BAHRIA UNIVERSITY, ISLAMABAD

Minutes of the 6th Video Conferenced Meeting of the Faculty Board of Studies (Engineering) on Tuesday 18 February, 2014, at 1400 hrs

1. ATTENDANCE

Present

BUHQ:

1.	M Ehsan Saeed	AAA & Head FBOSs	In chair
2.	Lt Cdr (R) M Younus	ADAA	Secy

BUIC:

3.	Assoc Prof Fazal Wahab	HOD(CS)	Member
4.	Assoc Prof Shaftab Ahmed	HOD(C&SE)	Member
5.	Asstt Prof Dr Najm-ul-Islam	HOD(EE)	Member

BUKC:

6.	Assoc Prof Dr Haroon Rasheed	HOD(EE)	Member
7.	Asstt Prof Dr Humera Farooq	HOD(CS)	Member
8.	Asstt Prof Majid Kaleem	HOD(C&SE)	Member

In attendance

BUKC:

9.	Capt Mohsin Hayat Malik TI(M) PN	Director
10.	Asstt Prof Faraz Humayun	FM(EE)
11.	Asstt Prof Muhammad Khalid	FM(EE)
12.	Prof Dr Misbahuddin	FM(EE)
13.	Lect Ali Ahmed	Subject Expert (C&SE)

2. PROCEEDINGS

A. Preliminaries

Commencement of the Meeting

1. The meeting commenced with recitation from the Holy Quran. Observing that the quorum was complete, the Chairman declared the meeting open. The Chairman welcomed the members and thanked them for making it convenient to attend.

Confirmation of the Minutes of the Last Meeting

2. The Chairman observed that no observation on the minutes of the previous meeting had been received and asked for their confirmation. The Board unanimously confirmed the minutes of the last meeting.

B. Review Items

Item 0501: Concept of "Inter-Semester Semester" for Graduate Programmes
Item 0502: Concept of "Special Study" Project in the Graduate Prog Road Map

3. The Chair informed the Board that HOD(MS)KC, the President of the Committee which *inter alia* was to take up the subject points, had communicated lack of meaningful support for the concept of Independent Study with which the subject two concepts were clubbed, and had requested that the point be dropped. The Chair asked the sponsor, HOD(EE)KC who was also the member of the Committee, his intention viz the two points given the new situation. The sponsor requested that the points be dropped, to which the house agreed.

4. **Decision**: Point dropped.

C. New Points

Item 0601	**BS(CS) Curriculum – Revision of**
Sponsor: HOD(CS)IC	**Supporting Documents:** Working Paper at Appendage 0601

5. HOD(CS)IC, proposed following revisions to the BS(CS) curriculum, with rationale, effective F2014 semester:

a. Clusters of elective courses in BS(CS) be merged into one single list of electives.

b. Format of Course titled "Client Server Programming" be changed from 3+0 to 2+1, to allow students to get hands on training on client server programming.

c. Owing to significant content similarity, course "Computer Organisation & Assembly Language" be merged into "Computer Architecture & Organisation". After merger:

(1) Computer Architecture & Organisation be reformatted to 3+0 (from 3+1) and shifted from the 5th to the 4th semester.

(2) "Computer Architecture & Assembly Language" be removed from the roadmap.

d. "Discrete Mathematics" be shifted from the 4th to the 3rd semester

e. "Technical Report Writing" be shifted from the 3rd to the 6th semester.

f. Course "Entrepreneurship" be added to the roadmap, in the 5th semester.

6. The Board endorsed the proposals unanimously except the one at 5.a which generated some debate. The Chair asked the two HODs to develop a consensus on 5.a and referred the case to the Academic Council for approval, wef F2014.

7. **Decision**: The proposals at paras 5.b to 5.f endorsed and referred to the Academic Council. HODs(CS)IC and KC to develop consensus on proposal at 5.a before presentation to the Council.

» Action: HOD(CS)IC

Item 0602	**BS(IT) Programme – Launch of**
Sponsor: HOD(CS)IC	**Supporting Documents:** Working Paper & Roadmap at Appendage 0602

8. HOD(CS)IC made the case for launching a new programme, BS(IT), in the evening, wef F2014, on the grounds that the number of applicants for the CS programmes had increased significantly in the recent semesters, and that the demand for IT in the market had increased significantly. He added that the evening nature of the programme would ensure optimum utilisation of the university infrastructure. The Chair inquired if marriage of CS (a

science) with IT (a technology) as an academic programme would be technically correct, to which some members replied that such precedents in other universities existed. DKC raised the question of the programme's accreditation by the NCEAC while HOD(EE)IC expressed apprehensions on its success being the first ever bachelors level programme in the evening. After some discussion, the Board concluded that the proposal needed to be backed up with a proper feasibility study, if it were to be tabled at the Academic Council.

9. **Decision.** A proper feasibility study be prepared for launching the BS(IT) Programme at BUIC. Subject to clearance by the Chair, the proposal be tabled at the Academic Council.

» Action: HOD(CS)IC

Item 0603	**MSc(CS) Programme – Launch of**
Sponsor: HOD(CS)IC	**Supporting Documents:** Working Paper & Roapmap at Appendage 0603

10. HOD(CS)IC made the case for launching a new programme, MSc(CS), in the evening, wef F2014, on the grounds that there was a rising demand for CS programmes, that the programme was running successfully in many universities, that it was an attractive choice for students with 14 yrs bachelors education and that most of the courses in the proposed MSc programme were already being offered as part of the BS(CS) programme. HOD(EE)IC and Dr Misbah were concerned about the quality of intake and the product. HOD(C&SE)IC supported the programme commenting that it could serve as a conversion programme for the left-outs. The Board found merit in the proposal and referred it to the Academic Council subject to a proper feasibility study.

11. **Decision.** A proper feasibility study be prepared for launching the MSc(CS) programme at BUIC. Subject to clearance by the Chair, the proposal be tabled at the Academic Council.

» Action: HOD(CS)IC

Item 0604	**PhD(Computer Sciences). Adding two new courses - "Wireless Sensor Networks" and "Mobile & Ad Hoc Networks" - to the programme**
Sponsor: HOD(CS)IC	**Supporting Documents:** Working Paper at Appendage 0604

12. HOD(CS)IC proposed adding two new courses - "Wireless Sensor Networks" and "Mobile & Ad Hoc Networks" - to the roadmap of the PhD programme in Computer Sciences. HOD(EE)KC, otherwise agreeing with the courses outlines, considered the book references for the courses (2005-2010) obsolete. HOD(C&SE)IC suggested improvements in the outline and the books references. An in-depth discussion followed on the learning objectives and methodology of the courses outlines. The Board asked the sponsor to make improvements to the courses outlines and references. Eventually, the Board endorsed the proposal and referred it to the Academic Council.

13. **Decision**: The proposal to add two new courses, "Wireless Sensor Networks" and "Mobile & Ad Hoc Networks", endorsed and referred to the Academic Council. Improvement be made to the outlines of the two courses. Current literature be cited as the course references.

» Action: HOD(MS)IC

Item 0605	**BS(CS) Programme. Addition of 4 Electives**
Sponsor: HOD(CS)KC	**Supporting Documents:** Working Paper at Appendage 0605

14. HOD(CS)KC proposed addition of the following 4 electives to the BS(CS) programme:

a. Emerging Technologies/Special Topics in CS.
b. Entrepreneurship.
c. Network Security & Performance.
d. Mobile and Wireless Communication.

15. During discussion it transpired that while course at 14.a was too open-ended and, thus, prone to misuse, the other three were already listed as electives. The point was, therefore, dropped.

16. **Decision**: Point dropped.

Item 0606	**BS(CS) Programme. Inclusion of Project 1 & Project 2 as Course Load and addition of Course Description/Outline in the Prospective**
Sponsor: HOD(CS)KC	**Supporting Documents:** Working Paper at Appendage 0606

17. HOD(CS)KC tabled the subject case on the following premise:

a. In order to incorporate the recent trend of R&D in FYPs, "Research Methodology" needed to be taught as a complete course in the 7th and 8th semesters.

b. To that end, Project 1 and Project 2 be assigned to a Faculty Member as a complete course. Furthermore, HEC guideline (2009) also recommended 9 hours lab work in each semester for FYP students.

18. The Board discussed the case at length and observed/concluded that:

a. Projects 1 & 2 already formed part of the BS programme.

b. Teaching "Research Methodology" as a course could not be equated with the 9-hr lab work.

c. Through the programme, the students were already being taught how to do research and work on projects, and how to write reports thereon.

d. The rest of the five departments attending the FBOS – CS IC, C&SE IC & KC, and EE IC & KC – did not face such like problem.

e. BU was already giving heavy doses of "Research Methodology" courses at the MS/MPhil and PhD levels, thereby obviating their requirement at the BS level.

f. The case might be rooted in some administrative issue, and not academic, at the CS Dept KC which could be addressed separately through say academic audit.

19. In view of the aforementioned reasons, the Board dropped the point.

20. **Decision**: Point dropped.

