

Minutes of the 20th
Meeting of the Board of Studies
Faculty of Engineering Sciences
held on
20th February, 17th March and 3rd June, 2020
through VLC



Bahria University Islamabad

Contents

<i>PROCEEDINGS</i>	3
<i>NEW ITEMS: 4</i>	
<i>ITEM 2001: REVISION OF QA SURVEY FORMS FOR ALUMNI, EMPLOYER, GRADUATING STUDENTS, INTERNSHIP AND CSP.</i>	4
ITEM 2002: REPLACEMENT OF ELECTIVE COURSES IN MSEE PROGRAM	4
ITEM 2003: ANALYSIS OF LOW INTAKE AND STUDENTS DROPOUT RATION IN EE DEPARTMENT	5
ITEM 2004: REVISED MAPPING OF PLOS TO PEOS.....	5
ITEM 2006: ADDITION OF LAB COMPONENTS	6
ITEM 2007: REVISION OF PEOS.....	7
ITEM 2009: UPDATION OF KPIS AND INDIRECT ASSESSMENT METHODS (FEEDBACK FORMS)	9
ITEM 2010: MSEE ROADMAP	9
ITEM 2011: RESTRUCTURING OF BS GEO PHYSICS PROGRAM. BACHELOR OF SCIENCE IN GEO SCIENCES	10
(WITH SPECIALIZATION: MARINE GEOLOGY; MARINE GEOPHYSICS; GIS & REMOTE SENSING).....	10
ITEM 2012: ESTABLISHMENT OF GEOSCIENCE RESEARCH CENTER (GRC)	12
ITEM 2013: PROPOSAL TO SUBMIT THESIS-I RESULT VIA CMS	13
ITEM 2014: FINAL YEAR PROJECT RESULT SUBMISSION VIA CMS	13
ITEM 2015: SUGGESTIONS TO IMPROVE CMS	13
ITEM 2016: ILP PROGRAM IN ADDITION TO THE CSP AND INTERNSHIP.....	14
ITEM 2017: MODIFICATION IN THE ELIGIBILITY CRITERION OF BS(CS)& BS(IT) PROGRAMS.	14
ITEM 2018: FINALIZATION OF OBE SOFTWARE & ITS INTEGRATION WITH CMS/LMS	15
<i>CLOSING OF THE MEETING</i>	15
<i>APPENDAGES:</i>	17
APPENDAGE 2001.....	17
APPENDAGE 2003.....	23
APPENDAGE 2004.....	26
APPENDAGE 2005.....	29
APPENDAGE 2010.....	30
APPENDAGE 2011.....	37
APPENDAGE 2017.....	54

Minutes of the 20th Meeting of Faculty Board of Studies Engineering Sciences held on 20th, 17th March & 3rd June, 2020 through Video Conferencing

Attendance:

BUIC

Prof. Dr. Atif Raza Jafri	Dean ES	Chair
Snr. Prof. Dr. Tahseen Ullah Khan	HoD(E&ES)	Member
Snr. Assoc. Prof. Dr. Muhammad Muzammal	HoD(CS)	Member
Snr. Assoc. Prof. Dr. Awais Majeed	HoD(SE)	Member
Snr. Asst. Prof. Dr. Khalid Javed	HoD(CE)	Member
Asst. Prof. Dr. Junaid Imtiaz	HoD(EE)	Member

BUKC

Snr. Prof. Dr. Haroon Rashid/Snr. Asst. Prof. Dr. Najam M. Amin	HoD(EE)	Member
Prof. Dr. Syed Shahid Ali	HoD(E&ES)	Member
Assoc. Prof. Dr. Syed Safdar Ali	HoD(CS)	Member
Assoc. Prof. Dr. Sohaib Ahmad	HoD(SE)	Member
Snr. Asst. Prof. Dr. Rizwan Iqbal	HoD(CE)	Member

BULC

Snr. Asst. Prof. Dr. Khawaja Qasim Maqbool	HOD(CS)	Member
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Proceedings

Preliminaries

FBoS-ES meeting took place on three days; in first session, with the quorum complete, the proceedings commenced at 0930 hrs, with recitation from the Holy Quran on 20th February, 2020.

The second session of FBoS took place on 17th March, 2020, with the quorum complete; the proceedings commenced at 0930 hrs.

The third session of FBoS held on 3rd June, 2020. Proceedings of the meeting commenced with the recitation of Holy Quran at 1000 hrs.

In his opening remarks, the Chair stressed the importance for participation in the proceedings while staying focused on the point under deliberation.

New Items:

Item 2001: Revision of QA Survey forms for Alumni, Employer, Graduating Students, Internship and CSP.

Sponsor: HOD (EE)BUKC

Referral Authority: DBoS EE BUKC

Summary of the Case

Following points were discussed in DBoS related to survey forms:

- i. QA survey forms should be updated as per PEC guidelines and in accordance with the revised PEOs approved in 34th ACM.
- ii. Graduating Students Survey forms must address all the PLOs.
- iii. Alumni and Employer Survey forms must be aligned with updated PEOs.

DBoS forwarded revised survey forms attached at appendage 2010 for deliberation in FBoS ES.

Discussion

The sponsor presented and reiterated the agenda point, after detailed discussion and deliberation the house suggested few changes which were incorporated.

Decision 2001

Revised forms attached at [appendage 2001](#) approved.

Item 2002: Replacement of Elective Courses in MSEE program

Sponsor: HOD(EE)BUKC

Referral Authority: DBOS EE BUKC

Summary of the Case

It was observed that following courses in MSEE electives list have course codes of level 4:

- i. Satellite Communication EET-449
- ii. Radar Systems EET-447

Moreover, Advance Satellite system EET-549 and Broadband Technologies and Components EET-705 are included in the unified course book but it is included as elective courses in MSTN program. Following replacement of elective courses is recommended in existing MSEE program:

Existing Course

Satellite Communication EET-449
Radar Systems EET-447

Proposed Courses

Advanced Satellite System EET-549
Broadband Technologies and Components EET-705

Discussion

The sponsor presented the agenda point which was deliberated by house in length. The chair suggested sharing course contents with Dr. Saleem Aslam and finalize. The house further suggested upgrading course code of Radar Systems.

Decision 2002

Point to be accommodated in Item 2010.

Item 2003: Analysis of low intake and Students dropout ration in EE department

Sponsor: HOD (EE) BUKC

Referral Authority: DBOS EE BUKC

Summary of the Case

- a. The BEE department at BUKC has done some analysis on low intake and Student dropout ratio. It was observed that dropout ration is around 50%. The following reasons have been identified:
 - i. Strict policy of chance and dropout considering the quality of intake
 - ii. Admission are done before Final result of intermediate which is why most students are unable to apply to BUKC
 - iii. Students are generally very weak in Applied Sciences
- b. The existing policy of probation and chance for undergraduate program is as under:
 - i. The student shall be placed on probation upon failing to achieve the minimum CGPA of 2.0 for the first time, in any semester,(except first semester) and shall be placed on chance upon failing to achieve the minimum CGPA of 2.0 for the second time in any semester.
 - ii. The same student shall be dropped from the program upon failing to achieve the minimum CGPA of 2.0 for the third time, in any semester.
- c. The same agenda item was put up in the 19th FBoS and chair asked to deliberate the recommendations.
- d. It was also discussed that solutions of these identified issues may be resolved. The detailed analysis regarding challenges to the BEE program is attached as Appendage 2003.

Based on which, DBoS EE BUKC recommended following:

- i. If the student improves his/her CGPA beyond 2.0 after getting the chance, his/her chance shall be removed but he/she shall still be on probation.
- ii. If the student again drops his/her CGPA below 2.0, then he/she shall again be placed on chance.

Discussion:

Importance of recommendations suggested by DBoS EE BUKC was presented by the sponsor. Majority of the house supported the agenda point. The chair emphasizes on following the precedence of other HEIs in Pakistan. Moreover, the chair asked Dr. Saleem Aslam at BUIC and Dr. Khawaja Qasim Maqbool at BULC to find out the policies followed by other HEIs in Islamabad and Lahore respectively; and submit the report in two weeks.

Decision 2003:

In parallel point was discussed in 5th Dean's Committee Meeting where "Status Quo" was decided. Point dropped.

Item 2004: Revised Mapping of PLOs to PEOs

Sponsor: HOD(CE)BUIC

Referral Authority: DBOS CE BUIC

Summary of the Case

The evaluators from PEC during the re-accreditation visit of BCE program raised some concerns regarding the PLOs to PEOs mapping. The issue was tabled and deliberated in CAC and DBOS meetings and the members suggested that multiple/dense mapping of PLOs on respective PEOs should be avoided. The proposed revised mapping of PLOs to PEOs is also given in appendage 2004.

Discussion

HoD CE-BUIC presented the agenda point, after detailed discussion and deliberation the recommended the revised mapping of PLOs to PEOs.

Decision 2004

Revised mapping of PLOs and PEOs attached at [appendage 2004](#) is approved.

Item 2005: Changes in Elective Courses of BSE Program

Sponsor: HOD (SE) BUKC & BUIC

Referral Authority: DBOS SE BUKC & BUIC

Summary of the Case

- Curriculum development is a continuous process. During the last PEC visit at BUKC, one of the members recommended that Cloud Computing course should have a lab component. Moreover, there were recommendations by CAC members to add lab component to some courses of BSE program to meet industrial requirements.
- Based on the changing trends in industry and recommendations by faculty and CAC members, changes in curriculum are recommended. Changes were proposed in the existing roadmap of Bachelor of Software Engineering program in terms of addition/changes in the following courses.
- Introduction to Data Science
- Object-oriented Software Engineering
- Cloud Computing

Discussion

The sponsor presented the agenda point which was deliberated in detail by the house. HoD SE-BUIC suggested that the course addition shall be applicable from FALL 2020. The Dean-ES added that since credit hour configuration of presented course (Object-oriented Software Engineering) is different, new course code should be proposed and content should be mentioned. The house also suggested few changes which are incorporated. Recommended changes along with course outlines are placed at [appendage 2005](#).

Decision 2005

The case to be forwarded for the approval in ACM.

Item 2006: Addition of Lab Components

Sponsor: HOD(SE) BUKC & BUIC

Referral Authority: DBOS SE BUKC & BUIC

Summary of the Case

During the last PEC visit, one of the members recommended that cloud computing course should have a lab component. Therefore, point was discussed along with the addition of other lab components of courses (Human Computer Interaction and Software Requirement Engineering) in last two meetings. However, our CAC members recommended the lab components of the following courses.

1. Cloud Computing
2. Human Computer Interaction

At the DBOS, it is further recommended that these two courses (Human Computer Interaction and Cloud Computing) may have lab components so that students can have sound knowledge of these courses with hands-on experience. Therefore, it is recommended that these courses may be added as (2 + 1) instead of (3+ 0).

Discussion

HoD SE BUKC presented the agenda point; HoD SE BUIC commented that content of HCI is not enough to be taught in 16 weeks. The house suggested preparing detailed report catering financial effects, course contents and required resources. The chair asked sponsor of the agenda point to prepare consolidated report in consultation with HoD SE BUIC and submit again.

Decision 2006

Point dropped due to unavailability of complete feasibility.

Item 2007: Revision of PEOs

Sponsor: HOD (SE) BUIC & BUKC

Referral Authority: DBOS SE BUIC & BUKC

Summary of the Case

There were few observations made during the PEC visit in Mar 2019 on PEOs of BSE Program. They observed that PEOs are rewording of PLOs and there is a mismatch between mapping of PEOs with the University's vision and mission. The issue was deliberated in DBOS at BUIC and BUKC and feedback was taken from CAC members in relevant CAC meeting.

Existing	Revision
Graduates should demonstrate competence to apply Software Engineering knowledge & practices in various phases of software/system development life cycle in their respective professional career.	Graduates should demonstrate competence in applying Software Engineering principles & practices in various phases of software/system development life cycle in their respective professional career.
Graduates should demonstrate an ability to work as a member and/or leader in a team with a strong sense of societal context, professional ethics and effective communication skills in professional practice.	Graduates should demonstrate effective team member or leadership skills with strong managerial skills and a sound sense of social responsibility for the sustainable development of society.
Graduates should demonstrate sustained learning by pursuing life-long learning through graduate studies, professional development or managerial/leadership skills.	Graduates should demonstrate sustained career development and progression through ethical engineering practices, effective communication skills and continuous learning.

