**

SNO	Course code	Course Title	Credit Hours
1	BEN 511	Business English	3
2	MGT 510	Principles of Management	3
3	ACC 501	Financial Accounting	3
4	MKT 510	Principles of Marketing	3

**Semester 2**

5	BCM 512	Business Communication	3
6	ECO 520	Economics	3
7	MTM 501	Fundamentals of Maritime Sector	3
8	MTM 503	Port Development, Operations& Management	3

**Semester 3**

9	MTM 514	Admiralty, Shipping & Marine Environmental Law	3
10	MKT 522	Marketing Management	3
11	MGT 508	Corporate Law	3
12	MGT 530	Organizational Behaviour	3

**Semester 4**

13	MTM 504	Shipping Operations& Management	3
14	QTM 503	Stats and Maths for Management	3
15	MKT 640	Entrepreneurship	3
16	MGT 615	Total Quality Management	3

**Semester 5**

17	MKT 630	International Business Analysis	3
18	MGT 541	Human Resource Management	3
19	RMT 621	Operations Research	3
20	RMT 620	Methods in Business Research	3

**Semester 6**

21	MGT 652	Leadership	3
22	HRM 652	People & Organizations	3
23	MKT 600	Contemporary Issues in Business	3
24		Maritime Elective 1	3

**Semester 7**

25	MTM 508	Logistics, Supply Chain Management & Methods	3
26	MGT 626	Project Management	3
27	MGT 662	Strategic Management	3
28		Maritime Elective 2	3

**Semester 8**

29		Maritime Elective 3	3
30		Maritime Elective 4	3
31	RMT 697	Dissertation-I (Proposal Development)	3

**Semester 9**

32	RMT 698	Dissertation-II	3
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**REVISED ROADMAP EXECUTIVE MBA (LOGISTICS & PORT MANAGEMENT)**  
**2 YEARS – 60 CREDIT HOURS**

**Semester 1**

S No	Course code	Course Title	Credit Hours
1	MTM 501	Fundamentals of Maritime Sector	3
2	MTM 503	Port Development, Operations& Management	3
3	MTM 514	Admiralty, Shipping & Marine Environmental Law	3
4	BEN 511	Business English	3
5	MTM 504	Shipping Operations& Management	3

**Semester 2**

6	MGT 510	Theories & practices of Mgt	3
7	ACC 501	Financial Accounting	3
8	MTM 508	Logistics, Supply Chain Management & Methods	3
9	BCM 512	Business Communication	3
10		Maritime Elective 1	3

**Semester 3**

11	MKT 510	Principles of Marketing	3
12	QTM 503	Stats & Maths for Management	3
13	RMT 620	Methods in Business Research	3
14		Maritime Elective 2	3
15	MGT 541	Human Resource Management	3

**Semester 4**

16	MGT 626	Project Management	3
17	ECO 520	Economics	3
18	MGT 662	Strategic Management	3
19		Maritime Elective 3	3
20	RMT 698	Dissertation-II(Thesis write-up & defense)	3

**OLD ROADMAP EXECUTIVE MBA (LOGISTICS & PORT MANAGEMENT)**  
**2 YEARS – 69 CREDIT HOURS**

**Semester 1**

S No	Course code	Course Title	Credit Hours
1	MTM 501	Fundamentals of Maritime Sector	3
2	MTM 503	Port Development, Operations& Management	3
3	MTM 514	Admiralty, Shipping & Marine Environmental Law	3
4	BEN 511	Business English	3

**Semester 2**

5	MTM 504	Shipping Operations& Management	3
6	MGT 510	Principles of Management	3
7	ACC 501	Financial Accounting	3
8		Maritime Elective 1	3

**Semester 3**

9	MTM 508	Logistics, Supply Chain Management & Methods	3
10	BCM 512	Business Communication	3
11		Maritime Elective 2	3

**Semester 4**

12	MKT 510	Principles of Marketing	3
13	ECO 520	Economics	3
14	QTM 503	Stats & Maths for Management	3
15	MGT 530	Organizational Behaviour	3

**Semester 5**

16	MKT 522	Marketing Management	3
17	RMT 620	Methods in Business Research	3
18	MGT 541	Human Resource Management	3
19		Maritime Elective 3	3

**Semester 6**

20	MGT 662	Strategic Management	3
21	MGT 626	Project Management	3
22	MKT 630	International Business Analysis	3
23	RMT 698	Project Thesis	3



## **BS (Accounting and Finance) Road Map**

**OLD ROADMAP****Fifth Semester**

1	ACC 304	Advanced Managerial Accounting	Accounting C 5
2	ACC 305	Financial Reporting	Accounting C 6
3	FIN 304	Alternative Investment	Finance C 4
4	FIN 305	Behavioral Finance	Finance C 5
5	FIN 306	Financial Modeling	Finance C 6

**Six Semester**

1	ACC 306	Auditing	Accounting C 7
2	FIN 308	Corporate Finance	Finance C 7
3	MGT 301	Corporate Law	Accounting E 1
4	FIN 309	Treasury and Funds Management	Finance E 1
5	HSS 111	HSS 3 (Introduction to International Relations)	Non-Spec 11

**Seven Semester**

1	ACC 407	Advanced Financial Reporting	Accounting E 2
2	FIN 310	Advanced Portfolio Management	Finance E 1
3		Elective-1	
4		Elective-2	
5		Econometrics	

**Eight Semester**

1		Project	4 credit hours
2		Elective-3	
3		Elective-4	
4		Elective-5	
5		Elective-6	

**BS (Accounting and Finance)  
Electives, Institute of  
Bankers Pakistan**

**OLD ROADMAP**

	<b>Course Code</b>	<b>List of Accounting Electives</b>
1	ACC 611	Corporate Governance
2	ACC 612	Accounting Information System with SAP
3	ACC 613	Corporate Financial Reporting 1
4	ACC 614	Corporate Financial Reporting 2
5	ACC 615	Strategic Management Accounting and Control
6	ACC 616	Tax Management and Optimization
7	ACC 617	Actuarial Accounting
8	ACC 618	Budgeting
9	ACC 619	Merger and Acquisition Accounting

	<b>Course Code</b>	<b>List of Finance Electives</b>
1	FIN 611	Financial Econometrics
2	FIN 612	Financial Restructuring
3	FIN 613	Derivatives
4	FIN 614	International Finance
5	FIN 615	Islamic Banking and Finance
6	FIN 616	Analysis of Financial Time Series
7	FIN 617	Financial Information System
8	FIN 618	Portfolio Analysis and Management
9	FIN 619	Treasury and Fund management

	<b>Course Code</b>	<b>Institute of Bankers Pakistan</b>
1		Branch and Branchless Banking
2		Lending-Products, operation and risk management
3		Finance of International trade
4		Marketing of Financial Services
5		Information technology in Financial Services
6	FIN 617	Investment Banking
7	FIN 615	Commercial Banking

## BS (Accounting and Finance) Road Map

### UPDATED ROADMAP

#### **Road Map**

#### **Bachelor of Science (Accounting and Finance)**

4 years - 138 Credit Hours

##### **First Semester**

Sr. No.	Course Code	Course Title
1	ENG 103	English-I
2	QTM 101	Business Mathematics - I
3	ECO 110	Microeconomics
4	MKT 110	Principles of Marketing
5	ACC 101	Principles of Accounting
6	MGT 111	Principles of Management

##### **Second Semester**

Sr. No.	Course Code	Course Title
1	ISL 101	Islamic Studies
2	ENG 104	English-II
3	QTM 105	Introduction to Statistics
4	ECO 121	Macroeconomics
5	ACC 102	Financial Accounting
6	QTM 102	Business Mathematics -II

##### **Third Semester**

Sr. No.	Course Code	Course Title
1	PAK 101	Pakistan Studies
2	MIS 210	Introduction to Information Technology
3	ACC 203	Cost Accounting
4	FIN 201	Introduction to Finance
5	BCM 243	Business Communication
6	MGT 242	Organizational Behavior

##### **Fourth Semester**

Sr. No.	Course Code	Course Title
1	MGT 301	Business Law
2	QTM 204	Statistical inference
3	HRM 353	Human Resource Management
4	ACC 304	Managerial Accounting
5	ACC 220	Principles of Taxation
6	FIN 202	Financial Management

## BS (Accounting and Finance) Road Map

### UPDATED ROADMAP

#### **Fifth Semester**

Sr. No.	Course Code	Course Title
1	ACC 400	Advanced Managerial Accounting
2	ACC 305	Financial Reporting-I
3	ACC 306	Principles of Auditing
4	BCM 302	Presentation and Communication Skills
5	FIN 306	Financial Modeling
6		HSS-1

#### **Six Semester**

Sr. No.	Course Code	Course Title
1	FIN 320	Financial Institution Management
2	FIN 308	Corporate Finance
3	MGT 508	Corporate Law
4	ACC 320	Financial Reporting-II
5		HSS
6		HSS

#### **Seven Semester**

Sr. No.	Course Code	Course Title
1	ACC 410	Advanced Taxation
2	ACC 412	Advanced Auditing
3		Elective-1
4		Elective-2
5	ECO 415	Econometrics

#### **Eight Semester**

Sr. No.	Course Code	Course Title
1	PRO 450	Project
2		Elective-3
3		Elective-4
4		Elective-5
5		Elective-6

**BS (Accounting and Finance) - Electives, Institute of Bankers Pakistan**

UPDATED ROADMAP

**BS (Accounting & Finance) - Electives**

**Accounting**

<b>Course Code</b>	<b>List of Accounting Electives</b>
1 ACC 623	Corporate Governance
2 ACC 624	Accounting Information System with SAP
3 ACC 625	Mercantile Law
4 ACC 626	Advance IT
5 ACC 627	Strategic Management Accounting and Control
6 ACC 628	Tax Management and Optimization
7 ACC 629	Acturial Accounting
8 FIN 621	Budgeting
9 ACC 631	Merger and Acquisition Accounting
10 ACC 607	Advance Financial Reporting