Item 0607	**BCS Programme. Barrier in taking Project 1 before completing Credit Hours within 6th Semester**
Sponsor: HOD(CS)IC	**Supporting Documents:** Working Paper at Appendage 0607

21. HOD(CS)KC raised the subject point and proposed that students should complete all courses (106-credit hours) within first six semesters before taking Project-1 (FYP), on the grounds that:

a. Many students could not complete their courses until the 6th semester, some of which might be useful/required for Project-1 (FYP).

b. If studying left-over courses during the project semesters, the students were unable to concentrate on FYP due to study load.

c. The issue led to inaccurate number of actual graduates.

22. The Board observed/concluded that:

a. *De facto*, the proposal was tantamount to making all the 106-credit hours worth of courses (in semesters 1 to 6) the pre-requisites to the FYP, which was unprecedented.

b. Such a step would be harsh for the students. It would also extend their programme durations.

c. It would lead to administrative difficulties when dealing with cases of students who missed out on any courses for any reason(s).

23. In view of the observations made and the conclusions arrived at, the Board dropped the point.

24. **Decision**: Point dropped.

Item 0608	**BCE & BSE Programmes. Revision of Roadmaps**
Sponsor: HOD(C&SE)IC	**Supporting Documents:** Working Paper & Roadmaps at Appendage 0608

25. HOD(C&SE) proposed the following changes to the roadmaps of the BCE and BSE programmes, for implementation wef F2014:

a. For both the BCE and BSE programmes, "Computer Programming" be made the pre-requisite of "Object Oriented Programming" vice "Computer Fundamentals".

b. In the BSE programme, a new core course "Computer Architecture & Organisation (3+1)" be introduced, in the 3rd semester, as a pre-requisite to the "Operating Systems" course. To make room for this course (Computer Architecture & Organisation), the 3rd semester course "Digital Logic Design" be moved to the 2nd semester, and in the 2nd semester "Supporting Elective-1" be deleted.

c. In the BCE programme, a new elective "Introduction to Communication Systems (2+1)" be added to the IDEE-1 list.

26. After a brief discussion, the Board endorsed the proposal and referred it to the Academic Council.

27. **Decision**: Changes to BCE and BSE roadmaps, as proposed in the revised roadmap at Appendage 0608, endorsed and referred to the Academic Council.

» Action: HOD(C&SE)IC

Item 0609	**PhD(SE). Addition of two Electives**
Sponsor: HOD(C&SE)IC	**Supporting Documents:** Working Paper & Roadmaps at Appendage 0609

28. HOD(C&SE) proposed addition of two new electives – "Advanced Web Computing Systems & Applications" and "Service Oriented Computing" – to diversify and strengthen the PhD programme, wef F2014. The Board endorsed the proposal and referred it to the Academic Council.

29. **Decision**: Proposal to add two new electives – "Advanced Web Computing Systems & Applications" and "Service Oriented Computing" – to the PhD roadmap, endorsed and referred to the Academic Council.

» Action: HOD(C&SE)IC

Item 0610	**"Control Engineering" Course's shifting to IDEE1 from IDEE2 Group**
Sponsor: HOD(C&SE)IC	**Supporting Documents:** Working Paper same as at Appendage 0610

30. HOD(C&SE)IC proposed shifting of the course "Control Engineering" from the IDEE2 Group to IDEE1 effect F2012, adding that the proposal involved no change in the roadmap. The Board approved the proposal.

31. **Decision**: Proposal to shift the course "Control Engineering" from the IDEE2 Group to IDEE1 effective F2012, approved.

» Action: HOD(C&SE)IC

Item 0611	**PhD Proposal Defence of Ms Uzma Jamil**
Sponsor: HOD(C&SE)IC	**Supporting Documents:** Working Paper at Appendage 0611

32. HOD(C&SE)IC tabled the case explaining that Ms Uzma Jamil was an HEC PhD scholar whose proposal defence though already cleared by the FDRC needed endorsement by the FBOS which was required by the HEC. The Board endorsed the scholar's proposal defence.

33. **Decision**: Proposal Defence in respect of the PhD scholar Ms Uzma Jamil endorsed as cleared by the FDRC.

» Action: HOD(C&SE)IC

Item 0612	**Merit Scholarship Criteria for MS/MPhil Candidates pursuing Research in place of Coursework**
Sponsor: HOD(C&SE)KC	**Supporting Documents:** Working Paper at Appendage 0612

34. HOD(C&SE)IC explained that the policy on award of merit scholarship at MS/MPhil was ambiguous; MS(SE) research students had to take thesis and 2 courses while coursework students had to do 3 courses, leading to a situation where it became impossible to ascertain who topped the course with the thesis result of research students pending. He suggested that the students be evaluated on the result of their coursework only, irrespective of their number; the student with the best GPA be awarded the merit scholarship.

35. In the ensuing discussion, the Board agreed that the issue raised had university-wide application and that the policy required a review for MS/MPhil students. It was also feared that the current policy would pull the best students away from research towards coursework.

36. **Decision**: Proposal to review the policy on award of merit scholarship at MS/MPhil level endorsed and referred to the Academic Council.

» Action: HOD(C&SE)IC

Item 0613	BSE Programme. Adding "Entrepreneurship & Leadership" as an Elective in the Roadmap
Sponsor: HOD(C&SE)KC	**Supporting Documents:** Working Paper at Appendage 0613

37. HOD(C&SE)KC explained that the course "Entrepreneurship & Leadership" already formed part of the BCE roadmap, and proposed its inclusion in the BSE roadmap too. The Board endorsed the proposal with the proviso that the course code and its title would be in conformity with the University's Course Codes, and referred the proposal to the Academic Council.

38. **Decision**: Proposal to include the course "Entrepreneurship & Leadership" in the BSE roadmap approved with the proviso that the course title and the course code would be in conformity with the University's Course Codes. Proposal referred to the Academic Council.

» Action: HOD(C&SE)KC

Item 0614	BS(EE) Programme. Revision of Roadmap/Curriculum
Sponsor: HOD(EE)IC	**Supporting Documents:** Working Paper at Appendage 0614

39. HOD(EE)IC presented an overview of the BS(EE) roadmap and suggested few minor changes for better realignment with the HEC roadmap-2012, as per the working paper at Appendage 0614. The case was contested by HOD(EE)KC who proposed his own changes through a comparative tabulation of the roadmap. As the Board went over the proposals point-by-point, it was noticed that the changes were far few than were being made to believe and were of minor nature. The Chair asked the two HODs to reach a consensus. The Board endorsed the case and referred it to the Academic Council, with the proviso that the proposals be reconciled by the two HODs.

40. **Decision**: The proposals endorsed and referred to the Academic Council subject to the proviso that HOD(EE)IC and HOD(EE)KC would reach a consensus over them.

» Action: HOD(EE)IC

Item 0615	Inter-Campus Transfer.
Sponsor: HOD(EE)IC	**Supporting Documents:** Working Paper at Appendage 0615

41. In his presentation, HOD(EE)IC expressed apprehensions over the University's policy on inter-campus transfers suggesting that it was prone to misuse and, therefore, required some regulatory controls. To that end, he made a number of proposals. The Board was split on the merit of the case but decided that since it had university-wide application, it merited consideration by the Academic Council.

42. **Decision**: The proposal to introduce regulatory controls over inter-unit transfers referred to the Academic Council for consideration.

» Action: HOD(EE)IC

D. Any Other Points

Item 0616	Medal Award Policy at MS/MPhil Level considered a Disincentive towards Research.
Sponsor: HOD(EE)IC	**Supporting Documents:**

43. HOD(EE)IC raised the point that the policy on award of medals at MS/MPhil put those candidates at a disadvantage who took research instead of coursework. As such, he added, there was increasing trend amongst the top students in the run for medals to take coursework in lieu of research which was a loss to the university. He proposed a review of the situation to provide a level playfield to the students in either category. The Board observed that there was merit in the proposal and, thus, required to be referred to the Academic Council, more so as the case had university-wide application.

44. **Decision**: The proposal to review the medal award criterion at the MS/MPhil level to ensure equal chance of winning medals to the research and non-research students endorsed and referred to the Academic Council.

» Action: HOD(EE)IC

Closing the Meeting

45. There being no further points on the agenda, the Chair declared the meeting closed, at about 1830 hrs.

M EHSAN SAEED
Advisor Academic Affairs &
Head FBOSs

20 February 2014

Distribution (by email):

BUHQ: Rector, Pro-Rector, Registrar, Advisor R&D, DAAudit, DE, DA, DQA, DRD
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Appendage 0601

Subject: Revision – BS(CS) Curriculum

1. Background to the Case

In the departmental board of studies meeting of the CS dept., faculty members were asked to suggest improvements to the existing curriculum of BSCS program. After detailed deliberations, the members recommended few changes which are listed in the next section.

2. Recommendations

- Clusters of elective courses in the BSCS program should be merged into one single list of electives.

- Course titled Client Server Programming which is presently 3+0 should be 2+1 allowing students to get hands on training on client server programming.

