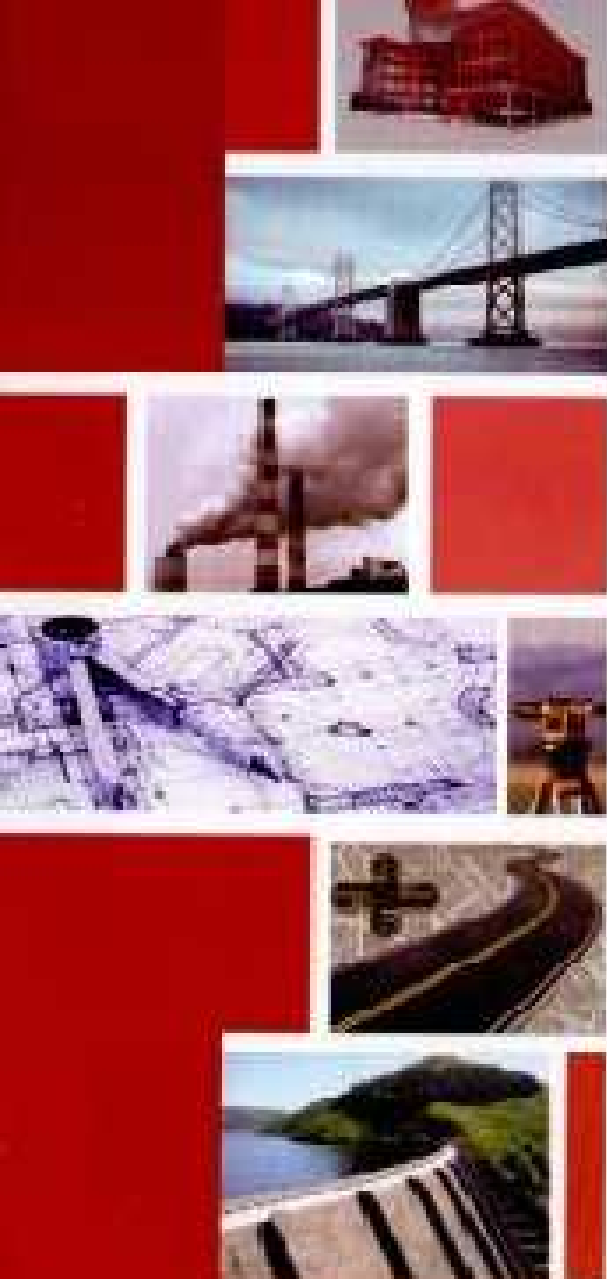


Information Booklet



KUET

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Department of Civil Engineering
Khulna University of Engineering & Technology

Department of Civil Engineering

Information Booklet

Undergraduate & Postgraduate Studies



Khulna University of Engineering & Technology

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Disclaimer

The information contained in this booklet are intended to provide a guidance to those concerned with undergraduate and postgraduate studies in the Department of Civil Engineering, No responsibility will be borne by the Civil Engineering Department of Khulna University of Engineering & Technology, if any inconvenience of expenditure is caused to any person because of the information of this booklet or any error in quoting the rules and regulations described herein. Also the information contained in it, are subjected to change at any time without any prior notification.

Preface to Fourth Edition

This Information Booklet has been prepared to provide the necessary information for the undergraduate (UG) and postgraduate (PG) students and teachers of the Department of Civil Engineering, Khulna University of Engineering & Technology (KUET), Khulna, Bangladesh. This booklet also includes the amendments of the academic rules and regulations, updates of the UG and PG syllabus since the publication of the third edition.

The booklet contains general information about this university, its historical background, faculties and teaching departments, admission procedure, academic rules and regulations for UG and PG students, administration and list of teachers in the Department of Civil Engineering. It introduces the different aspects of the course credit system such as credit structure, course offering instructions, attendance, teacher student contact, grading system, performance evaluation, requirement for degree, etc. This booklet also provides the detail course outline and courses offered in differed terms for both the UG and PG students of the Department of Civil Engineering.