**Finance**

<b>Course Code</b>	<b>List of Finance Electives</b>
1 FIN 646	Financial Econometrics
2 FIN 647	Financial Restructuring
3 FIN 619	Financial Derivatives
4 FIN 648	International Finance
5 FIN 649	Islamic Banking and Finance
6 FIN 650	Analysis of Financial Time Series
7 FIN 651	Financial Information System
8 FIN 613	Portfolio Analysis and Management
9 FIN 618	Treasury and Fund Management

**Banking**

<b>Course Code</b>	<b>Institute of Bankers Pakistan</b>
1 FIN 660	Branch and Branchless Banking
2 FIN 652	Lending-Products, operation and risk management
3 FIN 653	Finance of International trade
4 FIN 654	Marketing of Financial Services
5 FIN 655	Information technology in Financial Services
6 FIN 617	Investment Banking
7 FIN 615	Commercial Banking

**Appendage 3232****REVIEW OF CURRICULUM AND ROAD-MAP OF MS (MS) - 2018**

S. No	Module Contents	Credit Hours
1	Core	12
2	Electives	12
3	Thesis	6
	Total	30

**Semester 1**

S. No	C_Code	Course Title	Level	Cr Hrs
1	MGT 702	Advanced Research Methodology and Proposal Development	Core	3
2	MGT 705	Strategic Management: Contemporary Concepts, Theories and Applications	Core	3
3	MGT 706	Advance Marketing Management: Concept and Applications	Core	3
4	XXX	Elective 1	Elective	3

**Semester 2**

S. No	C_Code	Course Title	Level	Cr Hrs
1	MGT 707	Strategic Finance: Concepts and Applications of Contemporary Views	Core	3
2	XXX	Elective 2	Elective	3
3	XXX	Elective 3	Elective	3
4	XXX	Elective 4	Elective	3

**Semester 3**

S. No	C_Code	Course Title	Level	Cr Hrs
1	THS 702	Thesis	Core	6

**List of Elective Courses for MS (MS)**

S. No	C_Code	Course Title	Credit Hours
1	MGT 813	Contemporary Issues in International Marketing: Concepts and Applications	3
2	MGT 814	Corporate Governance and Sustainability	3
3	MGT 824	Globalization	3
4	MGT 817	HRM: Concepts and Applications	3
5	MGT 811	Change Management: Concepts and Applications	3
6	MGT 807	Leadership Issues in Organizations: Concepts and Applications	3
7	MGT 888	Organizational Behavior and Management	3
8	MGT 815	Financial Institution Management	3
9	MGT 825	International Business and Economic Perspectives	3
10	MSF 704	Financial Econometrics	3

**Appendage 3234****ADDITION OF ELECTIVE COURSE “ENTERPRENEURIAL GROWTH” IN MBA (SUPPLY CHAIN MANAGEMENT)****Course Code: ENT 610****Recommended Books**

- Entrepreneurship by Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd 10<sup>th</sup> edition.
- Innovation and Entrepreneurship by Peter Druker 2<sup>nd</sup> Edition.

<b>Week</b>	<b>Contents</b>	<b>Case Study</b>
Week 1	Introduction to Entrepreneurial Growth & Entrepreneurship - Definition, classification of Economics, Basic Concepts; Utility, Scarcity and Economic Wants, Revision of Entrepreneurial Foundations & the historical perspective.	
Week 2	Value generating ventures, scope of skill vs. talent, apple case study	Case study
Week 3	Corporate Entrepreneurship	Lecture and case study discussion
Week 4	Lifecycle of a product, value supply chain, business strategy	Lecture
Week 5	Mission, Vision, strategy and it's long term importance in an organization/venture	
Week 6	Generating and Exploiting new Entries.	Lecture and case study discussion
Week 7	Creativity and the business Idea-Business Plan	
Week 8	Revision Week	
Week 9	Mid Term Exam	
Week 10	Protecting the idea and other legal issues for the entrepreneur	Lecture and case study discussion
Week 11	Strategies for growth and managing the implications of growth	Lecture and case study discussion
Week 12	Assessing resources for growth from external sources.	
Week 13	<i>Strategies for harvesting and ending the venture.</i>	Lecture and case study discussion
Week 14	Seminar on Entrepreneurial growth and insight into the industry on when to contain, grow or stop your venture.	
Week 15	<i>Habits of entrepreneurs who make millions, Supplier and Supplier relationship management, the key role it can play in a venture (product dependent)</i>	Article plus class lecture
Week 16	<i>Projects Submissions &amp; Final Presentations</i>	

**Standardization of BU Transcripts as Per HEC Guideline**

S.No. 0106253



**BAHRIA UNIVERSITY**  
**I S L A M A B A D**  
**ISLAMABAD CAMPUS**  
**MASTER OF BUSINESS ADMINISTRATION (HRM)\***  
**FINAL TRANSCRIPT**



Student's Name : SADAF HANIF  
 Father's Name : RAJA MUHAMMAD HANIF  
 Date Of Birth : 26 Apr 1999  
 CNIC/ Passport No : 01101-0103462-2

Registration No : 43173  
 Enrollment No : 01-222182-030  
 Date of Admission : (To be obtained from CU)  
 Mode of Study : Regular

Credits Transferred **		
ACC 601	Financial Accounting	3
ACC 603	Cost & Managerial Accounting	3
BCM 612	Business Communication	3
ECO 620	Economics	3
FIN 602	Financial Management	3
HRM 653	Human Resource Management	3
MGT 610	Principles of Management	3
MKT 610	Principles of Marketing	3
OTM 603	Stats & Math for Management	3

Fall Semester 2018

Course Code	Title	Grade	Grade Point	Cr. Hours	Product
FIN 603	Entrepreneurial Finance	B-	2.67	3	8.01
HRM 654	Job Analysis & Design	A-	3.67	3	11.01
HRM 678	International HRM	A	4	3	12
MGT 652	Leadership	A	4	3	12
MKT 600	Strategic Marketing	B+	3.33	3	9.99

GPA : 3.53 CGPA : 3.53

Spring Semester 2019

Course Code	Title	Grade	Grade Point	Cr. Hours	Product
HRM 670	Performance Management	A-	3.67	3	11.01
HRM 689	Recruitment & Selection	A-	3.67	3	11.01
MGT 626	Project Management	A-	3.67	3	11.01
MGT 662	Strategic Management	A-	3.67	3	11.01
RMT 630	Methods In Business Research	A	4	3	12

GPA : 3.74 CGPA : 3.64

Thesis/Internship/CSP 2019

Course Code	Title	Grade	Grade Point	Cr. Hours	Product
SDW 496	Internship Completed on 27 March 2020	A	4	0	0
SDW 699	Project / Thesis Completed on 21 June 2019	B+	3.33	3	9.99

Overall Percentage : 81.2 GPA : 3.33 CGPA : 3.61

## GENERAL INFORMATION

### Bahria University Charter Date

07 February 2000

### HEC NOC Date for MS/ MPhil/ PhD Programs (to be obtained from CUs)

### Basic Admission Requirement for the Program

Four years Bachelor's degree with a minimum of 50% marks or CGPA 2.5/4.0 in any discipline.

### Previous Degree Held by the Student

BBA (HONORS) from PMAS ARID UNIVERSITY, RAWALPINDI

### Academic Honors

Students achieving high standards or awarded following honors upon completion of their degree requirements. Honors designations are indicated on the transcript.

Summa Cum Laude	>= 3.90
Magna Cum Laude	>= 3.80 To < 3.90
Cum Laude	>= 3.60 To < 3.80

### Criteria for Award of Academic Honors

The student should have been regular in the entire degree program and should have taken full load in all semesters required from the degree program as per road map/course outline.

### Ineligibility for Academic Honors

- Any course withdrawn or dropped.
- Any semester frozen.
- Repetition or retake of any course.
- Any 'F' or an 'I' endorsement in any subject/Course.
- Credit transfers.
- Any of the degree requirements not completed within the roadmap time frame.

Prepared by : \_\_\_\_\_

AD Exams : \_\_\_\_\_

Date : 23 October 2018

### Grading System

Following grading system (absolute) is used at Bahria University

Letter Grade	Percentage	Grade Point
A	>= 85	4
A-	>= 80 - < 85	3.67
B+	>= 75 - < 80	3.33
B	>= 71 - < 75	3
B-	>= 68 - < 71	2.67
C+	>= 64 - < 68	2.33
C	>= 60 - < 64	2
C-	>= 57 - < 60	1.67
D+	>= 53 - < 57	1.33
D	>= 50 - < 53	1
F	< 50	0
W		Withdrawn

### Medium of Teaching

English is the medium of teaching for all programs conducted at Bahria University.

### Transcripts

Following type of transcripts are issued to the students at Bahria University:

#### Final Transcript

Final transcript will be issued when all the degree requirements have been completed.

#### Interim Transcript

It is issued at the end of each semester (except final semester). Program incomplete is depicted on interim transcript.

#### Authentication

Final transcripts are light beige in colour. They bear embossed university seal, security water markings & Director/Deputy Director Examinations signatures on its face (Alteration and/or forgery of this documents is a criminal offense liable to be tried in the court of Law).