- Computer Organization & Assembly Language and Computer Architecture and Organization have significant overlap. It was recommended to combine these courses under one title Computer Architecture and Organization which should be offered as a 3+1 course instead of 3+0. Consequently, the course titled Computer Architecture & Assembly Language should be removed from the roadmap.

- The following changes were also recommended:

    a. Discrete Mathematics should be shifted from 4th to 3rd semester
    b. Technical Report Writing should be shifted from 3rd to 6th Semester.
    c. Computer Architecture and Organization should be shifted from 5th to 4th Semester.

- Course titled "Entrepreneurship" should be added in the roadmap and should be offered in the 5th semester.

3. Establishments/HR Effect if any

NIL

4. Financial Effect

To be worked out later.

DISCUSSION

Appendage 0602

Subject: BS (IT) Program

1. Background to the Case

The department of CS at Bahria University Islamabad campus presently offers BS (CS), MS (TN) and PhD (CS) programs. Recently, the MS (CS) program has also been launched with effect from Spring 2014 semester. It has been observed that the number of applicants in the BS (CS) program has significantly increased during the last couple of years. However, considering the available resources and the requirements of accreditation body (NCEAC in this case), the number of students admitted to the BSCS program is, in general, limited to two sections in the Spring and three sections in the Fall sessions. Considering these factors as well as the revival of the CS/IT industry in the recent years, the BS (IT) program is suggested to be launched with effect from Fall 2014 semester.

2. Recommendations

It is recommended that BS(IT) program may be approved for commencement with effect from Fall 2014 semester. The road map of the said program is attached at Anx-B.

3. Establishments/HR Effect if any

Initially, the program will be mainly conducted by visiting faculty in the evening. Depending upon the response, permanent faculty can be hired at a later stage.

4. Financial Effect

To be worked out later.

DISCUSSION

Council Decision:

Action By:

Deadline (if any):

Road Map

Semester 1:

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
None	GSC-105	Mathematics	3	0	3	
None	CSC-110	Computing Fundamentals	2	0	2	
None	CSL-110	Computing Fundamentals Lab	0	1	1	16
None	ENG-103	English I	3	0	3	
None	ISL-101	Islamic Studies	2	0	2	
None	PAK-101	Pakistan Studies	2	0	2	
None	MGT-110	Introduction to Management	3	0	3	

Semester 2:

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CSC-110	CSC-113	Computer Programming	3	0	3	16
CSC-110	CSL-113	Computer Programming Lab	0	1	1	
None	ACC-101	Principles of Accounting	3	0	3	

CSC-110	CSC-450	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
MGT-110	MGT-210	Technology Management	3	0	3	
NONE	CEN-120	Digital Logic Design	3	0	3	
NONE	CEL-120	Digital Logic Design Lab	0	1	1	17
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	
GSC-105	GSC-221	Discrete Mathematics	3	0	3	

Semester 4:

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
HSS-120	HSS-320	Technical Writing & Presentation Skills	3	0	3	
CSC-113	CSC-221	Data Structure and Algorithm	3	0	3	
CSC-113	CSL-221	Data Structures and Algorithm Lab	0	1	1	20
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	
None	MIS-460	E- Commerce	3	0	3	
None	MGT-626	Project Management	3	0	3	

Semester 5:

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CSC-220	CSC-468	Advanced Databases Management system	2	0	2	20
CSC-220	CSL-468	Advanced Databases Management system Lab	0	1	1	
None	MKT-640	Entrepreneurship	3	0	3	
CSC-210	CSC-313	Visual Programming	2	0	2	
CSC-210	CSL-313	Visual Programming Lab	0	1	1	
CSC-113	SEN-310	Web Engineering	2	0	2	
CSC-113	SEL-310	Web Engineering Lab	0	1	1	
NONE	CEN-222	Data Communication & Networking	3	0	3	
NONE	CEL-222	Data Communication &Networking Lab	0	1	1	
CSC-210	CSC-341	Mobile Application Development	2	0	2	
CSC-210	CSL-341	Mobile Application Development Lab	0	1	1	

Semester 6:

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
None	CSC-320	Operating System	3	0	3	
None	CSL-320	Operating System Lab	0	1	1	
SEN-220	SEN-420	Software Quality Assurance	3	0	3	17
CSC-210	CSC-342	Parallel Programming	2	0	2	
CSC-210	CSL-342	Parallel Programming Lab	0	1	1	
None	HSS-456	Organizational Behavior	0	1	1	
SEN-310	SEN-322	Advanced Web Engineering	2	0	2	
SEN-310	SEL-322	Advanced Web Engineering Lab	0	1	1	
CEN-222	CEN-322	Wireless Comm & Networks	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-l	0	3	3	
SEN-220	SEN-411	Software Testing	3	0	3	
None	SEN-493	Multimedia Systems	2	0	2	18
None	SEL-493	Multimedia Systems Lab	0	1	1	
		Elective-1 (3+0 or 2+1)	3	0	3	
		Elective-2 (3+0 or 2+1)	3	0	3	
SEN-220	SEN-320	Human Computer Interaction	3	0	3	

Semester 8:

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
None	ESC-499	Project-ll	0	3	3	
None	CSC-320	Cloud Computing	3	0	3	12
		Elective-3 (3+0 or 2+1)	3	0	3	
		Elective-4 (3+0 or 2+1)	3	0	3	
			Total Credit Hours			**138**

List of Electives (Cluster-wise)

Pre-requisite	Course code	Course Title	Lec	Lab	CR
CSC-341	CSC-342	Adv Mobile Application Development	3	0	3
MIS-460	MIS-462	E-Commerce Application Development	3	0	3
None	MGT-422	Business Process Management	3	0	3
None	MGT-423	Knowledge Management	3	0	3
CSC-468	CSC-452	Data Mining & Warehousing	3	0	3
CSC-210	CSC-411	Artificial Intelligence	3	0	3
CEN-222	CEN-451	Data Encryption & Security	3	0	3
SEN-310	SEN-421	Semantic Web	3	0	3
SEN-310	CSC-456	Distributed Computing	3	0	3

Appendage 0603

Subject: M.Sc. (Computer Science) Program

Working Paper

1. Background to the Case

It has been observed that the importance of CS/IT and the potential they offer has attracted a large number of students with non-computing backgrounds to computing/IT related programs. The most popular of these conversion programs is the two year MCS program which has been very successfully running in a number of peer Universities. Students with 14 years of education including BSc/B.Com/BA in Sciences, Statistics, Economics or Commerce etc. constitute a significant number and, a two year MSc program is an attractive choice for a large proportion of these students. Most of the courses in the proposed two year MSc program are stream lined with the last four semesters of the already running and effective BS (CS) program.

2. Recommendations

It is recommended that MCS program may be approved for commencement with effect from Fall 2014 semester. The road map of the said program is attached at Anx-A.

3. Establishments/HR Effect if any

Initially, the program will be mainly conducted by visiting faculty. Depending upon the response, permanent faculty can be hired at a later stage.

4. Financial Effect

To be worked out later.

DISCUSSION

Council Decision:

Action By:

Deadline (if any):

Roadmap

Semester 1:

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
None	CEN-120	Digital Logic Design	3	0	4	
None	CEL-120	Digital logic design lab	0	1		
None	HSS-120	Communication Skills	3	0	3	
None	CSC-113	Computer Programming	3	0	4	18
None	CSL-113	Computer Programming lab	0	1		
None	GSC-221	Discrete Mathematics / Structures	3	0	3	
None	CSC-220	Database Management System	3	0	4	
None	CSL-220	Database Management System lab	0	1		

Semester 2:

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CSC-113	CSC-210	Object Oriented Programming	3	0	4	
CSL-113	CSL-210	Object Oriented Programming lab	0	1		
HSS-120	HSS-320	Technical Writing & Presentation Skills	2	0	2	
CEN-120	CEN-221	Computer Architecture & Organization	3	0	3	19
CEN-120	CEL-221	Computer Architecture & Organization Lab		1	1	
None	CSC-315	Theory of Automata	3	0	3	
None	SEN-220	Software Engineering	3	0	3	
CSC-113	SEN-310	Web Engineering	2	0	3	
CSC-113	SEL-310	Web Engineering lab	0	1		

Semester 3:

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CSC-113	CSC-221	Data Structure and Algorithm	3	0	4	
CSC-113	CSL-221	Data Structure and Algorithm lab	0	1		
CSC-315	CSC-323	Compiler Construction	2	0	3	
CSC-315	CSL-323	Compiler Construction lab	0	1		
CEN-221	CSC-320	Operating System	3	0	4	19
CEN-221	CSL-320	Operating System lab	0	1		
NONE	CEN-222	Data Communication and Networking	3	0	4	
None	CEL-222	Data Communication and Networking	0	1		
CSC-210	CSC-313	Visual Programming	3	0	4	
CSC-210	CSL-313	Visual Programming lab	0	1		

Semester 4:

Pre-requisite	Course code	Course Title	Lec	Lab	CR	CR/Sem
CSC-220	SEN-320	Human Computer Interaction	3	0	3	
CEN-222	CEN-451	Data Encryption and Security / Elective –I	3	0	3	
CSC-220	SEN-410	Software Project Management / Elective – II	3	0	3	18
CSC-210	CSC-444	Computer Graphics	2	0	3	
CSC-210	CSL-444	Computer Graphics lab	0	1		
None	ESC-498	Project	0	6	6	