Revised PEO to PLO mapping

Program Learning Outcomes (PLOs)	Program Educational Objectives (PEOs)		
	1	2	3
PLO 1: Engineering Knowledge	✓		
PLO 2: Problem Analysis	✓		
PLO 3: Design/Development of Solutions	✓		
PLO 4: Investigation	✓		
PLO 5: Modern Tool Usage	✓		
PLO 6: The Engineer and Society		✓	
PLO 7: Environment and Sustainability		✓	
PLO 8: Ethics			✓
PLO 9: Individual and Team Work		✓	
PLO 10: Communication			✓
PLO 11: Project Management		✓	✓
PLO 12: Lifelong Learning			✓

Mapping of PEOs with University Vision & Mission

Vision & Mission	Program Educational Objectives (PEOs)		
	PEO 1	PEO 2	PEO3
University Vision To become an internationally recognized university that contributes towards the development of nation through excellence in education and research.	✓	✓	✓
University Mission To attain highest standards in teaching, learning and research, at par with the international standards.	✓	✓	✓
Department's Vision Department of Software Engineering aims to be recognized as a leader in Software Engineering education and research through excellence in modern education and targeted research in emerging areas of Software Engineering.	✓	✓	✓
Program Mission The mission of Bachelor of Software Engineering program is to prepare technically strong Software Engineers who can contribute effectively towards the nation, society and the world at large through effective problem solving skills, application of engineering knowledge, leadership and healthy lifelong learning attitude.	✓	✓	✓

Discussion

The sponsor presented and reiterated the agenda point. HoD SE BUKC appreciated the efforts made by the sponsor. A discussion was made regarding the mapping of PLOs on PEOs. Multiple PLOs were mapped to a single PEO which creates a difficulty in assessment of PEO through established KPI. After a joint discussion refined PEOs and mapping was finalized and presented above.

Decision 2007

The house agreed to the proposed revisions, agenda point forwarded to ACM for approval.

Item 2008: Enhancement in Result Submission Process & Examination Module –CMS

Sponsor: HOD(SE) BUIC

Referral Authority: DBOS SE BUIC

Summary of the Case

1. Examination marks entry policy was revised in 32nd ACM (Agenda Item 3028, Appendage 32(3028) and is in vogue since Fall 2019. Thereafter, faculty members are entering marks of various academic activities through online module available in CMS. The workflow/process defined in the system, allows the result to be submitted to HoD before it is submitted to campus.
2. However, HoD's cannot send the result back to the concerned FM if they find any discrepancy or if there are any mistakes in the result. During the last semester (SP2020) there were lot of mistakes observed in which case all changes have to be incorporated through Campus Examination Cell. This has resulted in tremendous amount of requests for Campus management.
3. There is a due process of exam marks correction in which the HoD ensures that the marks correction requested by the concerned FM is genuine (totaling mistake, missed marked question or typo mistake while entering the marks in the portal). Only genuine requests for the marks correction are recommended for change by the HoD.

To enhance to workflow of the existing Marks entry process, following is recommend:

Minutes of the 20th FBOS – ES

1. HoD should be allowed to unlock specific exam mark entry before submitting the result to Campus.
2. Such unlocked entries will be sent back to the concerned FM and only the FM will be able to update the authorized marks entries.
3. FMs should not be allowed to submit the marks directly to campus or BU HO. The current system treats such submitted results as incomplete results that adds more burden on the examination staff to process such results.
4. Complete log of changes shall be maintained as earlier with email notifications to all concerned and its record in CMS data base.

Discussion

The sponsor reiterated and presented the agenda point. The agenda point was deliberated in length by the house. Members of FBoS ES from BUKC supported the agenda point and emphasized on resolving the issue at departmental level rather accumulating the work for the campus management while maintaining the transparency and merit of the system. The chair suggested sponsor to improve the recommendations in light of suggestions proposed by the house.

Decision 2008

The case to be presented in ACM for required amendments in the process.

Item 2009: Updation of KPIs and Indirect Assessment Methods (Feedback Forms)

Sponsor: HOD(SE) BUIC

Referral Authority: DBOS SE BUIC

Background:

During recent PEC visit at BUIC for BSE program, certain observations were made by the PEVs about adequateness of KPIs and feedback forms from various stakeholders. However, PEC PEVs at Karachi campus didn't highlight the same observation.

Recommendation:

Revision in KPIs and feedback forms is required after a thorough deliberation. Any change in KPIs will affect both campus. It is requested that a committee may kindly be constituted to have a consolidated KPIs for both programs and feedback forms. The process will be completed by 15 June, 2020 and approval will be taken on file by Dean (ES). KPIs and Feedback forms should be applicable from Fall 2020.

Discussion

The sponsor presented agenda point during third session of FBoS. The house suggested arranging a separate FBOS to assess the progress of OBE as a whole along with revision/enhancement on OBE framework and its mapping on the OBE software development.

Decision 2009

Point dropped.

Item 2010: MSEE Roadmap

Sponsor: HOD(EF) BUIC

Referral Authority: DBOS EF BUIC

Summary of the Case

1. MSEE Road map was updated in 26th ACM in April, 2016.
2. Existing roadmap of MSEE (Power) and MSEE (Automation & Controls) was suggested to be improved so that the core courses and the electives are in alignment with the advancements in the area.
3. Embedded System specialization of MSEE is in competition with MS CE program at BUIC, Therefore it is recommended to discontinue this stream.
4. It was suggested to introduce "Internet of Things" specialization stream in the road map keeping in view large research opportunities in the domain of IoT and focusing following aspects:
 - i. Design tools for processing and analyzing large amounts of data from sensors.

- ii. Design and develop IoT applications and services adapted to industrial needs.
- iii. Understand and design communication mechanisms adapted to the constraints of the sensors (energy consumption, lack of computing capacities).
- iv. Acquire dual competences technical courses in advanced fields (data exploitation, software development, communication networks in constrained environments, Machine Learning, sensor security) associated with courses in Innovation, Project Management, and Entrepreneurship

Discussion

The sponsor presented the agenda point which was deliberated in length by the house. After detailed discussion the chair asked HoD EE IC to prepare a consolidated document in consultation with HoD EE KC and submit again in two days.

The sponsor presented and reiterated consolidated MS EE roadmap during third session of 20th FBoS. Agenda point was thoroughly discussed. With available information it was found that not a single student was enrolled in embedded system specialization since its start; moreover, the embedded system is very similar to MS CE program. Therefore, it is recommended to discontinue this specialization. It was also decided that rather starting a separate specialization of IoT, the related subjects should be included in the existing specialization of “Communication Systems and Networks” and change the name of specialization to “Communication Systems and IoT Networks”. Keeping afore-mentioned recommendations by the house, HoDs EE at BUIC and BUKC revised the roadmap

Decision 2010

MS EE roadmap, attached at appendage 2010, is recommended for approval in ACM.

Item 2011: Restructuring of BS Geo Physics Program. Bachelor of Science in Geo Sciences (with specialization: Marine Geology; Marine Geophysics; GIS & Remote Sensing)

Sponsor: HOD(EES) BUKC

Referral Authority: DBOS EES BUKC

Summary of the Case

Geoscience is the study of the Earth - its oceans, atmosphere, rivers and lakes, ice sheets and glaciers, soils, its complex surface, rocky interior, and metallic core. This includes many aspects of how living things, including humans, interact with the Earth. Geoscience has many tools and practices of its own but is intimately linked with the biological, chemical, and physical sciences. It helps to study both terrestrial and marine resources and ecology. Hence, It includes disciplines of Geology, Geomorphology; Geo-environment; Geochemistry; Geophysics; Marine Geology, Marine Geophysics, Marine Ecology and also uses techniques of GIS & Remote Sensing beside modern applications of artificial intelligence (AI) for natural resource explorations, such as oil, gas, mineral, water etc.

The Geoscientists use the knowledge of physical, chemical, biological sciences beside mathematics, economics and exploration engineering, to build a quantitative understanding of the Earth systems and processes in order to explore natural resources in the oceans and land, equitably. A geoscientist is a trained professional whose main tasks are; to explore earth resources by sampling, to operate the geological equipment and instruments, to design appropriate fieldwork; to collect geo-spatial data; to conduct estimation, analysis and processing of data, and also conduct research and development (R&D) activities for environmental protection, sustainable resource management etc.

Since the curriculum and research assignments of geosciences graduates are diversified which enable them to take professions directly related to their degree around the globe. Many Private companies and well-known Government enterprises hire the graduates for the exploration and production, water supply,

environmental engineering, and geological surveying Some well-known Government sector. There is a better scope of earning in government, education, and research-oriented job profiles as coastal geologist; Surveyor; Soil scientist; Remote sensing specialist; Groundwater specialist; Mining or marine engineer; Environmental scientist; Marine geologist; Petroleum Engineer; Seismologists; Geo-software developers; Geochemist; Geophysicist; Oceanographer; Environmental consultant; Environmental lawyer etc.

Moreover, the degree in geosciences is well-accepted in leading institutions of the world, BU graduates in geosciences may explore more academic programs for higher studies in various parts of the world academia to pursue PhD and Postdocs.

OBJECTIVES OF PROGRAM

Geosciences is an applied science where specialized geoscientists apply the scientific methods, formulate hypothesis after gathering data about the natural resource and then test their hypothesis in reality. *The study of Geosciences is highly application-oriented and lucrative. In the age of increasing demand for energy, decreasing energy resources, minerals and water resources and increasing environmental concerns present challenges to our society, thus the knowledge of diversified fields of geosciences is well utilized in several exploration and surveying projects.* Geosciences is an art as well as science with intellectual thinking and adventurism in both terrestrial and marine environments. Hence, the objectives of studying Geoscience are:

- To introduce modern techniques of applied science used in the exploration of natural resources in terrestrial as well as in offshore environments.
- To equip the students with critical analysis in quantifying the economic resources such as minerals, oil/gas, coal, and groundwater, etc.
- To enable the students to integrate allied disciplines: Geology, Geophysics, Environmental Sciences, Earthquake Seismology, GIS & Remote Sensing.
- To adopt holistic approach towards exploitation of natural resources for their contribution to national economy.
- To foster effective oral written and interpersonal skills with ethical values.

LEARNING OUTCOME OF PROGRAM

Geosciences has created enhanced career opportunities for geologists, environmentalists, geophysicists, seismologists, etc. to work for society's demands for natural resources while maintaining sustainable Earth's natural environments. After completion of the degree program in geosciences, the students will be able:

- to apply knowledge of Geosciences in integrated research
- to utilize emerging techniques, skills, and tools necessary to study geosciences
- to communicate effectively with excellent written and oral skills with ethical values.
- to work effectively in groups/teams to accomplish a common goal
- to pursue continuous professional development and higher studies

Eligibility Criteria

Program	Eligibility Requirements
BS Geosciences (Karachi only) With Specialization in <ul style="list-style-type: none"> • Marine Geophysics • Marine Geology • GIS and Remote Sensing 	F.Sc. (Pre-Engg/Pre-Medical /A-levels/ICS (second division or 45% marks) Associate Engg. Diploma (Polytech) with Equivalent of 45% marks. BU Entry test & Interview

Discussion

The sponsor reiterated and presented the agenda point: HoD EES BUIC suggested consulting HEC roadmap. HoD CE BUKC suggested not starting multiple streams. The chair suggested revising and aligning of the agenda point as per discussion in FBoS. He further commented that financial impact and HR analysis is missing in addition to market survey covering aspects such as offering of similar programs in other universities of Karachi, their success and possible job opportunities for graduates of this program.

The sponsor presented agenda point again during the third session of FBoS. The chair suggested changing course code name of GEOS to GEO. The house suggested few changes which are incorporated.

Decision 2011

The case is recommended for approval in ACM.

Item 2012: Establishment of Geoscience Research Center (GRC)

Sponsor: HOD(EES) BUKC

Referral Authority: DBOS EES BUKC

Summary of the Case

Department of Earth and Environmental Sciences (DEES) at BUKC has been making all-out-efforts to achieve academic excellence by realization of emerging trends of modern software technologies, usage of computer applications in geo- and environmental sciences. DEES facilitates its scholars to acquire practical knowledge of applied research areas through use of geology, geophysics, GIS, and environmental sciences laboratories and by on-field trainings.

DEES aimed to elevate the research profile and utility of the existing labs for commercial purpose, as well. The content of the proposal for establishment of Geosciences Research Center (GRC) has been deliberated among the committee members of D-BOS. All the members agreed in consolidation of GIS & Computer Lab and Geophysical Data Lab of DEES into GRC., which will help in broadening the spectrums of geo-sciences research in terrestrial and marine resources. It is informed to all the members that the Honorable Rector BU, Registrar and DG BUKC have visited existing labs i.e. to be merged into GRC upon their visit of the DEES- BUKC in December 2019. Upon discussion with the faculty, available expertise & facilities and basic infrastructure & software suits available, the Competent Authority has principally approved the proposal of GRC presented by HoD DEES.

In the light of Honorable Rector's in-principle approval and support from the management of BUKC, GRC is recommended with consensus among all D-BoS members.

Discussion

HoD EES, BUKC presented the agenda point, which was deliberated in length by the house. The sponsor suggested striving to get funded projects and trainings which can add value to the proposed idea. Prepare case in light of the suggestions of the house and move case on file.

Decision 2012

Prepare case in light of the suggestions of the house and move case on file.

Item 2013: Proposal to Submit Thesis-I result via CMS

Sponsor: HOD(CS) BUIC

Referral Authority: DBOS CS BUIC

Summary of the Case

The results of thesis-I are to be maintained manually, thereby increasing the probability of error. Students can register thesis-II without clearance of proposal defense. This may lead to unwanted situation.

It is suggested that Thesis-I result may be registered in the CMS as PASS/FAIL. Furthermore, Thesis-I should be considered as pre-requisite of Thesis-II

Discussion

The sponsor presented and iterated the case. After detailed discussion and arguments, the house suggested raising the agenda point at FRC ES after deliberation in DRCs.