#### Procedure for Final Transcript

Procedure to apply for transcripts is given on Bahria University website [www.bahria.edu.pk](http://www.bahria.edu.pk)

**Appendage 3245**

**COMMITTEE REPORT  
International Students' Recruitment**

**Background:**

1. Recruitment of International Students is in line with the Strategic Plan of Bahria University to meet the strategic goal of Excellence in Global Reach. While this is definitely an uphill task, keeping in view several internal and external factors, but there is no denying in the extreme value international students hold in any higher education setup. International Accreditations and ranking are highly dependent upon the number of international students on campus. Senior officials of Higher Education Commission Pakistan are also suggesting inclusion of number of international students on campus as one of the criteria for ranking Pakistan's Universities.
2. International Students bring a diverse experience in class that is not only helpful for the university but also for the fellow students who interact and engage with them. Such cross culture interactions are believed to instill important values, apart from academic gains, including tolerance, respect for other people's point of view and adaptability.
3. Keeping same in view, the management of the University formed a following member committee to recommend means through which Bahria University can increase the recruitment of international students:
  - a. Prof. Dr. M. Najam ul Islam, Dean Engineering Sciences
  - b. Prof. Dr. Faisal Aftab, HoD Management Sciences
  - c. Mr. M. Rizwan Aamir, Director IT
  - d. Mr. M Awais Mehmood, Director International Office
4. After detailed deliberation, the committee has recommended following bi-level changes to encourage international students to join Bahria University:
  - a. Procedural Changes.
  - b. Financial Changes

**Procedural Changes:**

5. The International students interested in seeking admissions at Bahria University shall apply online, while submitting following documents (to be uploaded online):
  - a) Statement of purpose or Research plan for PhD Students
  - b) Scans of degrees and transcript of all post-secondary degrees (with English translation where required).
  - c) Latest passport size photographs with blue background (*Required for NOC from HEC*).
  - d) Scan of valid passport.
  - e) Three copies of the Student Information Sheet, which will be made available with application form (*Required for NOC from HEC*).
  - f) Evidence showing proficiency in English Language (IELTS minimum score 5.0 band or TOEFL minimum score 70) or English proficiency certificate from the last attended institution.

6. The applications of international students shall be dealt separately from the admission of national students that requires compilation of merit list.
7. The decision on international students shall be taken on face value of their submitted documents.
8. The admission cycle of international student shall be completed prior to the start of admissions process of local students to have clear visibility on available seats for national students and allow sufficient time for visa processing.
9. The application forms once received shall be sent to the relevant academic departments for evaluation by International Office.
10. The departments shall form an Admission Committee headed by the HoD, to scrutinize the academic credentials of the applicant, against basic eligibility criteria set by the University and equivalence formula followed by IBCC.
11. The HoD then shall communicate the decision on provisional admission to the Admissions Directorate, through their Director and DG Campus.
12. The Admission Directorate shall issue a formal Provisional Admission Letter to student with following conditions as applicable:
  - a. Obtaining minimum equivalence percentage required for the programme they are applying for.
  - b. Obtaining minimum NTS/GAT/GRE/BU Entry Test score in their 1<sup>st</sup> semester study at BU (Masters only)
13. The Provisional Admission Letter shall be forwarded to International Office for further processing.
14. In case of rejection of admission by the Departmental Admission Committee, the Admission Directorate shall issue a formal letter in name of the student communicating rejection of admission. The same is to be forwarded to International Office for further processing.
15. After receiving the Provisional Admission Letter, the International Office shall send the offer letter to the selected candidate via email.
16. International Office shall initiate case for obtaining NOC from HEC for the international students, which is requirement of Pakistani visa.
17. After obtaining the NOC, the same shall be directly forwarded to the International Student by the International Office, along with original Provisional Admission Letter, for visa purpose.
18. The student on arrival to Pakistan shall be given **time period till one semester** after the commencement of semester to obtain necessary equivalence certificates from IBCC and HEC.
19. For postgraduate students, requiring NTS/GAT score; a student on arrival to Pakistan shall be given time period of up to one semester to appear for NTS/GAT/BU test and obtain minimum required score. NTS/GAT/GRE will only be compulsory at time of admissions for PhD students.

#### **Procedural Changes:**

20. To encourage more International Students to apply, the committee recommends following financial changes to international students admission:
  - a. There shall be no application fee charged from international students for submitting online application.
  - b. The fee of International Students shall be kept the same as National Students.

**BSCS Road Map for Fall 2014 Intake****Semester 1**

Pre-requisite	Course Code	Course Title	Lecture	Lab	CR	CR/Sem
None	GSC 105	Mathematics	3	0	3	16
None	CSC 110	Computing Fundamentals	2	0	2	
None	CSL 110	Computing Fundamentals Lab	0	1	1	
None	ENG 103	English-I	2	0	2	
None	ISL 101	Islamic Studies/Ethics	2	0	2	
None	PAK 101	Pakistan Studies	2	0	2	
None	GSC 113	Applied Physics	3	0	3	
None	GSL 113	Applied Physics Lab	0	1	1	

**Semester 2**

Pre-requisite	Course Code	Course Title	Lecture	Lab	CR	CR/Sem
GSC 105	GSC 110	Applied Calculus and Analytical Geometry	3	0	3	17
CSC 110	CSC 113	Computer Programming	3	0	3	
CSC 110	CSL 113	Computer Programming Lab	0	1	1	
GSC 113	EEN 210	Basic Electronics	3	0	3	
GSC 113	EEL 210	Basic Electronics Lab	0	1	1	
GSC 105	GSC 122	Probability and Statistics	3	0	3	
ENG 103	HSS 120	Communication Skills	3	0	3	

**Semester 3**

<b>Pre-requisite</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Lecture</b>	<b>Lab</b>	<b>CR</b>	<b>CR/Sem</b>
GSC 110	GSC 211	Multivariable Calculus	3	0	3	17
CSC 113	CEN 120	Digital Logic Design	3	0	3	
EEN 210	CEL 120	Digital Logic Design Lab	0	1	1	
CSC 113	SEN 213	System Analysis And Design	3	0	3	
CSC 113	CSC 210	Object Oriented Programming	3	0	3	
CSC 113	CSL 210	Object Oriented Programming Lab	0	1	1	
HSS 120	HSS 320	Technical Writing & Presentation Skills	3	0	3	

**Semester 4**

<b>Pre-requisite</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Lecture</b>	<b>Lab</b>	<b>CR</b>	<b>CR/Sem</b>
GSC 105	GSC 221	Discrete Mathematics	3	0	3	17
CSC 113	CSC 221	Data Structure and Algorithm	3	0	3	
CSC 113	CSL 221	Data Structures and Algorithm Lab	0	1	1	
SEN 213	SEN 220	Software Engineering	3	0	3	
SEN 213	CSC 220	Database Management System	3	0	3	
SEN 213	CSL 220	Database Management System Lab	0	1	1	
GSC 110	GSC 210	Differential Equations	3	0	3	

**Semester 5**

<b>Pre-requisite</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Lecture</b>	<b>Lab</b>	<b>CR</b>	<b>CR/Sem</b>
GSC 210	GSC 121	Linear Algebra	3	0	3	19
EN 120	CEN 221	Computer Architecture & Organization	3	0	3	
CSC 210	CSC 313	Visual Programming	2	0	2	
CSC 210	CSL 313	Visual Programming Lab	0	1	1	
None	CSC 315	Theory of Automata	3	0	3	
CSC 113	SEN 310	Web Engineering	2	0	2	
CSC 113	SEL 310	Web Engineering Lab	0	1	1	
None	CEN 222	Data Communication and Networking	3	0	3	
None	CEL 222	Data Communication and Networking Lab	0	1	1	

**Semester 6**

<b>Pre-requisite</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Lecture</b>	<b>Lab</b>	<b>CR</b>	<b>CR/Sem</b>
CEN-221	CSC-320	Operating System	3	0	3	19
CEN-221	CSL-320	Operating System Lab	0	1	1	
CSC-221	CSC-321	Design and Analysis of Algorithms	3	0	3	
CEN-221	CEN-323	Computer Organization and Assembly Language	2	0	2	
CEN-221	CEN-323	Computer Organization and Assembly Language Lab	1	0	1	
CSC-315	CSC-323	Compiler Construction	2	0	2	
CSC-315	CSL-323	Compiler Construction Lab	0	1	1	
CSC-220	CSC-468	Advanced Databases	2	0	2	
CSC-220	CSL-468	Advanced Databases Lab	0	1	1	
GSC 210	GSC 320	Numerical Analysis	3	0	3	

**Summer**

<b>Pre-requisite</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Lecture</b>	<b>Lab</b>	<b>CR</b>	<b>CR/Sem</b>
		Internship	0	0	0	

**Semester 7**

<b>Pre-requisite</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Lecture</b>	<b>Lab</b>	<b>CR</b>	<b>CR/Sem</b>
None	ESC 498	Project-I	0	3	3	18
SEN 220	SEN 410	Software Project Management	3	0	3	
CSC 210	CSC 444	Computer Graphics	2	0	2	
CSC 210	CSL 444	Computer Graphics Lab	0	1	1	
CSC 210	CSC 411	Artificial Intelligence	2	0	2	
CSC 210	CSL 411	Artificial Intelligence Lab	0	1	1	
		Elective-1 (3+0 or 2+1)	3	0	3	
		Elective-2 (3+0 or 2+1)	3	0	3	

**Semester 8**

<b>Pre-requisite</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Lecture</b>	<b>Lab</b>	<b>CR</b>	<b>CR/Sem</b>
None	ESC 499	Project-II	0	3	3	15
SEN 220	SEN 420	Software Quality Assurance	3	0	3	
SEN 220	SEN 320	Human Computer Interaction	3	0	3	
		Elective-3 (3+0 or 2+1)	3	0	3	

**BS (IT) Roadmap - Fall 2017 Intake**

Campus:	Karachi Campus
Department:	Computer Science
Program Title:	Bachelor of Information Technology
Program Level:	16 Years of Education
Total Duration of Program:	140
Total Number of semesters:	08 Semesters

**Semester 1:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
None	GSC 105	Mathematics	3	0	3	15 (18)
None	CSC 110	Computing Fundamentals	2	0	2	
None	CSL 110	Computing Fundamentals Lab	0	1	1	
None	ENG 103	English- I	2	0	2	
None	ISL 101	Islamic Studies	2	0	2	
None	PAK 101	Pakistan Studies	2	0	2	
None	MGT 111	Principle of Management	3	0	3	

**Semester 2:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CSC 113	CSC 113	Computer Programming	3	0	3	16 (19)
CSC 113	CSL 113	Computer Programming Lab	0	1	1	
None	ACC 110	Principles of Accounting	3	0	3	
None	CSC 458	Management Information System	3	0	3	
GSC 105	GSC 122	Probability and Statistics	3	0	3	
ENG 103	HSS 120	Communication Skills	3	0	3	