List of Electives

Pre-requisite	Course code	Course Title	Lec	Lab	CR
CSC-321	CSC-521	Advanced Design and Analysis of Algorithm	3	0	3
SEN-310	CSC-456	Distributed Computing	2	0	2
SEN-310	CSL-456	Distributed Computing Lab	0	1	1
SEN-320	SEN-456	Usability Engineering	3	0	3
CSC-323	CSC-451	Theory of Programming Languages	3	0	3

CSC-220	SEN-457	Software Design and Architecture	2	0	2
CSC-220	SEL-457	Software Design and Architecture Lab	0	1	1
CEN-221	CEN-460	Parallel Processing	3	0	3
CSC-220	SEN-458	Software Requirement Engineering	3	0	3
CSC-320	CEN-453	Real Time System	3	0	3
SEN-310	SEN-421	Semantic Web	3	0	3
CSC-468	CSC-452	Data Mining and Warehousing	3	0	3
CSC-444	SEN-493	Multimedia Systems	2	0	2
CSC-444	SEL-493	Multimedia Systems Lab	0	1	1
SEN-310	CSC-484	Content Management	2	0	2
SEN-310	CSL-484	Content Management Lab	0	1	1
CSC-444	CEN-444	Digital Image Processing	3	0	3
CSC-444	CEL-444	Digital Image Processing Lab	0	1	1
GSC-121	CEN-450	Simulation and Modeling	2	0	2
GSC-121	CEL-450	Simulation and Modeling Lab	0	1	1
CSC-444	CSC-486	Geographical Information System	2	0	2
CSC-444	CSC-486	Geographical Information System Lab	0	1	1
NONE	CSC-448	Introduction to Bio-Informatics	3	0	3
NONE	GSC-445	Operation Research	3	0	3
SEN-213	CSC-458	Management Information System	3	0	3
CSC-210	CSC-459	Client Server Programming	3	0	3
CEN-222	EET-455	Wireless Communications	3	0	3
CEN-222	EEL-455	Wireless Communications Lab	0	1	1
CSC-411	CSC-449	Neural Networks& Fuzzy Logic	3	0	3
CSC-411	SEN-455	Knowledge Based Management System	3	0	3
CSC-411	CSC-441	Natural Language Processing	3	0	3
CSC-411	CEN-458	Robotics	3	0	3
CSC-411	CEL-458	Robotics Lab	0	1	1
CSC-411	CSC-466	Introduction Biometrics	2	0	2
CSC-411	CSL-466	Introduction Biometrics Lab	0	1	1
CEN-222	CEN-451	Data Encryption and Security	3	0	3
GSC-210	EEN-313	Signals and Systems	3	0	3
GSC-210	EEL-313	Signals and Systems Lab	0	1	1
CEN-222	EEN-325	Digital Signal Processing	3	0	3
CEN-222	EEL-325	Digital Signal Processing Lab	0	1	1
CEN-221	CEN-321	Microprocessor & Interfacing	3	0	3
CEN-221	CEL-321	Microprocessor & Interfacing Lab	0	1	1
GSC-121	CEN-450	Simulation and Modeling	2	0	2
GSC-121	CEL-450	Simulation and Modeling Lab	0	1	1

Appendage 0604

Subject:

Adding two new courses - "Wireless Sensor Networks" and "Mobile & Ad Hoc Networks" - to the PhD Computer Science programme.

"Wireless Sensor Networks"

1. Background to the Case

Some of the most daunting challenges facing society today deal with healthcare, energy, surveillance, and the environment. This PhD course is predicated on a simple hypothesis: that real-time, high-fidelity data about physical processes can dramatically improve their operation, thereby reducing costs while improving quality of service. The challenge lies not only in manufacturing affordable and scalable instruments but also in the design of communication protocols for these sensor devices for long lasting, reliable and correct collection of data. This course will help PhD students to get background and latest trends in the field of wireless sensor networks.

2. Recommendations

Recommended.

3. Establishments/HR Effect if any

NIL.

4. Financial Effect

NIL.

"Mobile and Ad Hoc Networks"

1. Background to the Case

This course is an advanced research-oriented course designed for PhD students with computer and wireless networks background. The objective of this course is to teach basic and recent trends in mobile ad hoc networking, one of the most challenging fore-fronts of wireless communications. This course is aimed to address issues and challenges in not only Wireless Ad Hoc Networks but also to highlight protocols and trends in Mobile Ad Hoc Networks (MANETs), Vehicular Networks (VANETs), Wireless Mesh Networks (WMNs). Through this course, students will come to know about the state of art research in wireless ad hoc networks, and will enhance their potential to do research in this exciting area.

2. Recommendations: Recommended.

3. Establishments/HR Effect if any: NIL.

4. Financial Effect: NIL.

Appendage 0605

Subject: Addition of Elective Courses in BS (CS)

1. **Background to the Case**

In order to incorporate the latest changes in the technologies/ tools in the field of Computer Sciences. It is observed that students demand for a variety of elective courses in this discipline. Following are the list of proposed electives to be included in BS (CS) program.

1) Emerging Technologies / Special Topics in CS
2) Entrepreneurship
3) Network Security & Performance
4) Mobile and Wireless Communication

2. **Financial Effect** Nil

3. **Recommendation**

It is recommended to add above mentioned elective courses in BS (Cs) program for the prosperity of the program

4. **Establishment / HR Effect if any** Nil

Appendage 0606

Subject: Inclusion of Project 1 and Project 2 as Course Load and Addition of Course Description/Outline in the Prospective

- **Background to the Case**

In order to incorporate the recent trend of Research and Development in Final Year Projects, it is proposed to teach "Research Methodology" as a complete course to the students in 7^{th} and 8^{th} Semester. For this purpose Project 1 and Project 2 may be assigned to a Faculty Member as a complete course. Furthermore, HEC guideline (2009) also recommends 9 hours lab work in each semester for FYP students.

- **Financial Effect** Nil

- **Recommendation** It is recommended to add description of above mentioned courses in BS (CS) program for the prosperity of the program and makes it mandatory to teach in 7^{th} and 8^{th} semester as a workload.

- **Establishment / HR Effect if any** NIL

Appendage 0607

Subject: Barrier in taking Project 1 before completing credit hours within 6th Semester

1. **Background to the Case**

Many of the students are unable to complete their courses until 6th semester before taking Project 1 (FYP). Among these courses few may be those which might be useful in FYP. In addition, these students are also unable to concentrate on FYP due to study load. This issue also led to pass out inaccurate number of graduate from every semester.

2. **Financial Effect** Nil

3. **Recommendation**

It is requested to bring following changes in roadmap to the upcoming ACM meeting. Students should complete all courses until 6th semester before taking Project 1 (FYP).

4. **Establishment / HR Effect if any** Nil.

Appendage 0608

Roadmap Update

Roadmaps of BSE and BCE programs have not been changed since Fall 2010 semester. HEC has released their new guidelines for both the programs. It is recommended that the roadmap should be revised for any possible necessary changes.

Discussion

The new road map guidelines by HEC are identical to that of the current roadmaps. It is therefore decided that the same may be continued. However there are some changes suggested by faculty members regarding prerequisites of courses. Revised roadmaps have been finalized by all Engineering Sciences HODs. They should be used for reference.

Revised Roadmap - BCE

SEMESTER 1

Pre-Req	Course Code	Course Title	Theory	Lab	Total Credit Hours
None	CSC-110	Computing Fundamentals	2	0	2
None	CSL-110	Computing Fundamentals Lab	0	1	1
None	EEN-110	Linear Circuit Analysis	3	0	3
None	EEL-110	Linear Circuit Analysis Lab	0	1	1
None	GSC-110	Applied Calculus & Analytical Geometry	3	0	3
None	GSC-113	Applied Physics	3	0	3
None	GSL-113	Applied Physics Lab	0	1	1
None	ENG-103	English – I	2	0	2
None	ISL-101	Islamic Studies	2	0	2
			15	3	**18**

SEMESTER 2

Pre-Req	Course Code	Course Title	Theory	Lab	Total Credit Hours
None	CEN-120	Digital Logic Design	3	0	3
None	CEL-120	Digital Logic Design Lab	0	1	1
None	CSC-113	Computer Programming	3	0	3
None	CSL-113	Computer Programming Lab	0	1	1
None	GSC-121	Linear Algebra	3	0	3
EEN-110	EEN-211	Electrical Network Analysis	3	0	3
EEL-110	EEL-211	Electrical Network Analysis Lab	0	1	1
None	HSS-120	Communication Skills	3	0	3
None	PAK-101	Pakistan Studies	2	0	2
			17	3	**20**