Decision 2013

Point Dropped.

Item 2014: Final Year Project Result submission via CMS

Sponsor: HOD(CS) BUIC

Referral Authority: DBOS CS BUIC

Summary of the Case

The results of Final year project are submitted student-wise-semester-wise, for Project-I and Project-II, separately, whereas a final year project is evaluated at the end of Project-II. Further, each result is submitted to HoD and then HoD has to submit each result one-by-one student-wise-semester-wise. This practice results in considerable duplication of effort in data entry. It is suggested that Final Year Project result is submitted like a course by the concerned coordinator. A global view is given to coordinators/HoD for result submission of all students. Result unlock facility is given to HoD, for correcting the mistakes.

Discussion

The sponsor presented and iterated the case. After detailed discussion and arguments, the house suggested raising the agenda point with DIT on file.

Decision 2014

Case to be processed on file after discussion with DIT.

Item 2015: Suggestions to Improve CMS

Sponsor: HoD(CS) BUIC

Referral Authority: DBOS CS BUIC

Summary of the Case

CMS is the core operational IT system. Improvements are desired to further improve the existing functionality in attendance, result compilation, views, etc.

Following are the suggestions:

- i. It is suggested that once attendance is locked, an email is generated whenever attendance is updated.
- ii. In PG programs result, result takes average of all internal assessments. It should be similar to undergraduate, where separate assignments and quizzes average is possible.
- iii. There should be a provision to print detailed result including individual assessments.
- iv. Attendance Summary overall print functionality is provided.
- v. In executive view, batch-wise data should be generated.
- vi. In executive view, there should be a view for the program-wise display of students on probation, chance, etc.

Discussion

The suggested additions to CMS are very pertinent, however, an improvement process is already underway in BUHO. The chair suggested to have a meeting with DIT first and based on the discussion of the meeting, the case to be process on file.

Decision 2015

Case to process on file after discussion with DIT.

Item 2016: ILP program in addition to the CSP and Internship

Sponsor: HoD CS BUIC

Referral Authority: DBoS CS BUIC

Summary of the Case

Apropos decision 32 para 'c' of item No. 3137 of minutes of the meeting of 32nd ACM , comprehensive result analysis shall be undertaken by each department for corrective action plan and shall be tabled at FBoS. ILP is a new program which suggests a number of tasks including some which are part of the existing CSP program. Also, certain activities are irrelevant to the undergraduate students, such as, Participation in a conference. The focus of undergraduate education is learning the core concepts of their discipline. It is not meant to focus on the research perspective. Similarly, International Internships, even if we create the opportunities, most of the students (especially girls) would not be able to travel abroad to earn the points. It would be a burden on the students, and their entire focus would be to get another 75 points to get the degree in addition to mandatory internship and CSP requirements. Our primary focus should be to improve the quality of knowledge gained by undergraduate students so that they can get better jobs and compete with the students from better universities in the industry.

It is suggested that ILP proposal may be reconsidered and relevant ILP activities be covered in CSP or Internship.

Discussion

The sponsor presented the agenda point which was discussed in length. It was further discussed that after the inclusion of OBE framework in most of the undergraduate programs, all the learning domains i.e. cognitive, psychomotor and effective domains are already catered in the curriculum. Hence, there is no need to add activities burdening the students. After discussion and arguments house unanimously supported the agenda point.

Decision 2016

Point approved.

Item 2017: Modification in the eligibility criterion of BS(CS)& BS(IT) programs.

Sponsor: Hod CS BUIC, KC & LC

Referral Authority: DBoS -CS IC,KC & LC

Summary of the Case**a) Previous Policy**

For admission both is BSCS and BSIT the eligibility criteria is minimum 50% marks in Intermediate (HSSC) examination with Mathematics or equivalent qualification with Mathematics certified by IBCC.

b) New Provision by NCEAC

With reference to letter no. NCEAC/HEC/General/3-20 dated 20 March 2020, NCEAC has allowed the students of pre-medical to take admission in all the (Bachelors) Undergraduate computing programs (CS, SE, IT, AI, DS, CySec). All such students must pass deficiency courses of Mathematics of 6 credit hours within one year of their regular studies. The deficiency courses should cover most of the relevant topics to bachelor degree in computing education from intermediate level mathematics.

Minutes of the 20th FBOS – ES

In order to increase the pool of applicants in BSCS and BSIT program while availing the provision allowed by NCEAC for Pre Medical applicants, the modified eligibility criteria and scheme for registration is formulated.

Discussion

The HoD CS BUIC presented agenda point in the third session of 20th FBoS ES. The agenda point was deliberated in length. The chair suggested to prepare a consolidated policy document for CS programs at BUIC, KC & LC and submit again.

Decision 2017

Consolidated policy attached at [appendage 2017](#) is recommended to be forwarded for approval to the ACM.

Item 2018: Finalization of OBE software & its integration with CMS/LMS

Sponsor: Dean ES

Referral Authority:

Summary of the Case

Following tasks shall be done on priority basis to cater upcoming challenges to finalize OBE software and its integration with CMS/LMS:

- i. Features study of OBE soft wares available in market.
- ii. Any change in OBE framework.
- iii. Finalization of feedback forms with respect to KPIs.
- iv. Challenges to integrate OBE software with CMS/LMS
- v. Final software development.

Discussion

The sponsor presented and reiterated the agenda point. The house unanimously supported the agenda point. The chair formulated following committee to carry out aforementioned tasks:

- | | | | |
|--|----------------------------|---|--------|
| 1. Associate Prof. Sohaib Ahmad , | Associate Dean ES | - | Head |
| 2. Associate Prof. Dr. Awais Majeed, | HoD SE BUIC | - | Member |
| 3. Senior Assistant Prof. Dr. Khalid Javed, | HoD CE BUIC | - | Member |
| 4. Senior Assistant Prof. Dr. Abdul Attayyab Khan, | FM EE BUKC | - | Member |
| 5. Senior Assistant Prof. Adeel M Syed, | OBE Software In charge | - | Member |
| 6. Assistant Prof. Muhammad Hassan Danish Khan | Manager Accreditation Cell | - | Member |

Committee members will coordinate with all 6 engineering departments at IC and KC to complete the task. All respective HoDs will provide the support to the team for task completion.

Decision 2018

The committee is to send agenda for special FBoS specific to OBE by 10th July, 2020.

Closing of the Meeting

There being no further points, the Chair brought the meeting to close, thanking the participants for their wholehearted participation in both sessions.

Prof. Dr Atif Raza Jafri
Dean (ES), Head FBoS
June, 2020

Minutes of the 20th FBOS – ES

Distribution:

BUHQ:	Rector, Pro-Rector, Registrar DAA
BUIC:	DG BUIC, DIC HOD(EES), HOD(EF), HOD(CS), HOD(SE), HOD(CE)
BUKC:	DG BUKC, DKC HOD(EES), HOD(EF), HOD(CS), HOD(SE), HOD(CE)
BULC:	DLC, HOD(CS)

Appendages:

Appendage 2001



Quality Assurance Directorate
Bahria University
Alumni Survey Form - OBE
Department of Electrical Engineering – BUKC

Form No. EE-PEC-L3-01A

To be filled by Alumni

Name:

Name of Organization (optional):

Designation (optional):

Year of Graduation:

Contact:

Email:

Dear Alumni,

We are glad that you have spent your 4 valuable years of Bachelor in Electrical Engineering at Electrical Engineering Department, Bahria University. You will be pleased to know that your alma matter has, in a short period of time, grown to be one of the leading and sought-after universities. We would like to place on record that your co-operation and support has continued in no small measure towards this achievement.

To maintain and enhance higher teaching and research practices at Bahria University, the department of Electrical Engineering has enlisted a few program Educational Objectives (PEOs) inline to the Washington Accord's consortium as listed above.

We shall very much appreciate and be thankful if you can spare some of your valuable time to fill up this feedback form and give us your valuable suggestions for further improvement of this quality enhancement process.

1) Are you currently employed? **NO / YES** If YES, details

Electrical Engineering related field	
Non-Electrical Engineering related field	
Self-Employed i.e. started your own business/startup	

2) Have you presented your work at a technical forum such as conference, journal, symposium, technical competitions?

NO / YES If YES, details

3) Have you secured admission or currently pursuing or completed the MS or PhD Program?

NO / YES If YES, details

4) Have you attended any professional development course in the last one year?

NO / YES If YES, details

5) Are you a part of any voluntary organization working for the betterment of the society?

NO / YES If YES, details

Rating

A: Strongly Agree

B: Agree

C: Partially Agree

D: Neutral

E: Disagreed

1	I am satisfied with my technical competence in the field of electrical engineering to provide solutions to complex problems and to design new products providing value to the industry. (PEO 1)	A	B	C	D	E
2	I am satisfied with employment in Electrical Engineering and other diverse fields or with the exploration of entrepreneurship.(PEO 2)	A	B	C	D	E
3	The BEE Degree has enabled me to pursue professional growth by taking up higher studies and learning contemporary technologies which keeps me current in my chosen specialization. (PEO 3)	A	B	C	D	E
4	BEE Degree has been helpful in socially engaging by providing me the opportunity to work on different ethical, moral, environmental, gender and societal issues to leave an impact on society and community.(PEO 4)	A	B	C	D	E
5	The EE department is moving in the right direction towards the attainment of the said PEOs?	A	B	C	D	E

Any other Remarks/Suggestions:

Signature of Alumni and Date:

Bahria university's mission and vision; department's vision, program's mission and PEOs are attached in Appendage A1.

Appendage A1

University VISION

To become an internationally recognized university that contributes towards the development of nation through excellence in education and research.

University MISSION

To attain highest standards in teaching, learning and research, at par with the international standards.

Department Vision

A commitment to prepare students for professional and research activities with an ability to learn independently, within a diverse multi-cultural environment, and enabling them to become the global leaders in their respective fields.

Program Mission

The mission of BEE program is to produce ethically sound and technically competent electrical engineers who can serve in the diverse fields of research, design & development, teaching, system installation, support and maintenance.

Program Educational Objectives

Graduates from Bachelor of Electrical Engineering program are expected to achieve the following Program Educational Objectives and would possess the ability

PEO 1:

To exhibit the expertise in the field of electrical engineering to compete with technical challenges and find the solutions of complex engineering problems.

PEO 2:

To be skillful employable graduates in different domains of design, development, operation and maintenance, as well as explore opportunities for entrepreneurship.

PEO 3:

To pursue professional growth by taking up higher studies, ascertain technologies, develop proficiency in the usage of new tools.

PEO 4:

To work in multicultural environment and communities, providing leadership in their domain, and responsive to ethical, moral, and societal issues.



Quality Assurance Directorate
Bahria University

Alumni Survey Summary - OBE

Department of Electrical Engineering – BUKC

Form No. EE-PEC-L3-01B

Sample Size:

The purpose of this survey is to summarize the alumni input on their satisfaction in terms of the appropriateness of the BEE curriculum with respect to their professional needs.

Key Performance Indicators	Obtained Score (Average)	Threshold
Percentage of alumni currently employed(Q1 Survey)		50%
Percentage of alumni working in Electrical Engineering (EE) field (Q1 Survey)		50%
Percentage of alumni started their own business/startup or working in non-EE related field (Q1 Survey)		5%
Percentage of alumni presented their work at technical forums(Q2 Survey)		5%
Percentage of alumni who have completed or currently pursuing MS/PhD program (Q3 Survey)		15%
Percentage of alumni who attended professional development courses (Q4 Survey)		20%
Percentage of alumni being part of voluntary organizations(Q5 Survey)		15%
Satisfactory Percentage level of PEO 1		50%
Satisfactory Percentage level of PEO 2		50%
Satisfactory Percentage level of PEO 3		50%
Satisfactory Percentage level of PEO 4		50%
Satisfactory Percentage level of EE PEOs		50%

Remarks (if any):

--

Placement Coordinator Signature and Date:



Minutes of the 20th FBOS – ES

Quality Assurance Directorate

Bahria University

Employer Survey Form - OBE

Department of Electrical Engineering – BUKC

To be filled by Employer
(Details of Employee)

Employee Name:

Designation:

Organization:

Joining Date:

Leaving Date:

Dear Sir/Madam,

To maintain and enhance higher teaching and research practices at Bahria University, the department of Electrical Engineering has enlisted a few Program Educational Objectives (PEOs).

We shall be thankful if you can spare some of your valuable time to fill up this feedback form and give us your valuable suggestions for further improvement of this quality enhancement process.

1) Are the graduates employed in your organization working in the field closely related to Electrical Engineering?

YES / NO If NO, then give brief details

--

2) Are you satisfied with the technical competence of EE graduates working with your organization beyond 6 months?

YES / NO If NO, then can you please briefly describe the areas of improvement?

--

3) Have the graduates assumed leadership/managerial positions in your organization working beyond 4 years?

YES / NO If NO, can you please briefly describe the reasons?