The information herein may be changed or modified from time to time by the proper authority of this university to meet the advancement of science and technology. Such changes or modifications will be informed to the students by the authority of the university. Students are advised to contact their academic advisors if they are unable to understand any part of this booklet.

It brings me pleasure to gratefully acknowledge my colleagues who have extended their helping hands in preparing and publishing this booklet. Special thanks to Prof. Dr. Muhammed Alamgir for his valuable time for updating various aspects of general information of this booklet.

I hope that the information provided in this booklet will be helpful for the UG and PG students as well as teachers and all other concerned.

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Khulna University of Engineering & Technology (KUET) at a glance

This institution was established as an Engineering College in 1967 in the name of Khulna Engineering College, and the academic activities of the college were virtually started from the 3rd of June 1974 upon the special direction of Father of Nation Bangabandhu Sheikh Mujibur Rahman. Later, it was converted to an autonomous institute named as Bangladesh Institute of Technology, Khulna, (BIT, Khulna) in July 1986 to award degrees. To upgrade and further development in higher education and research, the institute was finally converted to Khulna University of Engineering & Technology, known as KUET, in September 01, 2003 as a public university by the Government of the People's Republic of Bangladesh to award degrees in different fields related to Engineering and Technology.

The university is aimed to take the leadership in promoting technological developments and management of the nation by strengthening engineering and technological education and research.

Location and its Surroundings

The campus is located at Fulbarigate, about 13 km north from the Khulna City near the Khulna-Dhaka highway. The Govt. B. L. College is located 4 km away from this campus to the southern side of it. Teacher's Training College, Technical Training Center etc. are located at the western side and the Jahanabad Cantonment is located at the northern side of KUET campus. The Khulna-Dhaka highway is passing through the eastern side of the campus.

Faculties and Teaching Departments

The university has sixteen (16) teaching departments under three faculties. All departments, with the exception of the department of Humanities, offer degree programs. However, some of them offer either Undergraduate (UG) or Postgraduate (PG) degrees only, while the others offer both the UG and PG degrees. Faculty wise list of the departments with the status of the degree offered is given below:

Faculty of Civil Engineering

Department of Civil Engineering	UG & PG
Department of Urban and Regional Planning	UG only
Dept.of Building Engineering and Construction Management	UG only
Department of Physics	PG only
Department of Chemistry	PG only
Department of Mathematics	PG only
Department of Humanities	---

Faculty of Electrical and Electronic Engineering

Department of Electrical and Electronic Engineering	UG & PG
Department of Computer Science and Engineering	UG & PG
Department of Electronics and Communication Engineering	UG & PG
Department of Biomedical Engineering	UG & PG

Faculty of Mechanical Engineering

Department of Mechanical Engineering	UG & PG
Department of Industrial Engineering and Management	UG & PG
Department of Leather Engineering	UG Only
Department of Textile Engineering	UG Only
Department of Energy Technology	PG Only

Institutes

Institute of Information and Communication Technology (IICT)
Institute of Disaster Management (IDM)

Academic Program

Undergraduate Program: Four (04) years Bachelor of Science in Engineering and Urban & Regional Planning degree

Postgraduate Program: Master of Science in Engineering (M.Sc. Eng.), Master of Science (M.Sc.), Master of Philosophy (M.Phil) and Doctor of Philosophy (Ph. D.)

The postgraduate courses are designed to meet the growing needs of engineering professions as well as further development of different specialized subjects of the above mentioned areas.

Language of Instruction

Official language of instruction and examination is English. However, teachers may use native language, Bengali; occasionally if no international students are present in the class.

Academic Facilities

To support the excellent and high quality academic environment, Khulna University of Engineering & Technology maintains a number of academic units.