SEMESTER 3

Pre-Req	Course Code	Course Title	Theory	Lab	Total Credit Hrs
CSC-113	CSC-210	Object Oriented Programming	3	0	3
CSL-113	CSL-210	Object Oriented Programming Lab	0	1	1
GSC-110	GSC-210	Differential Equations	3	0	3
None	CEN-210	Computer Applications in Engineering Design	2	0	2
None	CEL-210	Computer Applications in Engineering Design Lab	0	1	1
EEN-110	EEN-210	Basic Electronics	3	0	3
EEL-110	EEL-210	Basic Electronics Lab	0	1	1
CEN-120	CEN-221	Computer Architecture & Organization	3	0	3
			14	3	**17**

SEMESTER 4

Pre-Req	Course Code	Course Title	Theory	Lab	Total Credit Hrs
CEN-221	CSC-320	Operating Systems	3	0	3
None	CSL-320	Operating Systems Lab	0	1	1
		CE Depth Elective I	3	1	4
CSC-210	CSC-221	Data Structures & Algorithms	3	0	3
CSL-210	CSL-221	Data Structures & Algorithms Lab	0	1	1
GSC-110	GSC-220	Complex Variables & Transforms	3	0	3
CSC-210	CSC-220	Database Management Systems	3	0	3
CSL-210	CSL-220	Database Management Systems Lab	0	1	1
			15	4	**19**

SEMESTER 5

Pre-Req	Course Code	Course Title	Theory	Lab	Total Credit Hours
GSC-121/ GSC-210	GSC-320	Numerical Analysis	3	0	3
GSC-210/ GSC-220	EEN-313	Signals & Systems	3	0	3
None	EEL-313	Signals & Systems Lab	0	1	1
		CE Depth Elective II	3	1	4
		CE Depth Elective III	3	1	4
None	GSC-221	Discrete Mathematics	3	0	3
			15	3	**18**

SEMESTER 6

Pre-Req	Course Code	Course Title	Theory	Lab	Total Credit Hrs
None	GSC-122	Probability & Statistics	3	0	3
None	CEN-222	Data Communication & Networking	3	0	3
None	CEL-222	Data Communication & Networking Lab	0	1	1
CSC-320	CEN-321	Microprocessor & Interfacing	3	0	3
CSL-320	CEL-321	Microprocessor & Interfacing Lab	0	1	1
None	HSS-320	Technical Writing & Presentation Skills	3	0	3
		CE Depth Elective IV	3	1	4
			15	3	**18**

SEMESTER 7

Pre-Req	Course Code	Course Title	Theory	Lab	Total Credit Hrs
None	ESC-498	Project I	0	3	3
None	HSS-411	Engineering Economics & Management	3	0	3
		IDEE-I	3	0	3
		CE Depth Elective V	3	1	4
			9	4	**13**

SEMESTER 8

Pre-Req	Course Code	Course Title	Theory	Lab	Total Credit Hrs
	ESC-499	Project II	0	3	3
None	HSS-421	Entrepreneurship & Leadership	3	0	3
		IDEE-II	3	1	4
None	HSS-422	Engineering Ethics	3	0	3
			9	4	**13**

CE Depth Elective Courses (20 Credit Hrs)

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
CSC-320/ CEN-321	CEN-454	System Programming	4	3	1
EEN-313	EEN-325	Digital Signal Processing	4	3	1
CEN-221	CEN-442	Digital System Design	4	3	1
EEN-210	EEN-224	Electronic Devices & Circuits	4	3	1
CEN-321	CEN-440	Embedded System Design	4	3	1
EEN-210	EEN-442	Digital Electronics	4	3	1
CEN-120	CEN-452	VLSI Design	4	3	1
CSC-320/ CEN-221	CSC-456	Distributed Computing	3	2	1
CEN-120	CEN-443	Fault Tolerant System	4	3	1
CSC-320	CEN-453	Real Time Systems	3	3	0

Inter-Disciplinary Engineering Electives (IDEE) -I (3 Credit Hrs)

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
CSC-411	CSC-449	Neural Networks and Fuzzy logic	3	3	0
CSC-221	CSC-411	Artificial Intelligence	3	2	1
CSC-221	SEN-220	Software Engineering	3	3	0
None	EEN-466	Nanotechnology	3	3	0
EEN-313	EEN-467	Control Engineering	3	3	0
EEN-313	EEN-468	Introduction to Communication Systems	3	2	1

IDEE-II (4 Credit Hrs)

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
None	EEN-444	Opto-electronics	4	3	1
EEN-313	CEN-444	Digital Image Processing	4	3	1
EEN-467	CEN-458	Robotics	4	3	1
CEN-222	EET-456	Telecom. Transmission & Switching Systems	4	3	1
CEN-222	EET-455	Wireless Communication	4	3	1
EEN-468	EEN-411	Digital Communications	4	3	1

PROGRAM SUMMARY	
Duration	4 Years
Number of Semesters	8
Number of weeks per semester	18 (16 for teaching and 2 for exams.)
Total number of credit Hrs	138
Non-Engineering Courses (Minimum)	30 – 35 percent
Engineering Courses (Maximum)	65 – 70 percent

Domain	Knowledge Area	Total Courses	Total Credits	% Overall Cr Hrs
Non-Engineering	Humanities	6	16	32%
	Management Sciences	2	6	
	Natural Sciences	7	22	
	Sub Total	**15**	**44**	
Engineering	Computing	3	10	68%
	Engineering Foundation	8	32	
	Computer Engg. Core (Breadth)	5	19	

	Computer Engg. Depth Electives	5	20	
	Inter-Disciplinary Engineering Breadth (Electives)	2	7	
	Final Year Project	2	6	
	Industrial Training (Summer)	0	0	
	Sub Total	**25**	**94**	
	Grand Total	**40**	**138**	**100%**

Revised Roadmap - BSE

SEMESTER 1

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
None	CSC-110	Computing Fundamentals	2	2	0
None	CSL-110	Computing Fundamentals Lab	1	0	1
None	CSC-113	Computer Programming	3	3	0
None	CSL-113	Computer Programming Lab	1	0	1
None	GSC-110	Applied Calculus & Analytical Geometry	3	3	0
None	GSC-113	Applied Physics	3	3	0
None	GSL-113	Applied Physics Lab	1	0	1
None	ENG-103	English - I	2	2	0
None	ISL-101	Islamic Studies/Ethics (for Non-Muslims)	2	2	0

SEMESTER 2

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
None	GSC-221	Discrete Mathematics	3	3	0
CSC-113	CSC-210	Object Oriented Programming	3	3	0
CSL-113	CSL-210	Object Oriented Programming Lab	1	0	1
None	CEN-120	Digital Logic Design	3	3	0
None	CEL-120	Digital Logic Design Lab	1	0	1
		GE/University Elective I	3	3	0
None	HSS-120	Communication Skills	3	3	0
None	PAK-101	Pakistan Studies	2	2	0

SEMESTER 3

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
CSC-210	SEN-210	Introduction to Software Engineering	3	3	0
CSC-210	CSC-221	Data Structures & Algorithms	3	3	0
CSL-210	CSL-221	Data Structures & Algorithms Lab	1	0	1
CEN-120	CEN-221	Computer Architecture & Organization	3	3	0
None	GSC-121	Linear Algebra	3	3	0
		GE/University Elective II	3	3	0

SEMESTER 4

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
CEN-221	CSC-320	Operating Systems	3	3	0
None	CSL-320	Operating Systems Lab	1	0	1
		Supporting Elective I	3	3	0
None		SE Elective I	3	3	0
CSC-113	CSC-220	Database Management Systems	3	3	0

CSL-113	CSL-220	Database Management Systems Lab	1	0	1
None	HSS-320	Technical Writing & Presentation Skills	3	3	0

SEMESTER 5

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
SEN-210	SEN-458	Software Requirements Engineering	3	3	0
None	GSC-122	Probability & Statistics	3	3	0
CEN-120	CEN-222	Data Communication & Networking	3	3	0
CEL-120	CEL-222	Data Communication & Networking Lab	1	0	1
GSC-221	SEN-311	Software Construction	2	2	0
	SEL-311	Software Construction Lab	1	0	1
		Supporting Elective II	3	3	0
		GE/University Elective III	3	3	0

SEMESTER 6

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
None	SEN-320	Human Computer Interaction	3	3	0
SEN-312	SEN-420	Software Quality Assurance	3	3	0
SEN-312	SEN-457	Software Design & Architecture	2	2	0
SEL-312	SEL-457	Software Design & Architecture Lab	1	0	1
GSC-221	SEN-323	Formal Methods in Software Engineering	3	3	0
		SE Elective II	3	3	0
		SE Application Domain Elective –I	3	3	0

SEMESTER 7

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
	ESC-498	Project I	3	3	0
SEN-210	SEN-410	Software Project Management	3	3	0
None	HSS-422	Engineering Ethics	3	3	0
		SE Application Domain Elective –II	3	3	0
		GE/University Elective IV	3	3	0

SEMESTER 8

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
	ESC-499	Project II	3	3	0
		SE Elective III	3	3	0
		SE Elective IV	3	3	0
		SE Elective V	3	3	0