--

Rating

A: Strongly Agree

B: Agree

C: Partially Agree

D: Neutral

E: Disagreed

1	We are satisfied with the level of technical competence demonstrated in the field of Electrical Engineering to provide solutions to complex problems and to design new products	A	B	C	D	E
---	---	---	---	---	---	---

Minutes of the 20th FBOS – ES

	providing value to your industry. (PEO 1)					
2	Graduates' employment in Electrical Engineering and other diverse fields or their exploration of entrepreneurship is satisfactory. (PEO 2)	A	B	C	D	E
3	The BEE program has motivated the graduates to pursue professional growth by taking up higher studies and learning contemporary technologies. (PEO 3)	A	B	C	D	E
4	The BEE program has given the graduates a sense of social engagement in graduates regarding different ethical, moral, environmental, gender and societal issues. (PEO 4)	A	B	C	D	E
5	We are satisfied with the declared Program Educational Objectives (PEOs) of the Electrical Engineering Department.	A	B	C	D	E

Any Suggestions and Remarks:

Employer Name:

Employer Signature and Date:

Analysis, Comparison, and Challenges of the Student of BEE Program

Current Status (Fall 2019 Intake) of the Student Applied in BEE Program

1. 149 students applied and 140 students have cleared the entry test.
2. According to the experience, many students join EE BUKC in the second admission advertisement. Students usually prefer to join NED, NUST and SSUET etc.
3. Student prefer to join other university mainly because of semester fees (include all expensive) and reputation.

Challenges to Sustain the Strength of Students

1. It is observed that the students are overwhelm due to strict policy of maintaining CGPA to avoid probation conditions. The probation condition of Bahria University is relatively strict with respect to other university such as NED, Sir Syed etc.
2. The comparison of Bahria policy and NED policy for probation is explained briefly:
 - a) NED allows 2 probations, and after 2nd probation student needs to improve his CGPA of already taken courses without enrolling new courses. Under this condition, if student still can't improve then his admission is cancelled. This policy is only applied in first two years.
 - b) From third year onward, student only need to pass the courses. No Probation or chance will be marked even student CGPA drop below 2.0 from third year onward.
 - c) Bahria University only allows 1 probation and 1 chance. In worst case scenario, student will be dropped from 8th semester of the program, if he/she gets probation in 1st semester and he/she gets chance in 7th semester.
 - d) According to policy, student has lesser chance of improvement. University allows only 2 summer courses, also he/she can get only B grade maximum which do not help much to improve the grade.

S.No.	Name of University/Institution	Policy of Probation & Chance	
1.	DHA Suffa University, Karachi	CGPA	Student Disposal
		$1.5 \leq \text{CGPA} < 2.0$	Probation
		CGPA < 1.5 or on attaining two consecutive probations*	Relegation
		On earning third Relegation	Withdrawal from the program
		<p>*Note: In case a student has earned Relegation after two consecutive probations, he/she will be placed on further Relegation if his/her CGPA is not improved to 2.0 or above in the next semester. If the Relegation so earned becomes the third Relegation, student will be withdrawn from the Program.</p> <p>Rules for probation relegation and withdrawal from the program will not be applicable in the following cases:</p>	

Minutes of the 20th FBOS – ES

		<ol style="list-style-type: none"> For courses taken during Summer Semester; or/and When no regular semester is offered as the student is registered in an academic program for which the university only admits students once in a year due to regulatory body restriction. However such students are permitted by the competent authority to enroll few courses in order to improve their CGPA subject to availability of minimum number of students to hold the class
2.	NED University/ Usman Institute of Technology, Karachi	<p>Any student who fails to obtain at least 2.0 CGPA in any Semester shall remain on probation during next Semester. In any case, if such student still obtain less than 2.0 CGPA in the subsequent semester shall remain on second probation and shall be allowed to register in the following semester.</p> <p>Any further registration in subsequent semester shall be allowed subject to the condition that the student has obtained at least 2.0 CGPA after second probation, otherwise; he/she shall not be allowed to register in subsequent semester and shall be required to improve grades of previous courses already attempted. However, admission of any such student shall be cancelled, who after being on second probation during Second Year Fall Semester fails to obtain 2.0 CGPA on completion of that semester</p>
3.	PAF KIET, Karachi	<p>If the cumulative GPA of a student falls below 2.5, a warning is issued to remind the student regarding the minimum GPA requirements for the award of a KIET degree.</p> <p>If the GPA falls below 2.0, the student is placed on probation. In the event of failure to improve the grade in the next semester, to the minimum level of 2.0, the student is dropped from the roll of the Institute.</p>
4.	COMSATS	<p>A student is placed under probation if his/her CGPA falls below 2.0 at the end of each semester.</p> <p>A student already on probation is automatically dismissed if he/she attains a second successive probation at the end of a semester.</p>
		<p>(a) Academic Dismissal</p> <p>A student who fails to obtain a minimum GPA of 1.0 at the end of 1st semester of a degree program shall be placed on academic probation for the 2nd semester. In case, he fails to improve his CGPA to 1.0 at the end of 2nd semester, his name shall be removed from the Rolls of the University. Students dismissed on academic grounds shall, however, be furnished with an official transcript indicating the course</p>

5.	UET Taxila	<p>completed along with grades earned in registered courses.</p> <p>(b) Re-admission Re-admission in the first year, without going through the admission process, is granted to only those undergraduate students who have been dismissed on academic grounds but only for once. There is no second re-admission.</p> <p>(c) Relegation to Lower Semester An academically deficient student can apply to the Chairmen of concerned department for Willing Relegation to lower semester to overcome his academic deficiencies. The Chairman will refer his case to the Departmental Semester Committee for appropriate decision which will be forwarded to the Controller of Examinations through the concerned Dean for Vice Chancellor's approval and subsequent notification. The Willing Relegation to lower semester can only be availed once during the entire degree program subject to written consent of the parents / guardians.</p>
6.	UET Lahore	<p>a) A student will be placed on Warning if his GPA falls below 2.0 in any semester with his CGPA remaining greater than 2.0.</p> <p>b) A student will be placed on Probation if his CGPA falls below 2.0 after any semester.</p> <p>c) A student will be separated from the University if he remains on probation for two consecutive semesters. Advantage of repetition in summer semester, falling in between or after the two regular semesters on probation, being given to the student.</p> <p>d) Separated students can apply to the Vice Chancellor for re-admission. If their application is accepted, the concerned department will transfer subjects from the previous registration in accordance with the prescribed rule and assign them to an Entry Session for the purpose of computing their maximum degree duration. They will be allotted new entry session as per the recommendation of the department and new registration number.</p> <p>e) A re-admitted student will not be granted second re-admission if he is separated second time from the University.</p>

Program Educational Objectives:

PEO 1: Attain an ability to identify and solve challenging problems in their professions by applying theory, principles and modern tools learnt during degree program.

PEO 2: Demonstrate effective communication as an individual or team player with strong managerial and entrepreneurial skills.

PEO 3: Maintain highest ethical and professional standards in pursuing their careers.

PEO 4: Engage in life-long learning to continually polish their professional capabilities for their personal growth and the betterment of society.

Program Learning Outcomes:

PLO-1: Engineering Knowledge: An ability to apply knowledge of mathematics, computer engineering fundamentals and computer engineering specialization to the solution of complex engineering problems.

PLO-2: Problem Analysis: An ability to identify, formulate, research literature and analyze complex computer engineering problems reaching substantiated conclusions using engineering and natural sciences principles.

PLO-3: Design/Development of Solutions: An ability to design solutions for complex computer engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health & safety, cultural, societal, and environmental considerations.

PLO-4: Investigation: An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.

PLO-5: Modern Tool Usage: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations.

PLO-6: The Engineer and Society: An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solution to complex engineering problems.

PLO-7: Environment and Sustainability: An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PLO-8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PLO-9: Individual and Team Work: An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.

PLO-10: Communication: Ability to communicate effectively, orally as well as in writing, on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PLO-11: Project Management: Ability to demonstrate management skills and apply engineering principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.

PLO-12: Lifelong Learning: Ability to recognize importance of and pursue lifelong learning in the broader context of innovation and technological developments.

Previous Mapping of PLOs to PEOs

PEC Graduate Attributes (PLOs)	PEOs			
	PEO – 1	PEO – 2	PEO – 3	PEO – 4
Engineering Knowledge	✓			✓
Problem Analysis	✓			
Design/Development of Solutions	✓		✓	
Investigation	✓			
Modern Tool Usage	✓			✓
The Engineer and Society			✓	✓
Environment and Sustainability			✓	✓
Ethics			✓	
Individual and Teamwork		✓		
Communication		✓		✓
Project Management	✓	✓		✓
Lifelong Learning	✓			✓

Proposed Mapping of PLOs to PEOs

PEC Graduate Attributes (PLOs)	PEOs			
	PEO – 1	PEO – 2	PEO – 3	PEO – 4
Engineering Knowledge	✓			
Problem Analysis	✓			
Design/Development of Solutions	✓			
Investigation	✓			
Modern Tool Usage	✓			
The Engineer and Society			✓	✓
Environment and Sustainability			✓	
Ethics			✓	
Individual and Team Work		✓		
Communication		✓		
Project Management		✓		
Lifelong Learning				✓

Changes in Elective Courses of BSE Program

1. Addition of Lab Component/Newly Assigned Course Code

#	Existing Course Name	Elective Course Category	Change Status	Remarks
1	Course Code: CSC 487 Course Title: Introduction to Data Science Credit Hour: (3+0) Status: Part of existing curriculum	SE Elective course	Course Code: CSC 495 Course Title: Introduction to Data Science Credit Hours: (2+1) Pre-requisite: Course Code: CSC 220 Course Title: Database Management Systems	CSC 495 is already approved in CS roadmap (31 st ACM as per Unified Course Code Book)
2	Course Code: SEN-334 Course Title: Object oriented Software Engineering Credit Hour: (3+1) Status: Not part of existing curriculum	SE Elective course	Addition and Re-introduction of the course in the roadmap as: Course Code: SEN 335 Course Title: Object Oriented Software Engineering Credit Hour: (2+1)	The course was removed from the core courses in Fall 2018 course, however, it was part of core courses in the Fall 2016 roadmap.
3	Course Code: SEN-325 Course Title: Cloud Computing Credit Hour: (3+0) Status: Part of existing curriculum	SE Elective Course	Re-introduction of the course in the roadmap as: Course Code: SEN 401 Course Title: Cloud Computing Credit Hour: (2+1)	

SEN 335 Object Oriented Software Engineering (2+1)**Pre-requisite:** CSC 210 Object Oriented Programming**Course Description:**

This course gives introduction to object oriented software engineering, processes and models, object oriented analysis and design concepts, modeling with UML, project organization and communication, addressing design goals, object design, design and code reusability through design patterns and idioms, refactoring, configuration management, project management

SEN 401 Cloud Computing (2+1)**Pre-requisite:** None**Course Description:**

The course gives introduction to cloud computing and cover the topics of cloud infrastructures, virtualization, software defined networks and storage, cloud storage, and programming models, the motivating factors, benefits and challenges of the cloud, as well as service models, service level agreements (SLAs), security, example cloud service providers and use cases.

Road Map MSEE

Semester-I		
i.	ESC-501	Core – I Research Methodology (University Requirement)
ii.		Core – II
iii.		Core – III
Semester-II		
i.		Core-IV
ii.		Core-V
iii.		Elective-I

Semester-III		
i.		Elective-II
ii.		Thesis-I/Elective-IV

Semester-IV		
i.		Elective-III
ii.		Thesis-II/Elective-V

MS EE (Automation and Control)

Core Courses

Sr.	Course Code	Core Course Title	Credit Hours
1	ESC-501	Research Methodology	3
2	EEN-510	Stochastic Process	3
3	EET 724	Optimization Techniques in Electrical Engineering	3
4	EEA 600	Artificial Intelligence for Control Systems	3
5	EEN-726	Modern Control Theory	3

Elective Courses

Sr.	Course Code	Elective Course Title	Credit Hours
1	EEA-713	Robust Multivariable Control System	3
2	EEA-703	Dynamic Modeling system	3
3	CSC-749	Fuzzy Logic and Intelligent control systems	3
4	EEA-509	Nonlinear Control Systems	3
5	EEA-704	Adaptive Control Systems	3
6	CEN-758	Robotics and Intelligent Sensors	3
7	CEN-722	Advanced Interfacing Techniques	3
8	EEA-540	Mechatronics	3
9	EEN-506	Solid State Devices	3
10	EEA-601	Industrial Automation Technologies	3
11	EEA-602	System Integration	3
12	EEA-715	Industrial Project Management	3
13	EEA-716	Control Instrumentation and Robotics	3
14	EEA-717	Process Control Commissioning and Production management	3

MS EE (Power Systems)

Core Courses

Sr.	Course Code	Core Course Title	Credit Hours
1	ESC-501	Research Methodology	3
2	EEN-510	Stochastic Process	3
3	EET 724	Optimization Techniques in Electrical Engineering	3
4	EEP-558	Power Transmission and Distribution	3
5	EEP-559	Power Generation and Plant Operation	3