**Semester 3:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CSC 113	CSC 221	Data Structures and Algorithm	3	0	3	18 (17)
CSC 113	CSL 221	Data Structures and Algorithm Lab	0	1	1	
GSC 105	GSC 110	Applied Calculus and Analytical Geometry	3	0	3	
GSC 105	GSC 221	Discrete Mathematics	3	0	3	
None	EEN 210	Basic Electronics	3	0	3	
None	EEL 210	Basic Electronics Lab	0	1	1	
CSC 113	CSC 210	Object Oriented Programming	3	0	3	
CSC 113	CSL 210	Object Oriented Programming Lab	0	1	1	

**Semester 4:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
GSC 110	GSC 121	Linear Algebra	3	0	3	21 (19)
NONE	CEN 222	Data Communication and Networking	3	0	3	
NONE	CEL 222	Data Communication and Networking Lab	0	1	1	
None	SEN 220	Software Engineering	3	0	3	
EEN 210	CEN 120	Digital Logic Design	3	0	3	
EEN 210	CEL 120	Digital Logic Design Lab	0	1	1	
None	CSC 220	Database Management Systems	3	0	3	
None	CSL 220	Database Management Systems Lab	0	1	1	
None	MGT 212	Technology Management	3	0	3	

**Semester 5:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CEN-222	ITC 316	Internet Architecture and Protocols	3	0	3	19
ITC 226	SEN 310	Web Engineering	2	0	2	
ITC 226	SEL 310	Web Engineering Lab	0	1	1	
None	CSC 320	Operating Systems	3	0	3	
None	CSL 320	Operating Systems Lab	0	1	1	
CSC 220	ITC 327	Database Administration and Management	2	0	2	
CSC 220	ITL 327	Database Administration and Management Lab	0	1	1	
None	ITC 226	Web Systems & Technologies	2	0	2	
None	ITL 226	Web Systems & Technologies Lab	0	1	1	
CSC 210	CSC 313	Visual Programming	2	0	2	
CSC 210	CSL 313	Visual Programming Lab	0	1	1	

**Semester 6:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CSC 320	ITC 326	Systems and Network Administration	2	0	2	18
CSC 320	ITL 326	Systems and Network Administration Lab	0	1	1	
SEN 220 & MGT 212	SEN 410	Software Project Management	3	0	3	
CSC 220	CSC 410	Cloud Computing	3	0	3	
HSS 120	HSS 320	Technical Writing & Presentation Skills	3	0	3	

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CSC 210	CSC 318	Object Oriented Analysis and Design	3	0	3	
		Elective-1 (3+0 or 2+1)	3	0	3	

**Summer:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
		Internship	0	0	0	0

**Semester 7:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
NONE	ESC 498	Project-I	0	3	3	18
None	SEN 493	Multimedia Systems	2	0	2	
None	SEL 493	Multimedia Systems Lab	0	1	1	
SEN 220	SEN 320	Human Computer Interaction	2	0	2	
SEN 220	SEL 320	Human Computer Interaction Lab	0	1	1	
None	CSC 328	System Integration and Architecture	3	0	3	
		Elective-2 (3+0 or 2+1)	3	0	3	
		Elective-3 (3+0 or 2+1)	3	0	3	

**Semester 8:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
None	ESC 499	Project-II	0	3	3	15 (12)
CEN 222	CSC 407	Information Security	3	0	3	
None	HSS 421	Entrepreneurship & Leadership	3	0	3	
None		Elective-4 (3+0 or 2+1)	3	0	3	
		Elective-5 (3+0 or 2+1)	3	0	3	
		<b>Total Credit Hours</b>				<b>140</b>

**List of Electives**

Pre-requisite	Course code	Course Title	Lec	Lab	CR
None	ITB 471	E-Commerce	3	0	3
None	ITC 625	Business Process Re-engineering	3	0	3
None	ITC 657	Knowledge Management system & technologies	3	0	3
CSC 468	CSC 452	Data Mining	3	0	3
CSC 468	CSC 454	Data Warehousing	3	0	3
CSC 210	CSC 411	Artificial Intelligence	2	0	2
CSC 210	CSL 411	Artificial Intelligence Lab	0	1	1
SEN 310	SEN 421	Semantic Web	3	0	3
CSC 320	CSC 456	Distributed Computing	2	0	2

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CSC 320	CSC 456	Distributed Computing Lab	0	1	1
CSC 458	CSC 486	Geographical Information System	2	0	2
CSC 458	CSC 486	Geographical Information System Lab	0	1	1
CSC 210	CSC 342	Parallel Programming	2	0	2
CSC 210	CSL 342	Parallel Programming Lab	0	1	1
CEN 222	EET 455	Wireless Communication	2	0	2
CEN 222	EEL 455	Wireless Communication lab	0	1	1
SEN 220	SEN 411	Software Testing	3	0	3
CSC 210	CSC 459	Client Server Programming	2	0	2
CSC 210	CSL 459	Client Server Programming Lab	0	1	1
CSC 444	CEN 444	Digital Image Processing	2	0	2
CSC 444	CEL 444	Digital Image Processing Lab	0	1	1
CSC 210	CSC 444	Computer Graphics	2	0	2
CSC 210	CSL 444	Computer Graphics Lab	0	1	1
CSC 220	CSC 468	Advanced Databases	2	0	2
CSC 220	CSL 468	Advanced Databases Lab	0	1	1
SEN 320	SEN 456	Usability Engineering	3	0	3
CSC 113	CSC 341	Mobile Application Development	2	0	2
CSC 113	CSC 341	Mobile Application Development Lab	0	1	1
None	CSC 426	Business Intelligence and Analytics	3	0	3
CSC 458	SEN 427	Information Systems Auditing and Assurance	3	0	3
None	SEN 428	Service Oriented Architecture	3	0	3
SEN 220	SEN 420	Software Quality Assurance	3	0	3
None	MGT 241	Organizational Theory & Behavior	3	0	3

**BS (IT) Roadmap - Spring 2018 Intake**

**Semester 1:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
None	GSC 105	Mathematics	3	0	3	15 (18)
None	CSC 110	Computing Fundamentals	2	0	2	
None	CSL 110	Computing Fundamentals Lab	0	1	1	
None	ENG 103	English- I	2	0	2	
None	ISL 101	Islamic Studies	2	0	2	
None	PAK 101	Pakistan Studies	2	0	2	
None	MGT 111	Principle of Management	3	0	3	

**Semester 2:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CSC 113	CSC 113	Computer Programming	3	0	3	
CSC 113	CSL 113	Computer Programming Lab	0	1	1	

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GSC 105	GSC 110	Applied Calculus and Analytical Geometry	3	0	3	17 (19)
EEN 210	EEN 210	Basic Electronics	3	0	3	
EEN 210	EEL 210	Basic Electronics Lab	0	1	1	
GSC 105	GSC 221	Discrete Mathematics	3	0	3	
None	MGT 210	Technology Management	3	0	3	

**Semester 3:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CSC 113	CSC 221	Data Structures and Algorithm	3	0	3	19 (17)
CSC 113	CSL 221	Data Structures and Algorithm Lab	0	1	1	
None	CSC 220	Database Management Systems	3	0	3	
None	CSL 220	Database Management Systems Lab	0	1	1	
GSC 105	GSC 122	Probability and Statistics	3	0	3	
EEN 210	CEN 120	Digital Logic Design	3	0	3	
EEN 210	CEL 120	Digital Logic Design Lab	0	1	1	
CSC 113	CSC 210	Object Oriented Programming	3	0	3	
CSC 113	CSL 210	Object Oriented Programming Lab	0	1	1	

**Semester 4:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
GSC 110	GSC 121	Linear Algebra	3	0	3	19
NONE	CEN 222	Data Communication and Networking	3	0	3	
NONE	CEL 222	Data Communication and Networking Lab	0	1	1	
None	SEN 220	Software Engineering	3	0	3	
None	ITC 226	Web Systems & Technologies	2	0	2	
None	ITL 226	Web Systems & Technologies Lab	0	1	1	
CSC 210	CSC 313	Visual Programming	2	0	2	
CSC 210	CSL 313	Visual Programming Lab	0	1	1	
None	ACC 110	Principles of Accounting	3	0	3	

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**Semester 5:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CEN 222	ITC 316	Internet Architecture and Protocols	3	0	3	19
ENG 103	HSS 120	Communication Skills	3	0	3	
ITC 226	SEN 310	Web Engineering	2	0	2	
ITC 226	SEL 310	Web Engineering Lab	0	1	1	
None	CSC 320	Operating Systems	3	0	3	
None	CSL 320	Operating Systems Lab	0	1	1	
CSC 220	ITC 327	Database Administration and Management	2	0	2	
CSC 220	ITL 327	Database Administration and Management Lab	0	1	1	
CSC 210	CSC 318	Object Oriented Analysis and Design	3	0	3	

**Semester 6:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CSC 320	ITC 326	Systems and Network Administration	2	0	2	18
CSC 320	ITL 326	Systems and Network Administration Lab	0	1	1	
SEN 220 & MGT 210	SEN 410	Software Project Management	3	0	3	
CSC 220	CSC 410	Cloud Computing	3	0	3	
HSS 120	HSS 320	Technical Writing & Presentation Skills	3	0	3	
		Elective-1 (3+0 or 2+1)	3	0	3	
		Elective-2 (3+0 or 2+1)	3	0	3	

**Summer:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
		Internship	0	0	0	0

**Semester 7:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
NONE	ESC 498	Project-I	0	3	3	18
None	SEN 493	Multimedia Systems	2	0	2	
None	SEL 493	Multimedia Systems Lab	0	1	1	
SEN 220	SEN 320	Human Computer Interaction	2	0	2	
SEN 220	SEL 320	Human Computer Interaction Lab	0	1	1	
None	CSC 328	System Integration and Architecture	3	0	3	
		Elective-3 (3+0 or 2+1)	3	0	3	
		Elective-4 (3+0 or 2+1)	3	0	3	