Software Engineering Elective Courses -15 Credit Hours

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
SEN-210	SEN-440	Software Engineering Economics	3	3	0
SEN-210	SEN-449	Business Process Automation	3	3	0
None	SEN-453	Information System Audit	3	3	0
None	SEN-450	Design Patterns	3	3	0
SEN-210	SEN-447	Software Testing	3	3	0
CSC-113	SEN-448	Software Applications for Mobile Devices	3	3	0
SEN-210	SEN-451	PSP and TSP	3	3	0
CSC-210	CSC-456	Distributed Computing	3	2	1

CSC-113	SEN-443	Introduction to Soft Computing	3	2	1
CSC-320	CEN-453	Real Time systems	3	3	0
CSC-220	CSC-452	Data Mining and Warehousing	3	3	0
CSC-210	CSC-411	Artificial Intelligence	3	2	1
CEN-222	CEN-451	Data Encryption and Security	3	3	0
SEN-120	GSC-221	Discrete Mathematics	3	3	0
None	CSC-315	Theory of Automata	3	3	0
CSC-320	CEN-321	Microprocessors & Interfacing	3	3	0
CSC-221	CSC-321	Data and Analysis of Algorithms	3	3	0
CSC-113	CSC-445	Principles of Programming Languages	3	3	0
CSC-113	CSC-444	Computer Graphics	3	2	1
None	CSC-449	Neural Networks & Fuzzy Logic	3	3	0
CSC-220	CSC-468	Advanced Database Management Systems	3	3	0
None	CSC-448	Introduction to Bio-Informatics	3	3	0
CSC-113	SEN-310	Web-Engineering	3	2	1
CSC-113	CSC-313	Visual Programming	3	2	1
CSC-113	SEN-445	Advanced Internet Applications	3	3	0

Supporting Elective Courses – 6 Credit Hours

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
GSC-110	GSC-320	Numerical Analysis	3	3	0
GSC-113	GSC-446	Physics-II(Mechanics)	3	3	0
None	GSC-441	Bio-Chemistry	3	3	0
None	GSC-442	Biology/ Genetics	3	3	0
EEN-210	EEN-442	Digital Electronics	4	3	1
SEN-210	SEN-440	Software Engineering Economics	3	3	0
GSC-113	EEN-210	Basic Electronics	4	3	1
CSC-113	SEN-441	Mathematical tools for Software Engineering	3	3	0
GSC-120/ GSC-310	GSC-445	Operation Research	3	3	0
GSC-310	CEN-450	Simulation and Modeling	3	2	1
CSC-113	CSC-441	Natural Language Processing	3	3	0
GSC-110	GSC-220	Complex Variables and Transforms	3	3	0

General Elective/University Elective Courses–12 Credit Hours

Pre-Req	Course Code	Course Title	Total Credit Hrs	Theory	Lab
None	HSS-452	English Literature	3	3	0
None	ECO-457	Economics	3	3	0
None	HSS-202	Introduction to Sociology	3	3	0
None	PHY-101	Introduction to Psychology	3	3	0
None	HSS-111	Introduction to International Relations	3	3	0
None	HSS-459	Foreign Language (Arabic, French etc.)	3	3	0
None	SEN-453	Information System Audit	3	3	0
None	MGT-353	Principles of Management	3	3	0
None	HSS-454	Human Resource Management	3	3	0
None	HSS-460	Marketing	3	3	0
None	HSS-461	Accounting & Finance	3	3	0
None	HSS-456	Organizational Behavior	3	3	0
None	HSS-115	Introduction to Media Studies	3	3	0
None	HSS-201	Introduction to Anthropology	3	3	0

Domain Specific Elective Courses – 6 Credit Hours

Sr. #	Domain Name	Proposed Courses
1.	Enterprise Systems Engineering	CEN-451 Data Encryption and Security CSC-458 Management Information System
2.	Information Systems and Data Processing	CSC-453 Data mining & warehousing CSC-458 Management Information System
3.	Fault Tolerant and Survivable Systems	CEN-453 Real Time Systems SEN-311 Formal methods and specification SEN-423 Fault Tolerant Systems
4.	Bio-medical Systems	CSC-448 Introduction to Bio-informatics CEN-444 Digital Image Processing
5.	Multimedia, game, and entertainment Systems	SEN-320 Human Computer Interaction EET-452 Multimedia Communication CSC-444 Computer Graphics SEN-448 Software Applications for Mobile Devices
6.	Agent based Systems	CSC-411 Artificial Intelligence CSC-448 Neural Networks & Fuzzy Logic

PROGRAM SUMMARY	
Duration	4 Years
Number of Semesters	8
Number of weeks per semester	18 (16 for teaching and 2 for exams.)
Total number of credit hours	135
Non-Engineering Courses (Minimum)	37%
Engineering Courses (Maximum)	63%

Domain	Knowledge Area	Total Courses	Total Credits	% Overall Cr Hrs
Non-Engineering	Supporting Studies (Maths/Science)	8	22	37%
	General Education	9	28	
	Sub Total	**17**	**50**	
Engineering	Computing Core Courses	13	40	**63%**
	Required Software Engg Courses	5	18	
	Elective Software Engg Courses	4	15	
	Final Year Project	2	6	
	Domain Specific Elective Courses	2	6	
	Sub Total	**26**	**85**	
	Grand Total	**43**	**135**	**100%**

Course Title: Intro to Communication Systems

Prerequisite: ESEE-302 Signals and Systems

Learning Outcomes:

This course provides the foundational education in analog and digital communication system analysis and design.

1. Analyze and design basic communications systems, particularly with application to noise-free analog and digital communications.

2. Apply concepts and techniques from Fourier analysis and circuit analysis to communication systems.

3. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.

Contents:

INTRODUCTION

Communication systems; analog and digital messages; signal-to-noise ratio, the channel bandwidth, and the rate of communication; modulation

REVIEW OF FOURIER ANALYSIS

Aperiodic signal representation by Fourier integral; transforms of some useful functions; some properties of the Fourier transform; signal transmission through a linear system; ideal and practical filters; signal distortion over a communication channel; signal energy and energy spectral density; signal power and power spectral density; numerical computation of the Fourier transform: the DFT.

AMPLITUDE (LINEAR) MODULATION

Baseband and carrier communication; amplitude modulation: double standard (DSB); amplitude modulation (AM); quadrature amplitude modulation (QAM); amplitude modulation: single sideband (SSB); amplitude modulation: vestigial sideband (VSB); carrier acquisition; superheterodyne AM receiver

ANGLE (EXPONENTIAL) MODULATION

Concept of instantaneous frequency; bandwidth of angle-modulated wave; generation of FM waves; demodulation of FM; FM receiver

SAMPLING AND THE PULSE CODE MODULAION

Sampling theorem; pulse-code modulation; differential pulse code modulation (DPCM); delta modulation

PRINCIPLES OF DIGITAL DATA TRANSMISSION

A digital communication system; line coding; pulse shaping; M-ary communication; digital carrier systems; digital multiplexing

SOME RECENT DEVELOPMENTS AND MISCELLANEOUS TOPICS

Reference Book(s):

1. Modern Digital and Analog Communication Systems, 3rd Ed. B.P. Lathi
2. Jeffrey S. Beasley & Gary M. Miller “Modern Electronic Communication” 8th Ed.
3. Louis E., Frenzel, “Communication Electronics” 2nd Ed.
4. G. Kennedy & B. Davis., “Electronic Communication Systems”, 4th Ed.
5. Simon Haykin, “Communication Systems” 4th Ed.

Simon Haykin, “An Introduction to Analog and Digital Communications”

Appendage 0609

Addition of new courses in electives list of PhD SE Program

The new courses of ”Advanced Web Computing Systems and Applications” and “Service Oriented Computing” be included in PhD Software Engineering program to diversify and strengthen the PhD program. Course outline is attached.

The courses are helpful and may be included in the program as both areas of Web applications and systems and Service Oriented Architecture are under active research. The proposed course outline covers important research areas that might help the PhD as well as MS students to take up their research in these areas.

Course Outline and Weekly Plan for new PhD

Advanced Web Computing Systems and Applications	
Course Code:	SEN-754
Credit Hours:	3+0
Prerequisites:	1. Software Engineering 2. Object Oriented Programming
Objectives:	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.
Level of course	PhD, MS/ MPhil students in the field may take this course
Course outline:	Introduction to Internet & Web Applications, Requirements Engineering Issues of Web Applications, Web Application Architectures, Modeling & Design Perspectives of Web Applications, Technology Specific Perspective of Web, Operations & Maintenance of Web Applications, Web Application Testing, Usability Challenges of Web Applications, Semantic Web, Web 2.0, Search Engine Optimization, Web Services & Service Oriented Architecture, Social Networks, Web as e-Commerce & e-Learning Platform, Project Management issues in Web Applications.
Resources:	1. Emilia Mendes, Nile Mosley (Eds.) (2006) “Web Engineering”, Springer. 2. Relevant Research Papers from Journals/Conferences.