Computer Center

The Central Computer Center (CCC) has served over the years as the hub for computer related services in the campus. With the commissioning of the

University-wide network, the CCC is in a unique position in providing computing and network facilities to the campus to serve the University. Now it has strong IT infrastructure with broadband line of 45 Mbps from BTCL and 4 Mbps from ISP as backup for Internet facility, a router for routing, a firewall for Internet security, five high configuration server as Mail server, Proxy server, Database server, DNS server, Web server, seven midlevel configuration of workstations for other servers and backup server, a core switch, several manageable and unmanageable switches for intranet connectivity. At present there are about 600 network nodes through LAN connection. Internet service is also available to specific users through Wi-Fi. CCC maintains campus wide optical fiber backbone network which provides connectivity to all Faculties, Institutes, Departments, Centers, and Main Administrative Building, Web-based Email that enables all the faculty members and officers to access their mailbox from anywhere via the Internet. The CCC provides services daily from 9:00 am to 8:00 pm except weekends (Fridays & Saturdays) and holidays, though some services are available until late hours.

Library Facility

The library subscribes huge journals and materials. KUET operates two types of library system, General Library and Reference Library. The General Library provides in house reading and short duration borrowing opportunity of book and other reference material to the students and faculties. The reference Library provides in place reading. All students and faculties can enjoy these facilities for more than 10 hours in every working day. Audio-visual systems are available for studying audio and video documents. Right now the general library system has more than 50,820 hard copy books, 9,475 e-Books, 3076 hard copy Journals and 4,51511 e-Journals. The library operations are fully automated by KOHA integrated library system. Moreover, Central Library enriches every year by collecting recent books and journals. Besides the general library system, each academic department maintains rent-based library from which students can borrow textbooks at a nominal rate for one semester. There is a digital library access center at the library to access e-journals and materials with modern computers servers and switches.

Campus Life

The university has 101 acres large campus with nice green landscape blended with beautiful architectural constructions. It is located at about 12 km from Khulna, the third largest metropolitan city of Bangladesh. Nice countryside and the rivers Rupsha and Bhairab surround the city. The constructed Khan Jahan Ali Bridge connected the city with Mongla port and south-west region of Bangladesh. The Sundarbans, world's largest mangrove forest, is about 40 km from the city. The city has also housed with some of the major industries of Bangladesh.

Climate

Being a part of tropical climate region, Bangladesh has warm and humid weather. The three main seasons prevailing in this country are winter (November-February), summer (March-June) and rainy (July-October). However, there are three more seasons available in between these seasons namely spring, autumn and late autumn, but their effects are not predominant. The warmest days in Khulna region are between April and June with temperature ranging from 30°C to 37°C. Winter temperatures usually vary between 8°C to 20°C. Humidity is high (70-90%) in summer and rainy seasons but moderate in winter (50-70%).

Accommodation

In the campus, six male and one female residential hall having necessary facilities can accommodate more than 2336 male and 367 female students, respectively. Generally, four students have to share a large room. There is a common Guest Room in the each residential hall. Every residential hall is equipped with modern recreation facilities like Cable TV connection, common room, reading room, library and a well-furnished guestroom. Social, cultural and other co-curriculum activities are scheduled throughout the semester/term to offer breaks in tedious study routine. From the teachers of KUET, one Provost and one to four Assistant Provosts are appointed by the authority to look after the administration sector of each hall.

Sports and Entertainment

Both indoor and outdoor sports facilities are available for refreshment of the students. The physical education section of the university is under the control of Director of Students Welfare (DSW) who arranges central indoor and outdoor sports competition annually. The university also organizes annual cultural competitions and occasional cultural programs on some special events like celebration of different national days, university foundation day and Bengali New Year's Day, etc. Besides, a number of cultural and social groups like theater group, debating society etc. are also active in the campus. The university team also attends different national level sports and cultural competitions and shown excellent performance. The university has a big auditorium of capacity 1000 seats for these cultural activities.

Transportation

For the convenience of the students, teachers, officers and staffs, KUET operates its own shuttle bus service between Khulna city and the campus. In weekends, special services are also provided to meet the weekend recreational and other needs. Bus services are also available for the industrial visits and study tours of students.

Students Union

The student union of KUET is a student organization to promote the interests and welfare of the student body. All full time students are members of the student union who vote for the office bearers of it. The DSW is the president of the student union as ex-officio appointed by the university authority from the senior faculty members. The university authority as the treasurer of the student union appoints one more faculty member. Moreover, a strong student welfare committee is also available for looking after the students facilities in some special cases. Sports, cultural and social activities, indoor and outdoor games are organized regularly to keep the students campus life pleasing.