**Semester 8:**

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
None	ESC 499	Project-II	0	3	3	15 (12)
CEN222	CSC 407	Information Security	3	0	3	
None	HSS 421	Entrepreneurship & Leadership	3	0	3	
None	CSC 458	Management Information System	3	0	3	
		Elective-5 (3+0 or 2+1)	3	0	3	
		<b>Total Credit Hours</b>				<b>140</b>

**List of Electives**

Pre-requisite	Course code	Course Title	Lec	Lab	CR
None	ITB 471	E-Commerce	3	0	3
None	ITC 625	Business Process Re-engineering	3	0	3
None	ITC 657	Knowledge Management system & technologies	3	0	3
CSC 468	CSC 452	Data Mining	3	0	3
CSC 468	CSC 454	Data Warehousing	3	0	3
CSC 210	CSC 411	Artificial Intelligence	2	0	2
CSC 210	CSL 411	Artificial Intelligence Lab	0	1	1
SEN 310	SEN 421	Semantic Web	3	0	3
CSC 320	CSC 456	Distributed Computing	2	0	2
CSC 320	CSC 456	Distributed Computing Lab	0	1	1
CSC 458	CSC 486	Geographical Information System	2	0	2
CSC 458	CSC 486	Geographical Information System Lab	0	1	1
CSC 210	CSC 342	Parallel Programming	2	0	2

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CSC 210	CSL 342	Parallel Programming Lab	0	1	1
CEN 222	EET 455	Wireless Communication	2	0	2
CEN 222	EEL 455	Wireless Communication lab	0	1	1
SEN 220	SEN 411	Software Testing	3	0	3
CSC 210	CSC 459	Client Server Programming	2	0	2
CSC 210	CSL 459	Client Server Programming Lab	0	1	1
CSC 444	CEN 444	Digital Image Processing	2	0	2
CSC 444	CEL 444	Digital Image Processing Lab	0	1	1
CSC 210	CSC 444	Computer Graphics	2	0	2
CSC 210	CSL 444	Computer Graphics Lab	0	1	1
CSC 220	CSC 468	Advanced Databases	2	0	2
CSC 220	CSL 468	Advanced Databases Lab	0	1	1
SEN 320	SEN 456	Usability Engineering	3	0	3
CSC 113	CSC 341	Mobile Application Development	2	0	2
CSC 113	CSC 341	Mobile Application Development Lab	0	1	1
None	CSC 426	Business Intelligence and Analytics	3	0	3
CSC 458	SEN 427	Information Systems Auditing and Assurance	3	0	3
None	SEN 428	Service Oriented Architecture	3	0	3
SEN 220	SEN 420	Software Quality Assurance	3	0	3
None	MGT 241	Organizational Theory & Behavior	3	0	3

**SOP - POSTGRADUATE FCPS RESIDENTS (FCPS-R)****BAHRIA UNIVERSITY MEDICAL AND DENTAL COLLEGE**

Postgraduate FCPS Residents (FCPS-R) are MBBS graduates, who have cleared FCPS Part-I examination conducted by College of Physicians and Surgeons Pakistan (CPSP) and wants to undertake professional academic and clinical training to fulfill the requirements for appearing in FCPS Part-II examinations of CPSP in order to complete their postgraduate fellowship. Postgraduate FCPS Residents (FCPS-R) are posted in the department chosen as per their FCPS Part-I specialty and will be attached to CPSP approved supervisors for academic and clinical training under Department of Postgraduate programs of Bahria University Medical and Dental College (BUMDC). The college financially supports, by provision of stipend, training of Postgraduate FCPS Residents, who are required to contribute in teaching, clinical training and assessment of undergraduate students of BUMDC especially in major subjects specified by Pakistan Medical & Dental Council (PMDC) - Medicine, Surgery, Pediatrics, ENT, Obstetrics & Gynecology and Eye for MBBS students.

**1. SELECTION PROCESS:****a. Induction****FCPS Part-I cleared candidates**

After passing FCPS Part- I, these doctors, for FCPS Part -II training will be selected by the selection board on contract basis for completion of post graduate training, that is for a period of at least four years.

**b. Documents Required**

Following documents (Photocopies) shall be submitted with the application form and original documents to be produced at the time of interview:

- (1) Valid PM&DC Registration Certificate
- (2) MBBS Degree
- (3) House Job Certificate
- (4) FCPS Part-I Result
- (5) Copy of CNIC
- (6) 03 passport size photographs

**c. Induction Procedure**

Following procedures will be followed for induction of FCPS Residents by Admissions department BU & BUMDC in collaboration with Postgraduate secretariat:

- (1) Advertisement in the newspapers
- (2) Short listing of applicants as per specifications in advertisement
- (3) Specialty based entrance test at BUMDC, under the Examination department of BUMDC
- (4) Interviews of short listed candidates by selection board
- (5) Generation of final list of selected candidates by Admissions department and sending to Dean Health Sciences & PGP-TM Secretariat
- (6) Issuance of appointment letters by HR-BU for successful FCPS Residents
- (7) Candidate Reporting to Admissions office & PGP-TM Secretariat

- (8) Submission of joining report by candidate
- (9) Issuance of letter by Chairperson PGP-TM to Academic coordinator, concerned clinical HOD of BUMDC and PNS-SHIFA

**d. Selection Board:**

Following officers shall form board for selection of Postgraduate FCPS Residents:

(1) DG BUMDC	-	President
(2) Director General Health Services BU	-	Member
(3) DGMS (PAK- Navy)	-	Member
(4) Director Health Sciences BU	-	Member
(5) Dean & Principal / Vice Principal BUMDC	-	Member
(6) Commandant PNS SHIFA	-	Member
(7) Chairperson PGP-TM BUMDC	-	Member
(8) Academic Coordinator BUMDC	-	Member
(9) HOD Concerned (BUMDC)	-	Member
(10) HOD Concerned (PNS SHIFA)	-	Member
(11) Deputy Director Admissions BUMDC	-	Member

**2. TRAINING:**

- (a) Postgraduate FCPS Resident will be supervised by CPSP approved respective specialty supervisors of BUMDC & PNS SHIFA.
- (b) Daily attendance of the Postgraduate FCPS Resident shall be marked and maintained by Postgraduate Secretariat of BUMDC as per PMDC criteria of attendance for postgraduate students. This is more than 75%. In case of deficiency chairperson PGP-TM should be intimated by academic coordinator.
- (c) Copy of Proposal/ synopsis should be submitted to PGP-TM through academic coordinator. Submission of synopsis of dissertation should be done within 12 months of starting the residency program to CPSP.
- (d) DG BUMDC is authorized to terminate the training or withhold the stipend on poor performance, poor attendance, absence from the assessments, duties and any breach of discipline and misconduct on the recommendations of Chairperson PGP-TM to Principal & Dean Health Sciences.
- (e) Performance reports of each Postgraduate FCPS Resident will be monitored by respective supervisor, academic HOD of BUMDC and academic coordinator of PGP-TM. Quarterly progress report of Postgraduate FCPS Resident on specified form, duly signed by supervisor, academic HOD and academic coordinator based on BUMDC Postgraduate FCPS Resident Log-Book criteria should be submitted to PGP-TM. The quarterly progress report will be forwarded by PGP-TM through Dean Health Sciences & Principal BUMDC to Bahria University and for keeping PGP-TM personal file record of the candidate.
- (f) In case any Postgraduate FCPS Resident resigns from service, it shall be processed from PNS SHIFA to Chairperson PGP-TM. Dean Health Sciences & Principal BUMDC will forward the case on recommendations of PGP-TM, for approval by the Competent Authority (i.e. Rector BU) as per statutes of BU.
- (g) Postgraduate FCPS Resident will fulfill all requirements laid down by CPSP, including Synopsis submission within 12 months of starting the residency program and "fill up" the e- CPSP log Book on regular basis. Simultaneously they will also have to "fill up" BUMDC log book on monthly basis to fulfill the criteria laid down by BUMDC. The log

book must be duly signed/ approved by the Academic HOD and Academic coordinator of BUMDC for due consideration of performance.

**3. DUTIES:**

- (a) Duties of the Postgraduate FCPS Residents will be of dual nature.
  - (i) The **Clinical duties** will include patient care, OPDs, OTs, Labor rooms and Emergencies round the clock as per rotation. He/she will be available for evening and night duties as well. (ii) The **Academic duties** will be teaching, training and supervision of students of BUMDC as per mentioned in the BUMDC Postgraduate FCPS Resident Log Book especially including evening academic duties in the wards, clinics, ER, OT, Labor Room etc.
- (b) The time table of Postgraduate FCPS Resident will be generated by academic coordinator PGP-TM, after incorporating duties assigned to them both by BUMDC and PNS-SHIFA without compromising either of them.
- (c) The Postgraduate FCPS Residents will be actively involved in clinical training of students of BUMDC
- (d) The BUMDC Postgraduate FCPS Resident Log Book criteria is:

Timing	1	2	3	4	5
Monthly	MCQs development with key	SEQs development with key	OSCE development with key	UG-Teaching at BUMDC	UG-Teaching at Shifa
Three monthly	Module theory exam duty	Module OSCE exam duty	-----	-----	-----
Twice per year	Journal club presentations	Workshop participation	CME participation	-----	-----
Once per year	Small research project	Annual theory exam duty	Annual OSCE exam duty	-----	-----

- All Postgraduate FCPS Residents should submit duly filled log book per month to respective academic HOD for endorsement.
- All Postgraduate FCPS Residents should fulfill criteria for log book endorsement by respective BUMDC HOD
- Maintain attendance more than 75%
- Provide feedback on the program once per year.
- Submit MCQs, SEQs & OSCE questions with key to respective HOD of BUMDC.
- Submit duly signed [by HOD-SHIFA & HOD-BUMDC] quarterly progress report to Academic coordinator after every three months.
- Inform Academic Coordinator on progress of allocated research project.
- In case of non-compliance upon recommendations of Academic coordinator , case will be forwarded by Chairperson Postgraduate Programs to concerned authorities for following measure(s):
  1. Suspension of monthly stipend
  2. Discontinuation of training

- Submit duly filled endorsed BUMDC Log book for obtaining clearance certificate at the end of training period.
- (e) Duties of BUMDC academic HODS are:
  1. Sign duly filled log book of Postgraduate FCPS Residents monthly.
  2. Endorse quarterly progress report of Postgraduate FCPS Resident based on BUMDC log book criteria.
  3. Determine cut off number for submission of monthly MCQs, SEQs & OSCE questions.
  4. Provide topic list & guide the candidates for undergraduate teaching sessions at BUMDC and PNS-SHIFA.
  5. Allocate small research projects on prevalent diseases in our community.
  6. Facilitate Postgraduate FCPS Residents for:
    - (A) Development of MCQs, SEQs & OSCE questions with key.
    - (B) Teaching sessions at BUMDC and PNS-SHIFA.
    - (C) Preparing for intermediate module exam.
    - (D) Conducting small research projects.
    - (E) Publishing data of research project.