Sixteen Week Lesson Plan

Week-1:	Introduction to Internet & Web Applications
Week-2:	Requirements Engineering Issues of Web Applications
Week-3:	Web Systems & Application Architectures
Week-4:	Modeling & Design Issues of Web Systems
Week-5:	Technology Specific Perspective of Web
Week-6:	Operations & Maintenance of Web Applications
Week-7:	Web Application Testing
Week-8:	Usability Challenges of Web Applications
Week-9:	Semantic Web
Week-10:	Web 2.0
Week-11:	Search Engine Optimization

Week-12:	Web Services & Service Oriented Architecture
Week-13:	Social Networks
Week-14:	Web as an e-Commerce Platform
Week-15:	Web as an e-Learning Platform.
Week-16:	Project Management issues in Web Applications

Service Oriented Computing	
Course Code:	SEN-755
Credit Hours:	3+0
Prerequisites:	**1.** Software Engineering **2.** Software Design & Architecture
Objectives:	After completing the course the students will be able to understand the fundamental concepts and technologies relevant to Service Oriented Computing. Moreover, the students will get themselves familiarized with the latest trends and challenges associated in the domain of Service Oriented Computing helping them to find relevant research problems to further carry on during their PhD/MS research.
Level of course	PhD, MS/ MPhil students in the field may take this course
Course outline:	Overview of Service Oriented Computing, Service Oriented Architecture (SOA), RE techniques for Service Oriented Applications, Conceptual Modelling of Service Oriented Applications, Web Services, Business Process Management and SOA, Service Orchestration & Choreograhy, Composite Web Services, QoS issues in SOC, Dynamic Web Services, SLA and agreements in SOA, Service Reusability, Selected Topics in SOC.
Resources:	1. Dimitrios Georgakopoulos and Michael P. Papazoglou (Editors), (2009), "Service Oriented Computing", MIT Press. 2. Munindar P. Singh, Michael N. Huhns (2005) "SERVICE-ORIENTED COMPUTING: Semantics, Processes, Agents" John Wiley & Sons. 3. Relevant Research Papers.

Sixteen Week Lesson Plan

Week-1:	Overview of Service Oriented Computing
Week-2:	Service Oriented Architecture (SOA)
Week-3:	Web Services- Core building blocks of SOA
Week-4:	RE techniques for Service Oriented Applications
Week-5:	Conceptual Modeling of Service Oriented Applications
Week-6:	Conceptual Modeling of Service Oriented Applications
Week-7:	Business Process Management and SOA
Week-8:	Service Orchestration & Choreography
Week-9:	Service Orchestration & Choreography
Week-10:	Composite Web Services
Week-11:	Quality of Service (QoS) issues in SOC
Week-12:	Dynamic Web Service Selection and Reconfiguration
Week-13:	SLA and agreements in SOA
Week-14:	Service Reusability
Week-15:	Selected Topics in SOC.
Week-16:	Selected Topics in SOC.

Appendage 0610

"Control Engineering" Course's shifting to IDEE1 from IDEE2 Group

Working Paper and Roadmap same as at Appendix 0608

Appendage 0611

PhD Proposal Defence of Ms Uzma Jamil

1. As per Bahria University PhD regulation 27.3, Ms. Uzma Jamil,Registration No. 29861 defended her PhD proposal (multimedia presentation) in front of a panel of experts (selected by FDRC).
2. In the 4th FDRC meeting held on December 13, 2013, panel of experts to evaluate the proposal was approved by the FDRC. The panel included Dr. Imran Siddiqi, Dr. Muhammad Muzammil, Dr. M. Ali Shami and Dr. Usman Akram. The proposal defense was held on 6th Jan 2014 at 11:30 am in LT- 2 in NC Building.
3. The members of selected panel unanimously decided that Ms. Uzma Jamil meets the requirements for her research proposal and recommended the proposal for research.

The DBOS recommended to endorse the approval of PhD Proposal Defense

Appendage 0612

Merit Scholarship Criteria for MS/MPhil Candidates pursuing Research in place of Coursework

Scholarship policy for students in 3rd semester of MS SE is ambiguous. The students doing Thesis have to take 2 courses while students taking courses in place of these take 3 courses. Hence, at the time of result, it is un clear that which student has topped the batch as result for 3 credits of the thesis is pending. Clarification is needed on this part.

Scholarships are awarded to the batch topper students. The policy in practice lacks clarification and it is understood that a illumination is necessary. It is suggested that students taking 3 courses may be evaluated from the result of 3 courses and students taking thesis may be evaluated from the result of 2 courses they study. The student having greater GPA may be awarded the scholarship.

Appendage 0613

ADDING ENTREPRENEURSHIP AND LEADERSHIP AS AN ELECTIVE COURSE IN BSE ROADMAP

1. Background to the Case

It is no longer enough to come out of school with a purely technical education; engineers need to be entrepreneurial in order to understand and contribute in the context of market and business pressures. For engineers who start companies soon after graduation, entrepreneurship education gives them solid experience in product design and development, prototyping, technology trends, and market analysis. These skills are just as relevant for success in established enterprises as they are in startups; students with entrepreneurial training who join established firms are better prepared to become effective team members and managers and can better support their employers as innovators.

Entrepreneurship education teaches engineering students in all disciplines the knowledge, tools, and attitudes that are required to identify opportunities and bring them to life. Students who take part in entrepreneurship programs as undergraduates gain insights not available from traditional engineering education, such as understanding and designing for end users, working in and managing interdisciplinary teams, communicating effectively, thinking critically, understanding business basics, and solving open-ended problems.

The course "Entrepreneurship and Leadership" is also available in BCE program as a core course in the 8th semester and in 3+0 format.

2. Financial Effect Nil

3. Recommendations

DBOS unanimously recommends that the inclusion of "Entrepreneurship and Leadership" be made as a General/University elective course for intake batches 2011 and onward and to be offered to 7th or 8th semester students.

4. Establishment/HR effect if any Nil

Appendage 0614

Subject: Revision of Roadmap / Curriculum of BS(EE) Program

Background to the Case

1. The current roadmap of BEE program was adopted by BU in 2011, and three academic years have passed since then. As per the academic norm, the Curriculum / Roadmap needs a revision.
2. HEC has already provided the curriculum back in 2012, and wrote a letter to BU in 2013 asking for compliance of the revised roadmap. BU then assured of reviewing and opting the revised HEC curriculum by Fall'14.
3. The attached document contains Roadmap, and the Pre-Requisite Information.
4. The revised roadmap is inline with the HEC guidelines.

Financial Effect Total Credit Hours changed from 137 to 138

Recommendation

The revised roadmap be approved for presentation in the 22nd ACM.

Establishment / HR Effect if any Nil

Semester 1

Course Code	Pre Requisite	Course Title	Credit Hours
GSC110	None	Calculus and Analytical Geometry	3+0
CSC111	None	Introduction to Computing	1+1
ENG103	None	Functional English	2+0
ISL101	None	Islamic Studies/ Ethics	2+0
ESC111	None	Basic Mechanical Engineering	2+0
EEN110	None	Linear Circuit Analysis	3+1
EEL 112	None	Workshop Practice	0+1
Total			**13+3**

Semester 2

Course Code	Pre Requisite	Course Title	Credit Hours
EEL121	None	Engineering Drawing & CAD	0+1
GSC121	None	Linear Algebra	3+0
CSC113	CSC111 (Introduction to Computing)	Programming Fundamentals	2+1
GSC113	None	Applied Physics	3+1
EEN211	EEN110 (Linear Circuit Analysis)	Electrical Network Analysis	3+1
PAK101	None	Pakistan Studies	2+0
Total			**13+4**

Semester 3

Course Code	Pre Requisite	Course Title	Credit Hours
GSC210	GSC110 (Calculus and Analytical Geometry)	Differential Equations	3+0
EEN110	EEN110 (Linear Circuit Analysis)	Electronics 1	3+1
CEN120	None	Digital Logic Design	3+1
CSC221	CSC113 (Programming Fundamentals)	Data Structures and Algorithms	3+1
GSC220	GSC110 (Calculus and Analytical Geometry)	Complex Variables and Transforms	3+0
Total			**15+3**

Semester 4

Course Code	Pre Requisite	Course Title	Credit Hours
HSS120	None	Communication Skills	3+0
EEN224	EEN210 (Electronics 1)	Electronics 2	3+1
EEN313	EEN211 (Electrical Network Analysis) GSC220 (Complex Variables and Transforms)	Signals and Systems	3+1
CEN221	CEN120 (Digital Logic Design)	Computer Architecture & Organization	3+1
EEN212	GSC110 (Calculus and Analytical Geometry)	Probability Methods in Engineering	3+0
Total			**15+3**

Semester 5

Course Code	Pre Requisite	Course Title	Credit Hours
CEN321	CEN120	Microprocessors and Interfacing	3+1
GSC122	GSC210 (Differential Equations) GSC110 (Calculus and Analytical Geometry)	Numerical Analysis	3+0
HSSXXX	None	Social Sciences Elective	3+0
EET321	EEN313 (Signals and Systems) EEN212 (Probability Methods in Engineering)	Communication Systems	3+1
EEN221	EEN110 (Linear Circuit Analysis)	Electrical Machines	3+1
Total			**15+3**