Elective Courses

Sr.	Course Code	Elective Course Title	Credit Hours
1.	EEP 716	Advanced Power System Analysis	3
2.	EEP 717	Advanced Power System Planning	3
3.	EEP 718	Advanced Power System Protection	3
4.	EEP 561	High Voltage Engineering Design	3
5.	EEP 754	Smart Grid System Operation	3
6.	EEP 521	Design of Electrical Machines	3
7.	EEP 564	Hydel Power Generation	3
8.	EEP 565	Integration of Distributed Generation	3
9.	EEP 566	Power System Reliability	3
10.	EEP 719	Advanced Topics in Power Systems Engineering	3
11.	EEP 514	Renewable Energy	3
12.	EEP 757	Non-Conventional Energy Systems	3
13.	EEP 516	Solar Power Generation	3
14.	EEP 517	Wind Power Generation	3
15.	EEP 519	Hybrid Power Systems	3
16.	EEP 714	Advanced Topics in Renewable Energy	3
17.	EEP 723	Thermal and Nuclear Power Generation	3
18.	EEP 720	Computer Methods in Power Systems	3
19.	EEP 721	Insulation Co-ordination in Power Systems	3
20.	EEP716	Advanced Power Electronics	3
21.	EEP 502	Advanced Power System Operation and Control	3
22.	EEP-780	EMS & SCADA	3
23.	EEA-713	Robust Multivariable Control System	3
24.	CSC-749	Fuzzy Logic and Intelligent control systems	3
25.	EEA-509	Nonlinear Control Systems	3

MS EE (Communication Systems & IoT Networks)

Core Courses

Sr.	Course Code	Core Course Title	Credit Hours
1.	ESC-501	Research Methodology	3
2.	EEN-510	Stochastic Process	3
3.	EET - 724	Optimization Techniques in Electrical Engineering	3
4.	EEN-712	Advanced Digital Communication Systems	3
5.	EET-603	Communication Technologies & Platforms for IoT	3

Elective Courses

S#	Course Code	Elective Course Title	Credit Hours
1.	EET 729	Wireless Sensor Networks	3
2.	EET - 762	Communication Network Architecture and Protocols	3
3.	EET-766	RF System Engineering and Design	3
4.	EET -750	Antennas Theory, Design and Applications	3
5.	EET-768	Cognitive & software Defined Radio	3
6.	EET-755	Wireless Communication Techniques	3
7.	EEN-740	Embedded System Design for Telecommunications	3
8.	EET-756	Telecommunication Switching Systems	3
9.	EET-702	Advanced Network Security	3
10.	CEN-745	Advanced Digital Image Processing	3
11.	ESC-716	Advanced Topics in Wireless & Networking	3
12.	EEN-725	Advanced Digital Signal Processing	3
13.	EET-560	Telecommunication Network Management	3
14.	EET-555	Wireless & Mobile Communications	3
15.	EET-552	Multimedia Networking	3
16.	EET-553	Information Theory and Coding	3
17.	EET-546	Radio & Microwave Engineering	3
18.	EET-555	Wireless & Mobile Communications	3
19.	EET - 558	5G And Internet of Things	3
20.	EET - 559	Programming of Internet of Things	3
21.	EET – 601	Narrow Band IoT Systems	3
22.	EET –731	IoT for Industry 4.0	3
23.	EET - 730	AI for Internet of Things	3
24.	EET – 603	SDN for Internet of Things	3
25.	EET –728	Security for Internet of Things	3
26.	EET - 602	Ultra-Low Power Radios for IoT	3

Course Description of New Added Core Courses

- **Optimization Techniques in Electrical Engineering (EET - 724)**

The purpose of this course is to develop a knowledge in the field of optimization techniques their basic concepts, principles. linear programming and queuing theory in terms of engineering with more specific to electrical engineering

- **Artificial Intelligence for Control Systems (EEA- 600)**

This course equips the students to understand how Artificial Intelligence can help in control systems. AI tools and techniques can aid sensor systems like robotics, cars, and wheelchairs etc. by, making control loops smarter, adaptive, and able to change behavior. The appropriate deployment of new AI tools contribute to the creation of more capable control systems and applications. Systems with continuous dynamics controlled by sequential machines lead to this interdisciplinary area for Control systems are decision-making systems which the industry is moving towards.

- **Communication Technologies & Platforms for IoT (EET-603)**

This course provides with the comprehensive knowledge about key enabling technologies and platforms for Internet of Things. It provides an insight into communication, networks, identification & tracking and service management. This course will also enable the students to gain deep knowledge about different available platforms along with their capabilities & limitations.

Course Description of New Added Elective Core Courses

- **Ultra-Low Power Radios for IoT (EET - 602)**

This course aims at elaborating the design of an IoT radio optimized for low-power operation. In depth analysis of Low powered Radios for IoTs is covered with special focus to deployment in dense network

- **SDN for Internet of Things (EET – 603)**

This course aims at set foundation of SDN for IoT systems. Different types of SDN architecture and protocols will be a key part of this course.

- **Security for Internet of Things (EET –728)**

This course aims at building the necessary background and foundation about security model, protocol and assessment procedures for IoT systems. Different types of attacks, regulation standards and privacy assessment procedures will also be the key part of this course.

- **IoT for Industry 4.0 (EET – 731)**

The objective of the course, is to provide an introduction to Industry 4.0, Internet of Things (IoT) and related topics. The course is designed to show the convergence between

consumer and industrial applications, evolution of connectivity technologies and data processing. Students will be introduced to technological and business challenges and opportunities as well as ethical concerns related to IoT.

- **Programming of Internet of Things (EET - 559)**

This course aims at introduce programing aspect of IoT devices and systems. Algorithms governing the deployment and connectivity shall be the main focus

- **Narrow Band IoT Systems (EET – 601)**

This course provides with the comprehensive knowledge about narrow band IoT along with their architecture and enabling technologies. It also covers latency, mobility and energy aspects of this novel communication paradigm.

- **AI for Internet of Things (EET 730)**

The course aims to familiarize students with the fundamentals of Internet of Things and Artificial Intelligence so that they are able to design and analyze new solutions for the wide range of AI based industrial IoT applications.

- **5G And Internet of Things (EET - 558)**

This course aims at building the necessary background and foundation about communication in 5G and IoTs. Basic communication concepts covering architecture, PHY and MAC layer protocols along with enabling technologies (i.e., short and long distance communication) are the essential part of this course. Some advance applications for the merger of IoTs and 5G is also covered.

- **Industrial Automation Technologies (EEA-601)**

The course covers study of the applications of industrial automation systems, including identification of system requirements, equipment integration, motors, controllers, and sensors. Coverage of set-up, maintenance, and testing of the automated system

- **System Integration (EEA-602)**

This course studies the process of integrating different systems and software applications by examining current and emerging trends, strategies, and techniques for developing systems integration solutions effectively. Example topics covered include, but are not limited to: documenting integration requirements using business process models, designing integration solutions reusing patterns, and implementing integration solutions using service oriented architecture.

- **Industrial Project Management (EEA-715)**

This course accounts for and explain theories and tools used in the field of project management, different types of projects and their characteristics, assess appropriate planning and coordination methodology in relation to the project's scope and type, analyses projects and project execution from the perspective of different stakeholders within the focal organization as well as external stakeholders from other parts of society.

- **Wireless Sensor Networks (EET- 729)**

This course provides with the comprehensive knowledge about wireless sensor networks. It provides an insight into different layers and their design considerations. A thorough knowledge of infrastructure establishment and sensor network platform is provided.

- **Control Instrumentation and Robotics (EEA-716)**

The course covers Novel actuator and sensor technology, bio-robotics and bioinstrumentation, control of complex systems, precision instrumentation, autonomous robotic vehicle, and optics.

- **Process Control Commissioning and Production management (EEA-717)**

This course covers the function of basic devices for measuring and controlling different kinds of variables in process control. Introduces closed-loop control and PID functions. Introduces maintenance of analog and digital devices and programmable logic controllers (PLCs). ISA and SAMA instrumentation symbols and interpretation and use of process diagrams are covered. In the second part covers the Production and Operations Management would be given which would include decision-making, capacity planning, aggregate planning, forecasting, and inventory management, distribution planning, materials requirements planning (MRP), project management and quality control.

BACHELOR OF SCIENCE IN GEOSCIENCES**Rational & Feasibility:**

1. Broadening of existing BS-Geophysics Program to BS-Geoscience (that will include all aspects already covered in Geology & Geophysics related courses being offered during Semester I-VI)
2. No requirement of Additional Faculty, however Faculty of Maritime School & Aquatic Diagnostic Lab (Marine & Coastal Biology) will serve as additional resource in Final Year (2023-24) - If required.
3. Similarly, the current Educational environment of Southern Pakistan in general and Karachi in Particular, requires growing numbers of Off-shore and Geoscience trained personnel in an ever-expanded ecosystem.
4. At Karachi, University of Karachi is the only Institution that offers degrees in Geology & Marine Biology Programs, simultaneously, with limited seats.
5. BS-Geoscience Program is offered at my alma mater Louisiana State University, USA, a Coastal & Gulf State with 5 sub-campus. Other States with similar Programs include, Colorado State University, University of Texas, Austinliam & Merry, Amherest Colege, Univ. of California and many more with Specializations and MS/PhD Programs according to their Geography. Other HEIs, to name a few, include:
 - a. <https://clas.uiowa.edu/ees/undergraduate-program/bs-geoscience>
 - b. <https://www.boisestate.edu/earth/degrees/geosciences/>
 - c. <https://catalog.uaf.edu/bachelors/bachelors-degree-programs/geoscience/bs/>
 - d. <https://www.tarleton.edu/degrees/bachelors/bs-geoscience/index.html> (Texax A&M System)
 - e. https://earth.utah.edu/current_students_undergraduate/bs-geoscience.php (University of Utah)
 - f. <https://uwm.edu/geosciences/undergraduate/bs-degree/> Milwakee
 - g. University of Bremen, Germany
 - h. Wolfgang Goethe University, Frankfurt
 - i. University of Munich
 - j. <https://www.une.edu.au/about-une/faculty-of-science-agriculture-business-and-law/school-of-environmental-and-rural-science/courses/geoscience/bachelor-of-geoscience> (Australia)
 - k. https://my.uq.edu.au/programs-courses/plan.html?acad_plan=geolsx2030 (Queensland)
 - l. <https://www.tamug.edu/mars/degrees/> (Texax A&M at Gelveston) (Coastal & Marine Geology)
6. Most of the Coastal & Marine (Blue Economy) and CPEC-related upcoming projects will require extensive need of trained human resource in on-shore & off-shore related projects. The requirements will be to employ graduates that possess ample knowledge and training in Coastal & Geology off-shore, Marine Environment & its Sustainable Development, esp. in Off-shore Oil & Gas Exploration Studies. In this regard, Few Faculty members of E&ES in collaboration with Chinese Geological Society (CGS) and PN Hydrogeology Projects have received training and know-how about Off-shore Geography. Beside that Existing Industry & Organization in South Pakistan (PPL, LMKR, OGDCL, SUPARCO, Met. Dept. & Ministry of Maritime etc) have

also participated and accepting Interns for future employment. Such International & National Organizations have been focusing on Karachi & Coastal Belt of Balochistan, and are conducting groundwork for excavation/exploration of Coastal & Off-shore Natural Resources, hence Trained HR is need of the hr. and in future demand.

New Program will offer a consolidated Program with needed Geological Science courses along with Marine Environment related courses, as well. Hence, the Program will cater the need of both coastal and marine related job market in upcoming CPEC-OBOR related activities from Sindh Coast to Coastal Balochistan, in both on-shore & off-shore economic activity based on BLUE ECONOMY paradigm.