**4. DISCIPLINE:**

- (a) Postgraduate FCPS Resident shall abide by the Rules and Regulations of BU and PNS SHIFA.
- (b) In case of poor performance or breach in discipline by Postgraduate FCPS Residents, the case shall be referred to PGP-TM who will then recommend it to Dean /Principal BUMDC for further disposal.
- (c) Training may also be terminated on the grounds of poor performance, breach of discipline and violation of Rules and Regulations.
- (d) The Postgraduate FCPS Residents shall not indulge in any political, sectarian, ethnic or unlawful activities.

**5. STIPEND:**

The amount of stipend to be paid to Postgraduate FCPS Resident will be decided by the Bahria University Head Office.

**6. CORRESPONDENCE:**

All correspondence related to Postgraduate FCPS Residents will be processed by Chairperson Postgraduate Programs upon recommendation of academic coordinator postgraduate programs, to Dean Health Sciences & Principal BUMDC.

**7. LEAVES ALLOWED:**

Sick leaves and casual leaves allowed per year are 30 (15+15=30) that is 15 in the first 6 months & the other 15 in the next six months. Deduction of stipend will be done beyond this limit. Maternity leave is allowed (with full stipend) one time for twelve weeks maximum during four years of training. It will be considered break in the training and the resident has to complete this period to get experience certificate. Leave application should be signed and forwarded by concerned HOD to postgraduate secretariat for endorsement and then to Commandant PNS Shifa for further processing.

Minutes of the 32<sup>nd</sup> ACM

Brig. (R) Prof. Dr Syed Parvez Asghar  
Academic Coordinator  
Postgraduate Programs Training & Monitoring (PGP-TM)  
FCPS Residents  
BUMDC

Dr Syed Ijaz Hussain Zaidi  
Focal Person  
Postgraduate Programs Training & Monitoring (PGP-TM)  
BUMDC

Prof. Dr Nasim Karim  
Chairperson  
Postgraduate Programs Training & Monitoring (PGP-TM)  
BUMDC

**CONTRACT BETWEEN BAHRIA UNIVERSITY AND FCPS RESIDENT**

**THIS AGREEMENT**, made on this \_\_\_\_\_ day of 20, between **BAHRIA UNIVERSITY** of the first part, hereinafter referred to as Bahria University, **AND DR.** \_\_\_\_\_, bearing CNIC No \_\_\_\_\_, resident of \_\_\_\_\_ of the other part, hereinafter referred to as **FCPS RESIDENT** (Department of \_\_\_\_\_, Bahria University Medical and Dental College Karachi/PNS SHIFA Karachi).

I Hereby Witness That:

1. The **FCPS RESIDENT**/ FCPS-II Trainee is appointed at Bahria University Medical and Dental College Karachi (BUMDC), on contract basis with effect from \_\_\_\_\_ till the completion of post graduate training i.e for a period of four years as specified by CPSP.
2. The aforesaid appointment shall be subject to and governed by this Agreement and Bahria University's Statutes/Regulations/Policies etc prevailing at the time or made hereafter, as applicable to **FCPS RESIDENT** of Bahria University.
3. The **FCPS RESIDENT** if desires to leave should give a written application at least one month in advance. He /She should clear all the dues before he/she gets experience certificate.
4. The **FCPS RESIDENT** is hired for FCPS -II training in the residency program along with clinical training, patient care and teaching of BUMDC medical students. Working hours will be from 8 am to 3 pm on week days and the resident will also perform 24 hours duty as and when required by the HOD and Commandant PNS SHIFA. Assigned Resident will also conduct evening teaching of BUMDC students from 6pm to 8pm on week days. Any breach of contract i.e. failure in patient care, failure in teaching students or poor academic performance will be reported by HoD (Academic) or supervisor to Postgraduate secretariat BUMDC. For the first two reports a verbal warning and then written will be given. At the 3<sup>rd</sup> adverse report services of the resident will be terminated without prior notice by BUMDC.
5. The **FCPS RESIDENT** will write a comprehensive history of patient under his/her care. They will write comprehensive notes every evening on the patients care files and will perform procedures first under supervision and then independently and demonstrate them to the other residents and to undergraduate students.
6. The **FCPS RESIDENT** shall not disclose any information relating to Bahria University during or after termination of employment, and will not divulge any information or classified information that he/she may obtain or have access to while employed with Bahria University unless compelled to do so by a competent court of law.
7. a. The **FCPS RESIDENT** will be a full time resident of the Bahria University, and will be required to be available for the clinical and academic duties as and when required by the Commandant PNS SHIFA, Supervisor and Bahria University. His/her attendance will be marked daily in the Postgraduate secretariat office.  
b. His/ her duties will be of dual nature. Clinical duties will include patient care, OPDs, OTs, Labor rooms and Emergencies round the clock as per rotation. He/she will be available for evening duties and night duties. The academic duties will be teaching, training and supervision of medical students of BUMDC as required in evening clinics, ER, OT, Labour Room. They will be involved in all the academic and examination duties of BUMDC when and where required

- c. **FCPS RESIDENT** will complete all the requirements as laid down by CPSP including synopsis submission within 1<sup>st</sup> year, "fill up" the e – log book of CPSP and also BUMDC log book regularly. He/ she should appear in the assessments and submit all the records through the supervisor to the Postgraduate secretariat office. Leaves allowed will be 30 days with 15 days in the first six months and 15 days in the next six months as per specified by CPSP rules. Leaves will be approved by the Chairperson PGP-TM on the recommendation of Academic coordinator. Leave(s) exceeding the eligibility will be considered as deficiency or a break in the training. He/she will have to complete the break period to obtain experience certificate from BUMDC.
8. The **FCPS RESIDENT** shall not indulge in any political, sectarian, ethnic or unlawful activities.
9. For any other matter not specifically covered in this agreement, the decision of Bahria University shall be final & binding.
10. The **FCPS RESIDENT** shall be entitled to **Rs. 40,000/- monthly fixed stipend** as allowed by the Registrar Bahria University.
11. The **FCPS RESIDENT** agrees to execute the above mentioned responsibilities in true spirit.
12. The **FCPS RESIDENT** after having read the contractual clauses of this agreement and above mentioned terms and conditions of his/her tenure training for FCPS-part II , agrees to join Bahria University/ constituent unit from the date \_\_\_\_\_ for the period of \_\_\_\_\_ Years till the date:\_\_\_\_\_.
13. The **FCPS RESIDENT** will not be considered as a faculty member i.e residency is a tenure training post and not a regular employment.
14. Experience certificate will be issued by the Principal/ Dean office to **FCPS RESIDENT** for the entire duration of training at BUMDC & PNS-SHIFA.
15. The **FCPS RESIDENT** will not go to court of law if their training is terminated on poor performance and on disciplinary grounds.
16. The **FCPS RESIDENT** shall also abide by the duties as mentioned in **Annex-A** of this agreement.

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Registrar Bahria University

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**FCPS Resident's Signature**

**WITNESSES**

**Witness 1**

Signature: \_\_\_\_\_  
Name: \_\_\_\_\_  
NIC: \_\_\_\_\_  
Address: \_\_\_\_\_

**Witness 2**

Signature: \_\_\_\_\_  
Name: \_\_\_\_\_  
NIC: \_\_\_\_\_  
Address: \_\_\_\_\_

**DUTIES OF FCPS-II RESIDENT**

1. **FCPS RESIDENT** shall abide by the Rules /Regulation /Statutes of Bahria University Medical & Dental College.
2. **FCPS RESIDENT** must be regular and punctual and their attendance will be maintained at Postgraduate secretariat office.
3. **FCPS RESIDENT** will be involved in all academic activities of the BUMDC besides their clinical wards / OPDs when required and directed.
4. **FCPS RESIDENT** will be responsible for the clinical teaching of the BUMDC students in Wards, ER, Labor room and Operation theater etc.
5. **FCPS RESIDENT** must perform the duties with full responsibility as assigned by the Academic coordinator, Principal BUMDC, Supervisor, Commandant PNS SHIFA.
6. **FCPS RESIDENT** will appear in all formative, summative assessments at BUMDC whenever directed. Their absence from the assessments will be taken as lack of interest in their residency program.
7. Performance report of each **FCPS RESIDENT** by the Supervisor PNS Shifa / BUMDC and Academic HOD BUMDC will be sent to the Postgraduate secretariat of BUMDC.
8. DG - BUMDC will have the right to terminate the training or withhold the stipend (on poor performance & attendance, absence from the assessments, duties and any breach of discipline and misbehavior) on the recommendations of Principal & Dean Health Sciences BUMDC
9. **FCPS RESIDENT** should submit synopsis of dissertation within 12 month of starting the residency program.
10. **FCPS RESIDENT** will perform any other duty assigned by the Dean & Principal BUMDC