Semester 6

Course Code	Pre Requisite	Course Title	Credit Hours
EEN316	EEN211 (Electrical Network Analysis) CEN120 (Digital Logic Design) / EET321 (Communication Systems)	Instrumentation & Measurements (Electronics only) / Computer Communication Networks (Tele communication only)	3+1
EEN412	EEN313 (Signals and Systems)	Linear Control Systems	3+1
HSS411	None	Engineering Economics & Management	3+0
EEXXXX	XXX	Elective 1	3+1
EEN311	GSC110 (Calculus and Analytical Geometry)	Electromagnetic Field Theory	3+0
Total			**15+3**

Semester 7

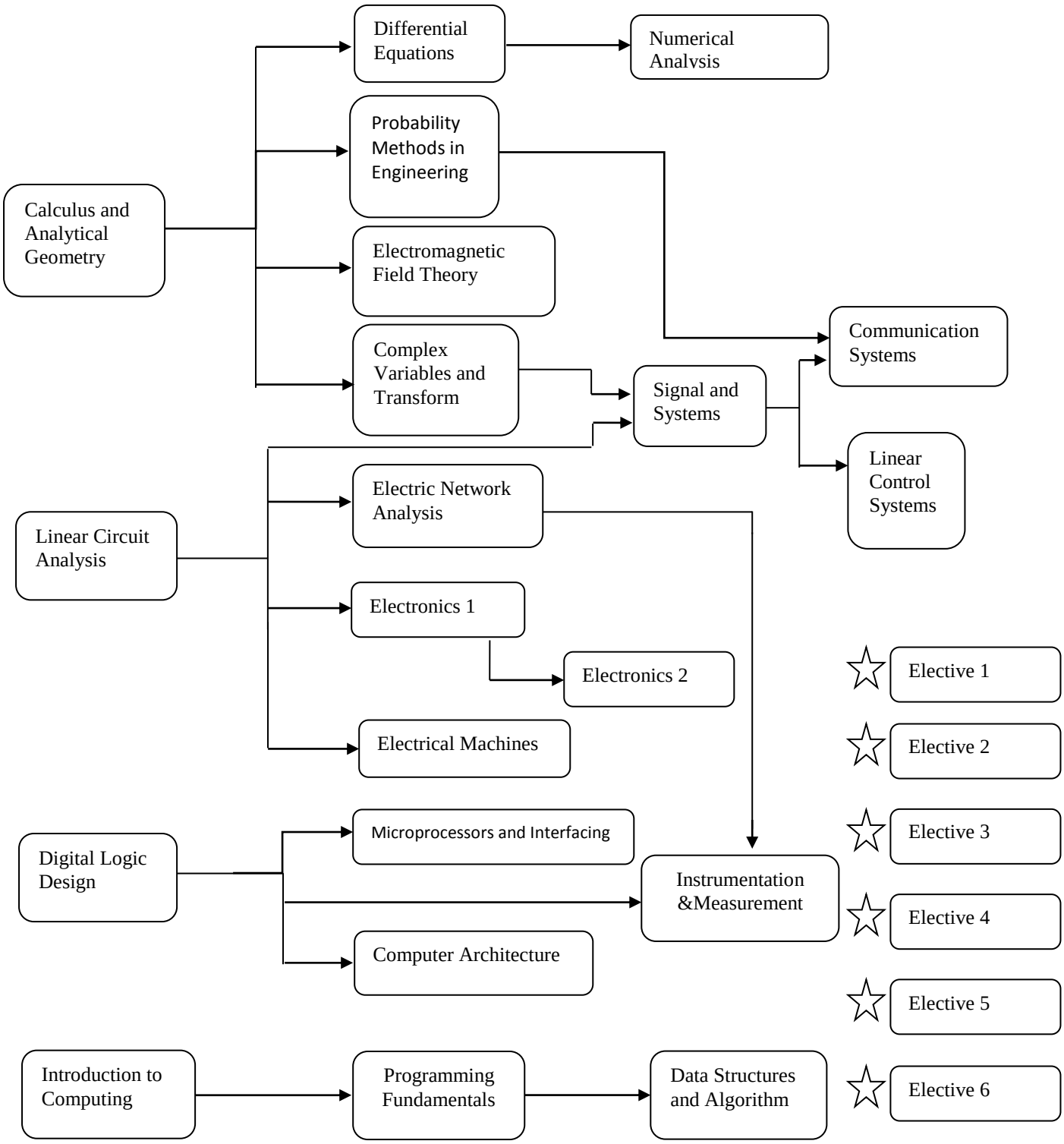
Course Code	Pre Requisite	Course Title	Credit Hours
ESC498	None	Senior Design Project – 1	0+3
HSS320	None	Tech. Writing & Present. Skills	3+0
EEXXX	XXXX	Elective 2	3+1
EEXXX	XXXX	Elective 3	3+1
EEXXX	XXXX	Elective 4	3+1
Total			**12+6**

Semester 8

Course Code	Pre Requisite	Course Title	Credit Hours
ESC499	XXXX	Senior Design Project – 2	0+3
HSS424	None	Engineering Ethics	2+0
HSS423	None	Entrepreneurship	2+0
EEXXXX	XXXX	Elective 5	3+1
EEXXXX	XXXX	Elective 6	3+1
Total			**10+5**

Total Credit Hours= 138 Credit Hours

Pre-Requisite Courses (BEE)



Pre-Requisites of Courses

- **Calculus and Analytic Geometry**
  Prerequisites: None
- **Differential Equations**
  Prerequisites: Calculus and Analytical Geometry
- **Numerical Analysis**
  Prerequisites: Differential Equations, Calculus & Analytical Geometry
- **Programming Fundamentals**

Prerequisites: Introduction to Computing

- **Data Structures & Algorithms**
  Prerequisites: Programming Fundamentals
- **Electrical Network Analysis**
  Prerequisites: Linear Circuit Analysis
- **Electronics1**
  Prerequisites: Linear Circuit Analysis
- **Probability Methods in Engineering**
  Prerequisites: Calculus and Analytical Geometry
- **Microprocessor Systems**
  Prerequisites: Digital Logic Design
- **Signals and Systems**
  Prerequisites: Complex Variables and Transforms
- **Electromagnetic Field Theory**
  Prerequisite: Calculus & Analytical geometry
- **Communications Systems**
  Prerequisites: Signals and Systems, Probability Methods in Engineering
- **Electrical Machines**
  Prerequisites: Linear Circuit Analysis
- **Linear Control System**
  Prerequisites: Signals and Systems
- **Power Distribution and Utilization**
  Prerequisite: Electrical Network Analysis
- **Instrumentation and Measurements**
  Prerequisite: Electrical Network Analysis, Digital Logic Design
- **Electronics2**
  Prerequisite*:* Electronics1
- **Computer Communication Networks**
  Prerequisites: Signals & Systems
- **Computer Architecture & Organization**
  Prerequisites: Digital Logic Design
- **Digital Communication**
  Prerequisites: Communication Systems
- **Optical Communication**
  Prerequisites: Applied Physics, Communication Systems
- **Wireless Communication**
  Prerequisites: Communication Systems
- **Mobile Communication Systems**
  Prerequisites: Communication Systems
- **Navigation and Radar Systems**
  Prerequisites: Electromagnetic Field Theory
- **Wave Propagation and Antennas**
  Prerequisites: Electromagnetic Field Theory
- **Digital Signal Processing**
  Prerequisites: Signals and Systems
- **Information Theory and Coding**
  Prerequisites: Communication Systems
- **Transmission and Switching**
  Prerequisites: Communication Systems
- **Power System Analysis**
  Prerequisite: Electrical Network Analysis

- **Opto-Electronics**
  Prerequisite*:* Applied Physics
- **FPGA-Based System Design**
  Prerequisite: Digital Logic Design
- **VLSI Design**
  Prerequisite*:* Electronics 2

- **Embedded System Design**
  Prerequisite*:* Programming Fundamentals, Digital Logic Design
- **Industrial Electronics**
  Prerequisite: Power Electronics
- **Digital Control Systems**
  Prerequisite: Control Systems

Appendage 0615

Subject: Transfers between Campuses / Constituent Units

Background to the Case

1. The existing rules of BU (student handbook clause 1.20) allow students to transfer between Karachi and Islamabad campuses with approval from the Head CU. The students need to apply 4 weeks before the intended date of joining at the other campus.

2. The existing rules don't require an approval from the intended Host Department or the CU. The Engineering programs are accredited with a cap on the Intake. The admission at BU is on open merit system and the students may get admission at one campus with lower merit and then move to other.

3. Transfer during the semester causes a lot of administrative issues, and results / attendance records require updating which is not possible if the students apply for transfer after the midterm.

Financial Effect **Nil**

Recommendation

1. Transfer only be allowed during the semester break i.e. The students can only join the other campus at the start of next semester once they apply for transfer.

2. The application be filed at least 8 weeks before the intended date of joining and the intended host CU approval be required.

3. The approval be given on the basis of seats available at the Host department and CU based on the recommendation of the accreditation bodies.

Establishment / HR Effect if any Nil