ROAD MAP

YEAR-1

Semester I

Course code	Course Title	Credit hours	Contact hours		
			Theory	Lab	Total
PAK-101	Pakistan studies	2	2	0	2
ISL-101	Islamic Studies	2	2	0	2
ENG-103	English I	3	3	0	3
GEO-101	Introduction to Geosciences	3	2	2	4
MAT-105	Mathematics (for pre-med.)	0	3	0	3
CSC-105	Introduction to Computers	3	2	2	4
PHY-101	Physics	3	2	2	4
Total		16	16	6	22

Semester II

Course code	Course Title	Credit hours	Contact hours		
			Theory	Lab	Total
ENG-104	English II	3	3	0	3
GEO- 110	Physical Geography & Geomorphology	3	3	0	3
GEO- 115	Introduction To Geophysics	3	3	0	3
GEO- 120	Field Geology & Surveying	3	2	2	4
MAT-115	Calculus & Analytical Geometry	3	3	0	3
CHM-105	Chemistry	3	2	2	4
Total		18	16	4	20

Field Work 1

GEO-280	Geosciences Field Work and Report I	2	0	2	2
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YEAR-2

Semester III

Course code	Course Title	Credit hours	Contact hours		
			Theory	Lab	Total
ENG-232	Oral Communication	3	3	0	3
GEO-205	Structural Geology	3	2	2	4

Minutes of the 20th FBOS – ES

GEO-210	Mineralogy & Crystallography	3	2	2	4
CSC-205	Programming Fundamentals	3	2	2	4
ENV-245	Introduction to Oceanography	3	3	0	3
HSS-111 HSS- 115 HSS-201 HSS-202	One of The Following: Introduction to IR Introduction to Media Studies Introduction to Anthropology Introduction to Sociology	3	3	0	3
	Total	18	14	6	20

Semester IV

Course code	Course Title	Credit hours	Contact hours		
			Theory	Lab	Total
GEO-215	Sedimentology	3	3	0	3
MAT-205	Statistics	3	2	2	4
GEO-225	Geochemistry	3	2	2	4
GEO-230	Geotectonics	3	3	0	3
HSS-111 HSS- 115 HSS-201 HSS-202	One of The Following: Introduction to IR Introduction to Media Studies Introduction to Anthropology Introduction to Sociology	3	3	0	3
	Total	15	13	4	17

Field Work 11

GEO-380	Geosciences Field Work and Report II	2	0	2	2
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YEAR-3

Semester V

Course code	Course Title	Credit hours	Contact hours		
			Theory	Lab	Total
GEO-305	Environmental Geology	3	2	2	4
GEO-302	Exploration Geophysical Methods	3	2	2	4
GEO-315	Igneous & Metamorphic Petrology	3	2	2	4
GEO-303	Geology of Pakistan & Arabian Sea	3	3	0	3
GEO-304	Fundamentals of GIS & RS	3	2	2	4
GEO-325	Stratigraphy of Pakistan	3	2	2	4
Total		18	13	10	23

Semester VI

Course code	Course Title	Credit hours	Contact hours		
			Theory	Lab	Total
GEO-320	Marine Geology	3	2	2	4

Minutes of the 20th FBOS – ES

GEO-335	Earthquake Seismology	3	2	2	4
GEO-309	Geological Engineering & Soil	3	2	2	4
GEO-345	Petroleum Geology	3	3	0	3
GEO-425	Research Methodology	3	2	0	2
Total		15	11	6	17

Field Work-III

GEO-480	Geosciences Field Work and Report III	2	0	2	2
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YEAR-4 (Specialization Year)

Semester VII

Course code	Course Title	Credit hours	Contact hours		
			Theory	Lab	Total
GEO- XXX	Specialize Course - I	3	2	2	4
GEO- XXX	Specialize Course - II	3	2	2	4
GEO- XXX	Specialize Course - III	3	2	2	4
GEO- XXX	Specialize Course - IV	3	2	2	4
GEO- XXX	Specialize Course - V	3	2	2	4
Total		15	10	10	20

Semester VIII

Course code	Course Title	Credit hours	Contact hours		
			Theory	Lab	Total
GEO- XXX	Specialize Course - VI	3	2	2	4
GEO- XXX	Specialize Course - VII	3	2	2	4
GEO-490	Thesis	6	0	0	6
Total		12	4	4	14
Grand Total		133 Credit Hours			

* All Courses in the Specialization will be offered during Year-IV (semester VII-VIII) and will be of 400s Level

** The courses under Specialization mentioned as GEO XXX (above) will be picked up from listed courses given below, accordingly

Specialization Courses

The following 3-Specializations will be offered to students at registration for Semester-VII, to choose from. The list of courses for each specialization is listed below:

- Marine Geology
- Marine Geophysics
- GIS & Remote Sensing

	Marine Geology	Marine Geophysics	GIS & RS
1	GEO 461 - Coastal Geology & Geomorphology	GEO 461 - Coastal Geology & Geomorphology	GEO 481- GIS Database Management
2	GEO 462 - Physical Oceanography & Surveying	GEO 471 - 2D/3D Seismic Data Interpretation	GEO 482 - Satellite Image Processing
3	GEO 463 - Ocean Crust Sedimentation	GEO 463 - Ocean Crust Sedimentation	GEO 483 - GIS Data Analysis
4	GEO 464 - Offshore Seismic Stratigraphy	GEO 464 - Offshore Seismic Stratigraphy	GEO 484 - Cartography & Mapping
5	GEO 415 - Economic Geology & Mining	GEO 340 - Borehole Geophysics	GEO 485 - GIS Surveying & GPS Tech.
6	GEO 420 - Hydrogeology	GEO 420 - Hydrogeology	GEO 486 - Mapping of Natural Resources
7	GEO 444 - Applied GIS & RS Tech. in Geosciences		

Details of Course Contents

A. University Course Requirements: (21 Credit Hrs)

ENG-103 English-I (3 CH):

Process of Comprehension; Understanding and segmentation of important information; Importance and Principles of Comprehension; Passage, Paragraph; extracting required and relevant information; Direct & Indirect approaches; Introduction to speech analysis; Comprehension of speech; Speaking correct English; Oral Communication / Practice; Listening Techniques; Taking and giving instructions orally / written and by telephone; Direct / Indirect Speech; Idioms / Synonyms; Communication through Visual Aids; Demonstrations / Presentations.

ENG-104 English-II (3 CH)

Pre-requisite: ENG—103

Report writing, letter writing (formal), précis writing (advance), listening skill (advance), reading skills (advance), essay writing, story writing, curriculum vitae/résumé writing, vocabulary (advance), and presentations.

ENG -232 Oral Communication (3 CH)

Pre—requisite: ENG—104

Introduction to Oral Communication, Confidence Building/Knowing your Audience, Public Speaking & Presentation Skills, Meeting & Interviewing Skills, Non Verbal Communication, Listening & Communication, Project Reviewing (Recording an interview), Arguing a Point of View.

ISL-101 Islamic Studies (2CH):

Introduction to Quranic Studies, Study of selected Text of Holy Quran, Study of Selected Text of Holy Quran, Seerat of Holy Prophet (S.A.W) I, Seerat of Holy Prophet (S.A.W) II, Introduction To Sunnah, Selected Study from Text of Hadith, Introduction to Islamic Law & Jurisprudence, Islam Culture & Civilization, Islam & Science, Islam Economic System, Political System of Islam, Islam History, Social values.

PAK-101 Pakistan Studies (2CH)

Historical Perspective, Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-e-Azam Muhammad Ali Jinnah. Factors leading to Muslim separatism, People and Land, Muslim advent, Location and Geo-physical features. Government and Politics in Pakistan, Political and constitutional Phases (1947-58, 1958-71, 1971-77, 1977-88, 1988-99, 1999 onward), Contemporary Pakistan, Economic institutions and issues, Society and social structure, Ethnicity, Foreign policy of Pakistan and challenges, Futuristic outlook of Pakistan.

MAT-105 Mathematics (0 CH) If Pre-Med Students

Number System: Real Numbers; Properties of Real Numbers; Complex Numbers and related laws of addition, multiplication and division; Functions Domain & Range; Inverse of a Function; Quadratic equations and their solutions; Matrices and Determinants; Partial Fractions; Sequences and Series; Permutations and Combinations; Mathematical Induction and Binomial Theorem; Basics of Vector Analysis; Elementary Coordinate Geometry; Limits and Continuity of Functions; Differentiation and Integration of Functions

MAT-115 Calculus & Analytical Geometry (3 CH)

Limit of a function and theorems on limits; Calculating limits using limit theorems; One-sided limits. Limits at infinity; Infinite limits; Continuity of functions and theorems on Continuity; The Intermediate Value of theorem; Differentiation rules; Derivatives of algebraic and transcendental functions Derivative of Composite functions (The chain rule); Implicit differentiation; Higher derivatives; Differentials and errors; Integral and derivative; Rules for indefinite integration; Integration by substitution, by Parts and by Partial Fractions; Trigonometric integrals and trigonometric substitutions; Definite integrals Application to arc length and area between curves; Sequences; Limit of a sequence; Infinite series; Convergent and divergent series; Test for convergence; Power Series; Taylor and Maclaurin Series; Review of Analytic Geometry (Line, Circle, Conic Sections).

MAT-205 Statistics (3 CH)

Collection and Interpretation of Data; Data array and frequency distribution; Measure of Central tendency: Mean (all types), Median, Mode; Measure of Dispersion: Mean deviation, standard deviation, variance and skewness; Introduction to probability; Probability distribution; Curve fitting and Regression Analysis; Sampling and Sampling distribution; Estimation of parameters: Point and interval estimates in samples; Statistical Inference; Testing of hypothesis using z, t and f tests.

CSC-105 Introduction to Computers (3 CH)

History of computer development; Application of computers; Classification and types of computers; Basic block diagram of a computer; Hardware (input, output, memory, CPU) and

software (system software & application software); Social impact of computer age; Computer in education and scientific research; Introduction to, and history of Internet; Internet service providers and connections; The World Wide Web

H&SS Courses (2 Courses to be selected) (6 Credit Hrs)

HSS-107 Introduction to Psychology (3 CH)

Understand the vocabulary and concepts of psychology Understand the research upon which the knowledge of human thought and behavior is based Understand how critical thinking skills are developed Be a cautious and analytical consumer of information that is proclaimed to be scientific or based on research Have a greater understanding and accepting of him/her and others Describe the critical developments that led to the present discipline of psychology contrast and compare the three major Describe and apply psychological theory in some areas of his/her life.

HSS-111 Introduction to International Relations (3CH)

In this course the students are introduced to basic concepts in international Relations; the development of International Relations as a discipline, its scope, approaches to the study of International Relations; level of analysis and contending theories. Emphasis will be on the examination of contemporary International political systems, global issues of war and peace, economic and political integration, poverty, human rights etc.

HSS-115 Introduction to Media Studies (3CH)

In this course the students are introduced to media institutions and methods of production of media messages. It familiarizes the students with the tools of analysis of media messages as well as the studies of the audience and contemporary media debates. The focus then switches from media production and organization, to analysis of media output, to exploration of

Consumption and use of this output and ultimately to the larger issue of the socio-political role/s of media in contemporary society.

HSS-201 Introduction to Anthropology (3CH)

The course is divided into four segments. Each segment introduces the students to one of the four main branches of Anthropology as a discipline namely socio-cultural anthropology, physical anthropology, archaeology and linguistics. In the first segment the students are introduced to the core concepts within socio-cultural anthropology to include ethnology, ethnography, society, social organization, culture, sub-culture and counter cultures etc. This segment also introduces the students to ethnographic fieldwork methods and basics of qualitative research. The second segment introduces students to the Darwinian evolutionary theory and theory & practice of paleo-anthropology, forensic anthropology and genetics. The third segment tells the students about the difference between historic, prehistoric and contemporary archaeology. It also familiarizes the students with the methods of conducting archaeological research and provides them with some basic information about various methods of feature and art-factual dating used in archaeology. The fourth and last segment of the course introduces students to various branches of linguistics with a focus on sociolinguistics. It would also discuss issues of politics of representation and discourse analysis.

HSS—202 Introduction to Sociology (3CH)

This course introduces students to the basic concepts of sociology to include the rise, evolution, and functioning of social groups in society, the principles underlying the inter and intra group interaction, the structure of conflict and conflict resolution, articulation between social structures and psychological processes. The course also looks at some of the classical sociological theoreticians to include: Augustine; Xavier; Comte; Herbert Spencer; Emile Durkhiem and others.

B. Program Required Courses:

PHY—101 Physics (3 CH)

Newton's gravitation law; Kepler laws; Electro statics; Magnetisms; Amperes law; Magnetic flux density B; Reflection and refraction Interference and diffraction; Natural and artificial radioactivity; Heat and Conductivity; Pressure and Density; Thermodynamic Principles; Electricity and Magnetism; Semi-Conductor; Transistors; Satellite Communication; Introduction to Meteorology.

CHM-105 Chemistry (3 CH)

Periodic Table, Metals, Non—Metals, Concept of Bonding and Its Types, Dielectric Constants, Biochemical Effects of Arsenic, Lead, Mercury, CO, Nitrogen Oxide, SOL Cyanide. Cyclic Pathways in the environment: N, P, COL Pollution and its types, Definition, nature and types of contaminants, Mechanisms and medium for their diffusion, Industrial effluents, agricultural chemicals, fossil fuels, Origin and transmission of pollutants, General study of selected environmental pollutants, Inorganic compounds in soil, Fertilizers, Pesticides and Weedicides as pollutants, Types of Radiation and their biological effects, Water logging and salinity, Buffers and acid base equilibrium, Amino acids, Proteins and enzymes, Techniques for pollution monitoring. Fundamentals of chemistry including macroscopic behavior of basic States of Matter; Energetics of Chemical bonding and its applications; Solutions and colloids; Special emphasis on the acid—base equilibria in aqueous solutions; Buffers and pH; Hydrocarbons; Factors effecting the Chemical reactivity of different organic functional groups; Introduction to molecular spectroscopy and modern analytical techniques with their applications.

CSC-205 Programming Fundamentals (3 CH)

Pre—requisite: CSC-105

Program structure of C; Input & Output functions of C and C + +; Preprocessor directives; Variables and Consonants; Operators; Decision and Loops; Arrays and Pointers. MATLAB.

GEO-101 Introduction to Geosciences (3 CH):

Fundamental processes of dynamic earth, exploring their nature and quantitative interactions; Fundamentals composition and structure of the planet earth; formation of mountain ranges, rocks and basins; Earth resources such as Surface and ground water; minerals; energy resources hydrocarbons & geothermal; Geological Eras, Weathering and erosion; Sedimentation; Glaciations, Fossils , volcanism & Environments; Laboratory exercises in identification of common minerals and rocks; and interpretation of topographic maps; Field trips to nearby geological localities.