Name: \_\_\_\_\_

**FCPS Resident's Signature**

**COUNTERSIGNED**

\_\_\_\_\_  
Chairperson PGP-TM, BUMDC Karachi

\_\_\_\_\_  
Dean & Principal, BUMDC Karachi

## Minutes of the 32<sup>nd</sup> ACM

### Appendage 3251

	<b>BAHRIA UNIVERSITY, ISLAMABAD</b> <b>SHIFA COLLEGE OF NURSING, ISLAMABAD</b> <b>FINAL TRANSCRIPT</b> <b>Programme: B. Sc Nursing*</b>																																																																																																																																																																																																																																																																																																																																																																													
<p><b>Registration No:</b> 13924  <b>Name:</b> Khurram Ishaq  <b>Father's Name:</b> Ishaq Bhatti  <b>Date of Birth:</b> 01 April 1984  <b>CNIC No:</b> 37405-0413713-1</p> <p><b>Roll No.:</b> 9420  <b>Final Professional:</b> Annual 2010  <b>Held in:</b> October 2010  <b>Date of Admission:</b>  <b>Mode of Study:</b> Regular / Private</p>																																																																																																																																																																																																																																																																																																																																																																														
<p><b>Year-I (Semester-I)</b></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Course Code</th> <th>Title</th> <th>Grade</th> <th>Grade Point</th> <th>Credit Hours</th> <th>Prod.</th> </tr> </thead> <tbody> <tr><td>NCFN111</td><td>Fundamentals of Nursing-I</td><td>B+</td><td>3.5</td><td>6</td><td>21</td></tr> <tr><td>NISAP112</td><td>Anatomy &amp; Physiology-I</td><td>B+</td><td>3.5</td><td>3</td><td>10.5</td></tr> <tr><td>NCCN113</td><td>Community Health Nursing-I</td><td>B+</td><td>3.5</td><td>2</td><td>7</td></tr> <tr><td>NENG114</td><td>English-I</td><td>B+</td><td>3.5</td><td>3</td><td>10.5</td></tr> <tr><td>NSNU115</td><td>Nutrition</td><td>B+</td><td>3.5</td><td>1</td><td>3.5</td></tr> <tr><td>NSMA116</td><td>Mathematics</td><td>B+</td><td>3.5</td><td>1</td><td>3.5</td></tr> <tr><td>NSCI117</td><td>Applied Sciences</td><td>A</td><td>4</td><td>3</td><td>12</td></tr> </tbody> </table> <p>GPA: 3.58 CGPA: 3.58</p> <p><b>Year-I (Semester-II)</b></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Course Code</th> <th>Title</th> <th>Grade</th> <th>Grade Point</th> <th>Credit Hours</th> <th>Prod.</th> </tr> </thead> <tbody> <tr><td>NCFN121</td><td>Fundamentals of Nursing-II</td><td>B+</td><td>3.5</td><td>6</td><td>21</td></tr> <tr><td>NSAP122</td><td>Anatomy &amp; Physiology-II</td><td>B+</td><td>3</td><td>3</td><td>9</td></tr> <tr><td>NCCH123</td><td>Community Health Nursing</td><td>B+</td><td>3</td><td>2</td><td>6</td></tr> <tr><td>NHET127</td><td>Ethics</td><td>A</td><td>4</td><td>1</td><td>4</td></tr> <tr><td>NENG124</td><td>English-II</td><td>B+</td><td>3.5</td><td>3</td><td>10.5</td></tr> <tr><td>NSMB126</td><td>Microbiology</td><td>C+</td><td>2.5</td><td>3</td><td>7.5</td></tr> <tr><td>NCPC125</td><td>Pharmacology</td><td>B</td><td>3</td><td>1</td><td>3</td></tr> </tbody> </table> <p>GPA: 3.21 CGPA: 3.39</p> <p><b>Year-II (Semester-III)</b></p> <table border="1" style="width: 100%; border-collapse: collapse; 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Communicable Diseases</td><td>C</td><td>2</td><td>2</td><td>4</td></tr> </tbody> </table> <p>GPA: 2.88 CGPA: 3.26</p> <p><b>Year-III (Semester-V)</b></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Course Code</th> <th>Title</th> <th>Grade</th> <th>Grade Point</th> <th>Credit Hours</th> <th>Prod.</th> </tr> </thead> <tbody> <tr><td>NU311</td><td>Concepts in Nursing (Theory)</td><td>B</td><td>3</td><td>3</td><td>9</td></tr> <tr><td>NU311</td><td>Concepts in Nursing (Clinical)</td><td>B</td><td>3</td><td>5</td><td>15</td></tr> <tr><td>NCHA313</td><td>Health Assessment</td><td>A</td><td>4</td><td>3</td><td>12</td></tr> <tr><td>NSPH312</td><td>Pathophysiology-II</td><td>B+</td><td>3.5</td><td>2</td><td>7</td></tr> <tr><td>NENG314</td><td>English-V</td><td>B+</td><td>3.5</td><td>3</td><td>10.5</td></tr> <tr><td>NSIH315</td><td>Islamiat / Ethics</td><td>B</td><td>3</td><td>1</td><td>3</td></tr> </tbody> </table> <p>GPA: 3.32 CGPA: 3.28</p> <p><b>Year-III (Semester-VI)</b></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Course Code</th> <th>Title</th> <th>Grade</th> <th>Grade Point</th> <th>Credit Hours</th> <th>Prod.</th> </tr> </thead> <tbody> <tr><td>NCAH321</td><td>Advance Concepts in Nursing (Theory)</td><td>B</td><td>3</td><td>3.5</td><td>10.5</td></tr> <tr><td>NCAH321</td><td>Advance Concepts in Nursing (Clinical)</td><td>B+</td><td>3.5</td><td>4.5</td><td>15.75</td></tr> <tr><td>NSBS322</td><td>Introduction to Biostatistics</td><td>B+</td><td>3.5</td><td>3</td><td>10.5</td></tr> <tr><td>NCTL323</td><td>Teaching &amp; Learning</td><td>B</td><td>3</td><td>3</td><td>9</td></tr> <tr><td>NENG324</td><td>English-VI</td><td>B+</td><td>3.5</td><td>3</td><td>10.5</td></tr> <tr><td>NHPB325</td><td>Behavioral Psychology</td><td>B+</td><td>3.5</td><td>2</td><td>7</td></tr> <tr><td>NHCS326</td><td>Sociology</td><td>B+</td><td>3.5</td><td>2</td><td>7</td></tr> </tbody> </table> <p>GPA: 3.35 CGPA: 3.29</p> <p><b>Year-IV (Semester-VII)</b></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Course Code</th> <th>Title</th> <th>Grade</th> <th>Grade Point</th> <th>Credit Hours</th> <th>Prod.</th> </tr> </thead> <tbody> <tr><td>NCMH411</td><td>Mental Health Nursing (Theory)</td><td>B</td><td>3</td><td>3</td><td>9</td></tr> <tr><td>NCMH411</td><td>Mental Health Nursing (Clinical)</td><td>B+</td><td>3.5</td><td>3</td><td>10.5</td></tr> <tr><td>NCHH413</td><td>Community Health Nursing (Theory)</td><td>C+</td><td>2.5</td><td>4</td><td>10</td></tr> <tr><td>NCHH413</td><td>Community Health Nursing (Clinical)</td><td>C+</td><td>2.5</td><td>3</td><td>7.5</td></tr> <tr><td>NENG414</td><td>English</td><td>B</td><td>3</td><td>3</td><td>9</td></tr> </tbody> </table> <p>GPA: 2.88 CGPA: 3.23</p> <p><b>Year-IV (Semester-VIII)</b></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Course Code</th> <th>Title</th> <th>Grade</th> <th>Grade Point</th> <th>Credit Hours</th> <th>Prod.</th> </tr> </thead> <tbody> <tr><td>NCLM421</td><td>Leadership &amp; Management (Theory)</td><td>A</td><td>4</td><td>4</td><td>16</td></tr> <tr><td>NCNE422</td><td>Clinical Elective (Clinical)</td><td>B+</td><td>3.5</td><td>6</td><td>21</td></tr> <tr><td>NCNS423</td><td>Nursing Seminar</td><td>A</td><td>4</td><td>2</td><td>8</td></tr> <tr><td>NSNR425</td><td>Research</td><td>B</td><td>3</td><td>3</td><td>9</td></tr> <tr><td>NHPS412</td><td>Pakistan Studies</td><td>B</td><td>3</td><td>2</td><td>6</td></tr> <tr><td>NENG424</td><td>English</td><td>B</td><td>3</td><td>3</td><td>9</td></tr> </tbody> </table> <p>GPA: 3.45 CGPA: 3.26</p> <p style="text-align: right;"><b>Director Examinations</b> Shifa College of Nursing, Islamabad</p> <p><b>First Professional Examination</b></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">S No</th> <th rowspan="2">Title</th> <th colspan="4">Marks Obtained</th> </tr> <tr> <th>Theory (Max 100)</th> <th>Practical (Max 100)</th> <th>Total</th> <th>Status</th> </tr> </thead> <tbody> <tr><td>1</td><td>Adult Health Nursing-I</td><td>75</td><td>67</td><td>142</td><td>Pass</td></tr> <tr><td>2</td><td>Basic Sciences in Nursing-I</td><td>74</td><td>76</td><td>150</td><td>Pass</td></tr> <tr><td>3</td><td>Comm. &amp; Child Health Nursing-I</td><td>70</td><td>75</td><td>145</td><td>Pass</td></tr> <tr> <td align="right" colspan="2"><b>Total</b></td><td><b>219</b></td><td><b>218</b></td><td><b>437</b></td><td><b>72.83%</b></td></tr> </tbody> </table> <p><b>148 credit hours completed.</b></p> <p>* The Program consists of 148 credit hours in 4 years (8 semesters), with semesters-based exams conducted by the Shifa College of Nursing and Professional Examinations (First &amp; Final Prof) conducted by Bahria University, with overall marks obtained 72.27% (795/1100).</p> <p style="text-align: right;"><b>Director Examinations</b> Bahria University, Islamabad</p> <p>Dated: 22 October 2018</p> <p>Note : Errors &amp; omissions exempted.</p>			Course Code	Title	Grade	Grade Point	Credit Hours	Prod.	NCFN111	Fundamentals of Nursing-I	B+	3.5	6	21	NISAP112	Anatomy & Physiology-I	B+	3.5	3	10.5	NCCN113	Community Health Nursing-I	B+	3.5	2	7	NENG114	English-I	B+	3.5	3	10.5	NSNU115	Nutrition	B+	3.5	1	3.5	NSMA116	Mathematics	B+	3.5	1	3.5	NSCI117	Applied Sciences	A	4	3	12	Course Code	Title	Grade	Grade Point	Credit Hours	Prod.	NCFN121	Fundamentals of Nursing-II	B+	3.5	6	21	NSAP122	Anatomy & Physiology-II	B+	3	3	9	NCCH123	Community Health Nursing	B+	3	2	6	NHET127	Ethics	A	4	1	4	NENG124	English-II	B+	3.5	3	10.5	NSMB126	Microbiology	C+	2.5	3	7.5	NCPC125	Pharmacology	B	3	1	3	Course Code	Title	Grade	Grade Point	Credit Hours	Prod.	NCAH211	Adult Health Nursing	B+	3.5	12.5	43.75	NSPH212	Pathophysiology	C+	2.5	2	5	NSNU213	Applied Nutrition-II	B+	3.5	1	3.5	NENG214	English-III	B+	3.5	2.5	8.75	Course Code	Title	Grade	Grade Point	Credit Hours	Prod.	NCCH223	Community Health Nursing	C+	2.5	5.5	13.75	NHDP221	Development Psychology	B	3	1.5	4.5	NCPH222	Child Health Nursing	B+	3.5	7	24.5	NENG224	English-IV	C+	2.5	2	5	NCTD225	Tropical & Communicable Diseases	C	2	2	4	Course Code	Title	Grade	Grade Point	Credit Hours	Prod.	NU311	Concepts in Nursing (Theory)	B	3	3	9	NU311	Concepts in Nursing (Clinical)	B	3	5	15	NCHA313	Health Assessment	A	4	3	12	NSPH312	Pathophysiology-II	B+	3.5	2	7	NENG314	English-V	B+	3.5	3	10.5	NSIH315	Islamiat / Ethics	B	3	1	3	Course Code	Title	Grade	Grade Point	Credit Hours	Prod.	NCAH321	Advance Concepts in Nursing (Theory)	B	3	3.5	10.5	NCAH321	Advance Concepts in Nursing (Clinical)	B+	3.5	4.5	15.75	NSBS322	Introduction to Biostatistics	B+	3.5	3	10.5	NCTL323	Teaching & Learning	B	3	3	9	NENG324	English-VI	B+	3.5	3	10.5	NHPB325	Behavioral Psychology	B+	3.5	2	7	NHCS326	Sociology	B+	3.5	2	7	Course Code	Title	Grade	Grade Point	Credit Hours	Prod.	NCMH411	Mental Health Nursing (Theory)	B	3	3	9	NCMH411	Mental Health Nursing (Clinical)	B+	3.5	3	10.5	NCHH413	Community Health Nursing (Theory)	C+	2.5	4	10	NCHH413	Community Health Nursing (Clinical)	C+	2.5	3	7.5	NENG414	English	B	3	3	9	Course Code	Title	Grade	Grade Point	Credit Hours	Prod.	NCLM421	Leadership & Management (Theory)	A	4	4	16	NCNE422	Clinical Elective (Clinical)	B+	3.5	6	21	NCNS423	Nursing Seminar	A	4	2	8	NSNR425	Research	B	3	3	9	NHPS412	Pakistan Studies	B	3	2	6	NENG424	English	B	3	3	9	S No	Title	Marks Obtained				Theory (Max 100)	Practical (Max 100)	Total	Status	1	Adult Health Nursing-I	75	67	142	Pass	2	Basic Sciences in Nursing-I	74	76	150	Pass	3	Comm. & Child Health Nursing-I	70	75	145	Pass	<b>Total</b>		<b>219</b>	<b>218</b>	<b>437</b>	<b>72.83%</b>
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NCFN111	Fundamentals of Nursing-I	B+	3.5	6	21																																																																																																																																																																																																																																																																																																																																																																									
NISAP112	Anatomy & Physiology-I	B+	3.5	3	10.5																																																																																																																																																																																																																																																																																																																																																																									
NCCN113	Community Health Nursing-I	B+	3.5	2	7																																																																																																																																																																																																																																																																																																																																																																									
NENG114	English-I	B+	3.5	3	10.5																																																																																																																																																																																																																																																																																																																																																																									
NSNU115	Nutrition	B+	3.5	1	3.5																																																																																																																																																																																																																																																																																																																																																																									
NSMA116	Mathematics	B+	3.5	1	3.5																																																																																																																																																																																																																																																																																																																																																																									
NSCI117	Applied Sciences	A	4	3	12																																																																																																																																																																																																																																																																																																																																																																									
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NCFN121	Fundamentals of Nursing-II	B+	3.5	6	21																																																																																																																																																																																																																																																																																																																																																																									
NSAP122	Anatomy & Physiology-II	B+	3	3	9																																																																																																																																																																																																																																																																																																																																																																									
NCCH123	Community Health Nursing	B+	3	2	6																																																																																																																																																																																																																																																																																																																																																																									