GEO-110 Fundamentals of Geography and Geomorphology (3 CH)

The nature and scope of Geography, structure and composition of atmosphere, horizontal and vertical distribution of temperature, air pressure and winds, impacts of lithosphere on human being, role of Hydrosphere on mankind, movements in oceanic water, concept of map making, socio-physical environment of Pakistan, concept of resources and human role. Geomorphological processes, Glaciers and their erosional and depositional land forms. Geological works of wind. Erosional and depositional work of surface and subsurface water, valley and base-level development and its type, drainage pattern, stream meandering and development off flood plans.

The erosional and depositional work of sea, development of coastal land forms. Geomorphic cycles and associated landforms produced by tectonics and volcanic activity.

GEO-115 Introduction to Geophysics (3 CH)

Pre-requisite: PHY-101

Elementary study of the gravitational, seismic, magnetic, thermal, and radioactive properties of the earth; Methods of measurement, interpretations of data and their applications to the scientific and economic exploration of the earth's interior, ISO stays and Introduction to Paleomagnetism

GEO-120 Field Geology & Surveying (3 CH)

Pre-requisite: GEO-101

Instruments used in field mapping; Introduction to topographic and Geological maps; Methods and techniques of surface and subsurface Geological mapping; Correlation techniques; Field description of igneous, metamorphic and sedimentary rocks; Modes of Geological illustration including structural contour, isopach and lithofacies maps, block and fence diagrams; Field mapping, preparation of Geological maps and cross-section; Field work; Each student is required to do field work and submit a report in the examination; The field work should cover; observation of physical features and their plotting on topographic sheet; Study of geomorphic feature; Measurement of stratigraphic sections; Recognition of structural features; Fauna observation; Study of primary and secondary structures; Field description of sedimentary; igneous and metamorphic rocks.

GEO-205 Structural Geology (3 CH)

Pre-requisite: GEO-110

Dynamics of rock deformation and mechanical properties of rocks; Stress and strain concepts; Factors controlling mechanical behavior of Materials; Folds classification based on morphology, geometry, and vergence; Mechanics of fold formation; Faults classification based on geometry and genesis; Structures in compressional and extensional regimes; Classification of Joints, foliations and lineation; Unconformities, their classification and recognition. Laboratory exercises on geologic map interpretation and cross sections; Field trips to area where good Geological structures are exposed

GEO-210 Mineralogy & Crystallography (3 CH)

Pre—requisite: GEO-101

Minerals; Significance of Minerals in modern world; Classification and system study of minerals with an emphasis on their crystallographic features, physical properties, Chemical

composition, occurrences, associations and uses; Introduction to Crystallography; elements of symmetry, symmetry operations, crystal notation, crystal systems study of normal classes of crystallographic systems; Introduction to X-ray crystallography Lab: Identification and description of common minerals. Study of crystal models

ENV-245 Introduction to Oceanography (3 CH)

Pre-requisite: GEO-101

Fundamental oceanographic principles, Physical properties of sea, water, salinity, temperature, density, water masses, Oceanic budgets of heat, water and salt. Circulations and currents, waves, tides, tsunamis, monsoonal reversals. Estuarine circulation, sea water stratification, ocean acoustics, acoustic attenuation in marine sediments, Chemical properties of marine environment, Typical distribution of sea water characteristics, Surface and deep ocean water circulation, Worldwide heat budget study.

GEO-215 Sedimentology (3 CH)

Pre-requisite: GES-101

Introduction; Sediments, their origin, transportation and deposition; Stratification, diagenesis, lithification and origin of sedimentary rocks; Depositional environments; Sedimentary basins; Sedimentary structures, their morphology and interpretation: Classification, composition and textures of sedimentary rocks and their descriptive study.

GEO-225 Geochemistry (3CH)

Prerequisite: CHM—105

Introduction; Nature of geochemical data and methods of analysis; Composition of solar system, meteorites and the earth; Geochemical classification of elements; Factors governing behavior of elements in Geological processes; Eh and pH diagrams; Geochemistry of igneous, sedimentary, and metamorphic rocks; Geochemical cycle; Introduction to exploration, environmental and analytical geochemistry; Laboratory instrumentation and common analytical methods involving rocks, soils, minerals and water.

GEO-230 Geotectonic (3 CH)

Pre-requisite: GEO-205

Review of various tectonic theories; Historical development of the plate tectonic theory; Plate Movements, Mantle Plumes, Plate Boundaries, Detail study of plate tectonics; Orogenic belts and evolution of folded mountains; Young folded mountains of the earth with special emphasis on mountain belt in Pakistan; Regional Tectonics of Pakistan.

GEO-305 Environmental Geology (3 CH)

Pre-requisite: GES-101

Fundamental concepts of Environmental Geology; Soil; Earth Materials & Processes; Application of Geology to a broad environmental concerns of Society; Evaluation of natural hazards, floods, landslides, subsidence, earthquakes, volcanic activity and coastal erosion; Water resources; Waste disposal management; environmental related health effects; Environmental impacts of mining, petroleum and gas exploitation; Geology in land use and urban planning; Environmental Geology mapping; Preparation of environmental impacts Statements.

GEO-302 Exploration Geophysical Methods (3 CH)

Pre-requisite: GEO-115

Introduction of Gravity and Magnetic Exploration, fundamental principles, units of gravity, roll of mass & density in gravity, distribution of density inside earth, methods of determining value of “g”, gravity acquisition, flattening effect of earth, Bouger anomaly, regional and residual effect, Methods of finding out density & thickness of ore bodies, Introduction to magnetic method, magnetic force, magnetic induction & magnetic permeability, magnetism in rocks and minerals, remnant magnetization, susceptibility contrast, magnetism of earth (geomagnetism), hysteresis loop, interpretation of magnetic data.

GEO-315 Igneous & Metamorphic Petrology (3 CH)

Pre-requisite: GEO-110

Nature and generation of magma; Magmatic crystallization and differentiation; Mode of occurrence and types of extrusive and intrusive igneous rock bodies; Structure and textures of igneous rocks; Classification and systematic study of igneous rocks; Processes and types of metamorphism and tectonism; Field and Laboratory study of igneous rocks in Hand specimen study of igneous and metamorphic rocks; Field trip to igneous & metamorphic areas.

GEO-303 Geology of Pakistan & Arabian Sea (3CH)

Pre-requisite: GEO-230

Introduction of general geology and tectonics of Pakistan. Physiographic and tectonic divisions; geology and stratigraphy of the accreted terrains such as Karakoram and Kohistan plate, Indian plate, stratigraphy and structure of foreland basins, Chamman fault, Makran convergence zone, and southern Indus basins, oroclines and suture zones. Himalayan and pre-Himalayan orogenic events, magmatism and metamorphism (pre-Himalayan and post-Himalayan); Evolution of Arabian Sea ; Geology of Pakistan offshore Basins.

Labs: Reconstruction of continents through times, regional tectonic elements of the Pakistan, geology and tectonics of Salt Range/Kohat-Potwar Plateau, Sulaiman/Kirthar fold belt, Makran convergence zone, on-and-offshore Pakistan.

GEO-304 Fundamentals of GIS & Remote Sensing (3CH)

Pre-requisite: GEO-110

Introduction to Geographical Information System, Data Types (spatial/non-spatial), Data Models and Structures (Raster / Vector), GIS Data Sources and Satellite Image Capturing Techniques, Displaying and Manipulating spatial information, Vector Data Models such as rivers, coastal features, water bodies, etc. Preparation (Digitization and Spatial Data Editing), GPS Survey, Introduction to the concept of RS, Electromagnetic Spectrum, Atmospheric Interaction, Technology of Remote Sensing (Orbits, Satellites, Sensors and Platforms), Applications of Remote Sensing, Satellite Image Processing Cycle, Image Enhancement, Data Fusion and Mosaicking Information Extraction (Classification and Vectorization). Photogrammetry, Satellite Imageries, Image Processing, Interpretation, Preparation of thematic maps, Image Data analysis and output.

GEO-325 Stratigraphy of Pakistan (3CH)

Pre-requisite: GEO-101

Principles of stratigraphy; laws of superposition and faunal succession; geological time scale with divisions; Unconformities, classification and nomenclature of stratigraphic units: lithostratigraphic, biostratigraphy and chronostratigraphic units; contacts; litho-and-biofacies; principle of stratigraphic correlation; Stratigraphic code of Pakistan; outline of stratigraphy of Pakistan; principles of biostratigraphy and biostratigraphy zones.

Labs: Preparation of stratigraphic columns and their correlation, facies maps, isopach, stratigraphic map.

GEO-320 Marine Geology (3CH)

Pre-requisite: GEO-101

Coastal environment & Biodiversity, Coastal features, Development of marine geology, contribution of deep sea drilling project and ocean drilling program. Hypsometry, topographic features of the ocean. Plate tectonics and sea floor spreading, major ocean basins, gulfs and seas. Geology of continental margins, estuaries, deltas, barrier islands and coral reefs. Sediment types and distributions, shelf sedimentation, oxygen and strontium—Isotope, deep sea sedimentation. Methods and instrumentation in marine geology. Worldwide sea level changes through time.

GEO-335 Earthquake Seismology (3 CH)

Pre-requisite: GEO-110

Causes and effects of earthquakes; Methods to locate and to assign magnitudes to earthquakes; Types of elastic waves, their propagation, travel—time curves and applications to the study of earth's interior; Earthquake risk analysis and expectations; man-made earthquakes and seismometer; Earthquake Seismology and the mathematical analysis of seismological processes on the basis of elastic wave theory; Seismic waves and their analysis in earthquake seismology; Frequency, magnitude, energy of an earthquake and their relationship; Source parameters and their determination; Composite fault plane solutions of earthquakes and their determination; Geographical distribution of important earthquakes; Earthquakes and their implication on the tectonics of the area; Specified problems on data processing analysis; fault solutions and interpretation.

GEO-309 Geological Engineering & Soil (3CH)

Pre-requisite: GEO-215

Basic concept of Engineering Geology; Mass-wasting, landslide and other rock movements; Uplift and settlement problems; Excavation and tunneling; Introduction to soil mechanics; Classification and characteristics of soil; Engineering properties of soil; Introduction to rock mechanics, stress and strain characteristics in deformation of rocks; rock classification; rock engineering properties; Geology of the engineering structures: dams, tunnels, bridges

GEO-345 Petroleum Geology (3 CH)

Pre-requisite: GEO-205

Introduction; Properties of petroleum and natural gas; Origin, migration and accumulation of hydrocarbons; Related source, reservoir and seal rocks; Reservoir properties; Various types of Geological traps for hydrocarbon accumulation; Concept of petroleum province and introduction to basin analysis.

GEO-425 Research Methodology (2 CH)

An Overview of Research Methods and Methodologies; Difference Between “Method” and “Methodology”; Epistemology, Methodology, and Method; An Overview of Empirical Research Methods: Descriptive (Qualitative) & Experimental (Quantitative); Assessing Methods; Ethnographies; Case Studies; Survey Research; Focus Groups; Discourse/Text Analysis;

Quantitative Descriptive Studies; Prediction and Classification Studies; Meta-Analysis; Validity in Research; Reliability in Research; Rigor in Research; Key Considerations to Design Your Research Approach; The Importance of Methods and Methodology

Field Work Courses: (3 Field work Courses offered with 2CH instead of 3CH)

GEO-280 Geosciences Field Work-I (2 CH)

Use of field instruments; Basic Geological mapping procedures; Identification of mineral and Rocks and coastal features & resources

GEO-380 Geosciences Field Work-II (2 CH)

One-week fieldwork for mapping of terrains and their structures, coastal environment & morphology by using Geological, geophysical and GIS/RS Techniques; measurement of stratigraphic sections.

GEO-480 Geosciences Field Work-III (2 CH)

One-week fieldwork in order to introduce Method of data collection; Geological and Geophysical field techniques; Interpretation/Report writing.

NEW Specialization Courses

GEO-461 Coastal Geology & Geomorphology (3 CH)

Pre-requisite: GEO- 320

Coastal and near shore geology. Waves and wave dominated coast, Neo-tectonics. Shore line morph dynamics. Tidal and lake coast. Long term development of coast. Sea level changes. Sub-tidal and tidal ecosystem. The management of coastal water. Land and sediments. Coastal Hazards and Coastal Dunes. Development of Delta.

GEO-462 Physical Oceanography & Surveying (3 CH)

Pre-requisite: ENV-245

Representation of annual wave period percentage frequency of the given region in the form of bar-diagram/histogram and its study. Representation of wave direction data in the form of rose diagram and their study. Interpretation of wave climate for the given data. T-S diagrams. CSS diagram and study of waves. Wave forecasting and Wave refraction study. Observation and study of different wave breaker types. Study of waves during rough and fair weather seasons. Preparation and study of tidal curves (mean tidal range, spring and neap tidal range - for different months). Calculation of velocity of sound using Nomograph. Study of major surface current patterns of the Indian Ocean. Study of major surface current patterns of the Atlantic Ocean. Study of major surface current patterns of the Pacific Ocean. Deep ocean circulation in the Atlantic Ocean. Littoral drift study in the field & lab using dye & tracer techniques.

GEO-463 Ocean Crust Sedimentation (3 CH)

Pre-requisite: GEO-215

Formation of Ocean Crust sedimentation. Marine Organism and chemical reaction in sediments formation on ocean belt. Study of erogenous, biogenesis, hydrogenesis, and cosmogenesis sediments. Turbidity currents, turbidites and cosnrogenous sediments, Ocean sedimentary structures and its morphology and texture.

GEO-464 Offshore Seismic Stratigraphy (3 CH)

Pre-requisite: GEO-115

Introduction; Seismic stratigraphic approach; Recognition and discrimination of depositional sequence; Boundaries of depositional sequences; Stratigraphic interpretation of seismic facies; Principal types of seismic facies; Recognizing and evaluating unconformities; Factors controlling

deposition of cyclic sequences; Origin of cyclic sequence; Application of seismic stratigraphy in hydrocarbon exploration; Basin classification; Classification and structural styles related to strike slip, Thrust tectonics; Source rocks and its types. Interpretation of logs and other relevant data to

identify areas favorable for hydrocarbon exploration.

GEO-471 Seismic Data Interpretation (3 CH)

Pre-requisite: GEO-115

Seismic data analysis techniques, Geological constraints regarding seismic data interpretation, Importance of seismic data quality, QC of data, Geological implementation in the seismic data, Seismic to well tie, Tying methods, Seismic correlation techniques, e. g Jump tie, loop tie, Interpretation ways, Mapping, 3 D surfaces, Practical implementation of different Software like OpendTect/Kingdom/Geographix (Licensed software).

GEO-415 Economic Geology and Mining (3 CH)

Pre-requisite: GEO-101

Introduction and historical development of economic Geology; Processes of formation, classification and importance of mineral deposits; Physical and Chemical controls of mineral deposition; Wall rock alteration; Para genesis and zoning; Occurrence, association of ore deposits; Hand specimen studies of common metallic and industrial mineral. Electrical methods — Basic theory; Electrical properties of rocks and minerals; Self potential method — Basics; Self Potential method — field and interpretation; Self Induce Polarization method — principles and theory; IP method — field survey and interpretation — study of a case history; Resistivity method — basic theory; Electrical resistivity — relations and measurements; Resistivity and Properties of materials; Acquisition and Processing of Data Interpretation; Radioactive methods — Basic theory; Radioactive minerals and Survey Interpretation.

GEO-420 Hydrogeology (3 CH)

Introduction to the hydrology of surface and groundwater supplies; Water bearing properties of rocks; hydrodynamics of flow through porous Materials; Flow nets; Well hydraulics; Analysis and evaluation of pumping test data; Groundwater quality; Occurrence of groundwater in various rock types and sediments; Introduction to techniques used in groundwater exploration and survey.

GEO-340 Borehole Geophysics (3CH)

Introduction; Types of Logs; Methods and principles; Factors influencing Logs; Resistivity logs; SP logs; Gamma Ray logs; Formation density logs; Neutron logs; Sonic logs; Caliper logs,

Dip meter logs. Application of logs; Porosity determination; Lithology and hydrocarbon detection; Structural interpretation; Correlation; Laboratory work.

GEO-444 Applied GIS & RS in Geosciences (3 CH)

Pre-requisite: GEO-304

Scope of Geographical Information System and Remote Sensing in Geology & Geophysics; Application of GIS & RS in Geosciences to understand the utilization of Data bases for various Geosciences projects; Building of Geo-Spatial dataset (its acquisition and development); ArcGIS environment; Concepts of Spatial layering in GIS; Spatial Data Analysis *GIS Software Lab*: Introduction to Open Source Software; Introduction to Geoprocessing ; Geo-referencing; Handheld GPS based survey; Incorporation of spreadsheet data with GIS; Creating shape file and spatial database files; Digitization [preparation of Land-use Map]; Generating Maps in form of PDF/Jpeg etc; Term Projects –Application

GEO-481 GIS Database Management (3 CH)

Pre-requisite: CSC-205

Fundamentals of geographical databases; Fundamentals of Python; Usage of variables and special data types; Naming conventions and reserved words; testing and printing variable values; Looping and control structures; Debugging; optional and required parameters; Objects, properties and methods; Object Model Diagrams; The geo-processor object introduction; Functions and parameters, passing and returning values; Multiple inputs and complex parameter passing; Selections and sets; SQL basics; Writing results to disk, various formats and switches; Advanced topics and further directions; Num.py for numerical modeling; Architecture of Arc Objects; Main Arc Objects classes, classes and interfaces *Lab*: Introduction to Lab; Looping statements; Getting and setting object parameters; Creating features and feature classes; Editing layer's display properties; Changing/editing and summarizing attribute data; Exploring the geo-processor object; Projects

GEO-482 Satellite Image Processing

Pre-requisite: GEO-304

Data Sources and acquisition; Characteristics of grey-level digital images; Types of Image data Formats; Pre-processing (Image stacking, Sub-setting & Geomatic and Atmospheric Corrections); Image Rectification and Registration; Re-sampling; Image transformation (Geometric and Affine); Batch Processing; Image Mosaicking and Color Balancing; Image Enhancement (Grey level transformations, Histogram equalization,); Image Filtering (Pan-sharpening, Fourier descriptors, Linear and non-linear filtering operations, Image and Separable convolutions, Sub-sampling and interpolation as convolution operations); Image Indices (NDVI, NDWI, NDSI, Leaf Area Index, etc); Image Classification (Types, Algorithms and Spatial modeler techniques); Signatures selection, feature space and evaluation; Principal component analysis; Morphological operations; Accuracy Assessment and Field Verification

Lab: Intro to lab and software; Hands on training on Spatial modeler in ERDAS Imagine; Atmospheric correction of multi-spectral and hyper-spectral data sets; Image Management (Import/Export & Display); Image Enhancement Techniques (Histogram equalization, filtering); Spectral and spatial digitizing; Mosaicking and color balancing; Rectification, Registration and Re-sampling; Image processing techniques; Signature selection; Accuracy Assessment and Field Verification; Individual/Group project with field work.

GEO-483 GIS Data Analysis & Modelling (3 CH)

Pre-requisite: GEO- 305

Introduction to spatial data types; Potentials of spatial data; Modeling and storing field data; Cluster analysis Boundary Analysis; Spatial Analyses; Point pattern analysis; Spatial Autocorrelation; Buffering, proximity and neighborhood functions; Spatial interpolation, type, Methods / algorithms, Derived measures on surfaces; Polylines and network Analyses;

Area objects and types of area objects; Geometric properties of areas; Map overlay; Vector and raster overlay operations; Ordinary Least Squares & Geographically Weighted Regression Techniques; Problems in simple Boolean polygon overlay; Multivariate data and multidimensional space; New approaches to spatial analysis; Surface modeling, DTM/DEM/DSM; Multi-criteria and Multi-attribute Decision Making; Uncertainties in spatial modeling.

Lab: Assignment on Spatial Analysis for various applications; Geo-coding Point analysis exercise; Interpolation of point data and surface modeling; Network analysis exercise; Aerial analysis exercise; Buffer analysis exercise; Multivariate analysis; Assignment on advanced spatial analysis; Suitability analysis; Risk Modeling, Assignment on uncertainties in spatial modeling

GEO-484 Cartography & Mapping

Pre-requisites: CSC-205 Introduction to Cartography and its history, Nature of Cartography, Map Types (Choropleth, Proportional Symbol, Dot, Isarithmic, Cartograms Flow, and Graduated Color Maps), Symbols, Lettering, Scale and direction, Map Projections, Datum and Coordinate Systems, Generalization, Land Use/Land Cover Schemes: standards for land cover/land use classification schemes Survey of Pakistan, Food and Agriculture Organization (FAO), United States Geological Survey (USGS), Coordination of Information on the Environment (CORINE). Thematic Maps, Descriptive Statistics, Class Intervals, Map Compilation, Map Design, Cartography and Ethics, Map Production, Project.

Lab: Map reading, Assignment on Types of Maps, Understanding of Survey of Pakistan (SOP) symbology and Development of Symbol Charts, Development of Graphical Map Projections, Development of at least two map projections each from conical, cylindrical, and plane projection, Large to small scale map conversion, Data classification and Thematic Mapping, Map composite development, Assignment on misleading cartography, Visit to SOP, Seminar.

GEO-485 GIS Surveying & GPS Technology

Pre-requisite: GEO-120

Introduction to Basic Concepts: Definitions, scope, evolution, current trends and future prospects of geodesy; Earth's shape & size, ellipsoid, its gravitational field and geoid; Units of measurement; surveying classification, Operations in Surveying: Triangulation, Trilateration, Traverse, establishment of ground control, mosaic, diagonal scale, surveying safety, units of measurement in surveying, zero-dimension in relation to different map scales, Theory of GPS & its working principles; errors in observations, precision & accuracy, least square adjustments Functions of Surveying Instruments: Tracking and data processing including GPS data display; Planimetric & vertical errors calculations; Distance measurement: Horizontal and vertical, Chain, Taping procedure its errors

Lab: Coordinate System conversion, GPS value reading; Easting Northing (latitude/longitude) and elevation; Map Projections and Datum Settings; Adjustment of errors, compass sketch surveys; problems on whole circle bearing and quadrantal bearing; Topographic data capturing and mapping in ArcGIS.

GEO-490 Thesis (6 CH)

Conduct research work in any field of interest related to Geosciences program being offered at BU and will require submission of a dissertation.

Comprehensive Viva Voce (0 CH)

At the end of the last semester, the students are going to sit for a comprehensive Viva voce that will cover the material from the start to the end of their academic program (8 semesters). The students result will be submitted to exam only after passing this Viva voce. No grades will be assigned against it.

Minutes of the 20th FBOS – ES
AVAILABLE HUMAN RESOURCES

PERMANENT FACULTY MEMBERS			
S. No	Faculty Name	Designation	Qualification
1	Dr Syed Shahid Ali	Professor / HOD	PhD Environmental Sci.
2	Dr Mehrab Khan	Senior Professor	PhD Geology
3	Dr Haris Ahmed Khan	Senior Assistant Professor	PhD Geophysics
4	Dr Salma Hamza	Senior Assistant Professor	PhD Geology (GeoChem)
5	Ms Shaista Iftikhar	Senior Assistant Professor	MS Geophysics (Petro)
6	Mr Muhammad Jahangir Khan	Assistant Professor	MS Geophysics (GIS)
7	Mr Muhammad Irfan	Senior Lecturer	MS Geophysics
STAFF FOR LABS			
8	Mr Ahsan Majeed Qureshi	Senior Lab Engineer	MS Geophysics (Petro)
9	Vacant - to be appointed	Laboratory Assistant Geo-Chemical Lab	BS Geology/GeoPhysics
10	Vacant - to be appointed	Laboratory Assistant GIS & DGD Lab	BS GIS/ Geology/Geophysics/

LAB FACILITIES AT DEES

1. Geology Lab and Museum
2. Geochemical and Physical Analysis Lab
3. GIS/RS Computer Lab
4. Digital Geophysical Data Lab (DGD)

FINANCIAL SUPPORT & FACULTY REQUIREMENTS

- Existing Geophysics Faculty at BUKC-DE&ES with diverse specializations will offer courses and Research will be available
- Currently, No additional Budget is required except annual budget allocations for Dept. functioning.

New Proposed Policy**Eligibility Criteria:**

Minimum 50% marks in Intermediate (HSSC) examination Pre-Engg./Pre-Medical or equivalent qualification with Mathematics certified by IBCC.

Deficiency Courses:

For Pre-Medical students, the following two deficiency courses of 3 credit hours each are proposed.

Fundamentals of Mathematics I (3 credit hours)

- Number System, Sets, Functions and Groups, Matrices and Determinants, Quadratic Equations, Partial Fractions, Sequences and Series, Permutation, Combination and Probability, Mathematical Induction and Binomial Theorem, Fundamentals of Trigonometry, Trigonometric Identities, Trigonometric Functions and their Graphs, Application of Trigonometry, Inverse Trigonometric Functions, Solutions of Trigonometric Equation

Fundamentals of Mathematics II (3 credit hours)

- Functions and Limits, Differentiation, Integration, Introduction to Analytic Geometry, Linear Inequalities and Linear Programming, Conic Section, Vectors

Course Registration

1. Students with Pre-medical background must furnish an **undertaking** that they must pass deficiency courses of Mathematics of 6 credit hours within one year of their regular studies. Failure to do so will result in cancellation of admission without any fee refund. The scheme for registration in deficiency courses shall be as under:
2. Student will cover deficiency course (as an additional load) in their regular semester. One option is they will opt for Fundamentals of Mathematics I in first semester and Fundamentals of Mathematics II in second semester. Furthermore, both these deficiency courses have no prerequisites i.e. both can be registered together as well. Deficiency courses may also be allowed to be registered as new courses in Summer Semester.
3. The student shall pay deficiency courses fee as per undergraduate program fee structure.
4. 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.
5. The deficiency course(s) shall not be included in CGPA calculations of the degree program.
6. The UG general/semester rules shall be applicable to these student including registration, maximum course load, attendance, examinations, medal and awards etc.