NHET127	Ethics	A	4	1	4																																																																																																																																																																																																																																																																																																																																																																									
NENG124	English-II	B+	3.5	3	10.5																																																																																																																																																																																																																																																																																																																																																																									
NSMB126	Microbiology	C+	2.5	3	7.5																																																																																																																																																																																																																																																																																																																																																																									
NCPC125	Pharmacology	B	3	1	3																																																																																																																																																																																																																																																																																																																																																																									
Course Code	Title	Grade	Grade Point	Credit Hours	Prod.																																																																																																																																																																																																																																																																																																																																																																									
NCAH211	Adult Health Nursing	B+	3.5	12.5	43.75																																																																																																																																																																																																																																																																																																																																																																									
NSPH212	Pathophysiology	C+	2.5	2	5																																																																																																																																																																																																																																																																																																																																																																									
NSNU213	Applied Nutrition-II	B+	3.5	1	3.5																																																																																																																																																																																																																																																																																																																																																																									
NENG214	English-III	B+	3.5	2.5	8.75																																																																																																																																																																																																																																																																																																																																																																									
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NCCH223	Community Health Nursing	C+	2.5	5.5	13.75																																																																																																																																																																																																																																																																																																																																																																									
NHDP221	Development Psychology	B	3	1.5	4.5																																																																																																																																																																																																																																																																																																																																																																									
NCPH222	Child Health Nursing	B+	3.5	7	24.5																																																																																																																																																																																																																																																																																																																																																																									
NENG224	English-IV	C+	2.5	2	5																																																																																																																																																																																																																																																																																																																																																																									
NCTD225	Tropical & Communicable Diseases	C	2	2	4																																																																																																																																																																																																																																																																																																																																																																									
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NU311	Concepts in Nursing (Theory)	B	3	3	9																																																																																																																																																																																																																																																																																																																																																																									
NU311	Concepts in Nursing (Clinical)	B	3	5	15																																																																																																																																																																																																																																																																																																																																																																									
NCHA313	Health Assessment	A	4	3	12																																																																																																																																																																																																																																																																																																																																																																									
NSPH312	Pathophysiology-II	B+	3.5	2	7																																																																																																																																																																																																																																																																																																																																																																									
NENG314	English-V	B+	3.5	3	10.5																																																																																																																																																																																																																																																																																																																																																																									
NSIH315	Islamiat / Ethics	B	3	1	3																																																																																																																																																																																																																																																																																																																																																																									
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NCAH321	Advance Concepts in Nursing (Theory)	B	3	3.5	10.5																																																																																																																																																																																																																																																																																																																																																																									
NCAH321	Advance Concepts in Nursing (Clinical)	B+	3.5	4.5	15.75																																																																																																																																																																																																																																																																																																																																																																									
NSBS322	Introduction to Biostatistics	B+	3.5	3	10.5																																																																																																																																																																																																																																																																																																																																																																									
NCTL323	Teaching & Learning	B	3	3	9																																																																																																																																																																																																																																																																																																																																																																									
NENG324	English-VI	B+	3.5	3	10.5																																																																																																																																																																																																																																																																																																																																																																									
NHPB325	Behavioral Psychology	B+	3.5	2	7																																																																																																																																																																																																																																																																																																																																																																									
NHCS326	Sociology	B+	3.5	2	7																																																																																																																																																																																																																																																																																																																																																																									
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NCHH413	Community Health Nursing (Theory)	C+	2.5	4	10																																																																																																																																																																																																																																																																																																																																																																									
NCHH413	Community Health Nursing (Clinical)	C+	2.5	3	7.5																																																																																																																																																																																																																																																																																																																																																																									
NENG414	English	B	3	3	9																																																																																																																																																																																																																																																																																																																																																																									
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NCLM421	Leadership & Management (Theory)	A	4	4	16																																																																																																																																																																																																																																																																																																																																																																									
NCNE422	Clinical Elective (Clinical)	B+	3.5	6	21																																																																																																																																																																																																																																																																																																																																																																									
NCNS423	Nursing Seminar	A	4	2	8																																																																																																																																																																																																																																																																																																																																																																									
NSNR425	Research	B	3	3	9																																																																																																																																																																																																																																																																																																																																																																									
NHPS412	Pakistan Studies	B	3	2	6																																																																																																																																																																																																																																																																																																																																																																									
NENG424	English	B	3	3	9																																																																																																																																																																																																																																																																																																																																																																									
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