Medical Centre

The university operates a medical center for meeting the needs of students' health care and medical facilities. The medical services are provided in a newly constructed two storied modern building in a nice location equipped with necessary medical equipments, patient's bed and full time experienced medical doctors, nurse and assistants. Mostly medical counseling and in some cases, medicine is supplied to the students free of cost. Moreover, pathological tests can be also done in the medical center with least amount of fees.

Food and Stationeries

Each residential hall has its own dinning facilities, which serves two meals per day maintained by the hall authority. Students are also involved in the management. Special menus are provided in different occasions. One annual grand dinner is also arranged in each hall as a yearly occasion. Besides these, in the campus, a big central cafeteria (presently under construction) and other small shops offer breakfast, meals and snacks, etc. Moreover, in Khulna city, there are number of nice restaurants that serve a wide variety of food including oriental and western flavor. Any sorts of alcohol or alcoholic drinks are completely prohibited in the campus. A departmental store is also housed in the campus for the benefit of all.

Other Facilities

In the campus, there is a water treatment plant to treat the water. There are also a large Mosque, a bank, 2 ATM booths and a post office in the campus. To provide uninterrupted power supply an electrical substation is located in the campus. There are also a gymnasium and a large well-equipped auditorium. A swimming pool integrated with Student's Welfare Center & Central Cafeteria (presently under construction) will provide necessary facilities to students, teachers and others.

Admission

The admission process of KUET emphasizes to identify students who will be able to successfully complete the degree requirements of different departments as well as contribute to the social and techno-economical environment of the nation.

Undergraduate Admission

Applicants for the undergraduate program must pass the Higher Secondary Certificate (H.S.C) or equivalent examination from any education board with science and must obtain excellent grade (decided in each year by the authority) in Physics, Chemistry, Mathematics and English courses. The candidates who have completed a-level examination can also apply. The applicants have to go through a rigorous entry examination to be qualified for admission. The entrance examination named as Admission Test is taken for 150 minutes duration based on current syllabus of Higher Secondary level Physics, Chemistry, Mathematics and English. The undergraduate admission is conducted once in each academic session.

Postgraduate Admission

Applicants must have B.Sc. Eng. Degree/ M.Sc. Eng./ M.Phil/ M.Sc. or equivalent (as required based on the PG Program) in the relevant field from a recognized University/Institute with good academic records. Students who have higher research aptitude are welcome to the program. KUET invites applications twice in a year for the admission in January and July Semesters. After appropriate notification, the respective departments arrange the admission test (written and/or viva-voce) at a specific time to select the suitable candidates for the program. Two categories of students, namely, full-time and part- time are admitted in the program. For full-time students, limited number of Teaching Assistantships/ Fellowships is available to provide financial assistance. A part-time student must have consent from his employer to pursue studies.

International Applicants

International applicants for both the UG and PG programs can apply throughout the year. Application materials and other information are available in the Registrar office. According to the present policy of KUET, an international student does not have to go through the entry examination procedure. However, they should have excellent high school record or equivalent to be qualified for admission in UG. The admission committee and equivalence committee (if necessary) take decision about the illegibility of admission of the applicants. KUET always encourages international students to maintain wide cultural and social diversity in this campus.

Students from SAARC (India, Pakistan, Nepal, Bhutan, Sri Lanka, Maldives and Afghanistan) countries can apply through their concern ministries to the Ministry of Education of Bangladesh to avail the special quotas, which are reserved under SAARC countries educational and cultural contract. However, these positions are limited. The completed application and above-mentioned documents should be reached to the Registrar's office following necessary formalities. Inquiries can be directed to:

Registrar

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Khulna 9203, Bangladesh.

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Administration

The university Syndicate is the supreme body for policy making and other operational procedures. The syndicate forms necessary policies, rules and regulations under the recommendation of different committees namely the Academic Council, Committee for Advanced Studies & Research, Planning and Development Committee and the Finance Committee. Nationally and internationally recognized academicians, planners, economists and high government officials as well as distinguished faculties from KUET form these committees. The Vice Chancellor is the administrative and academic head of the university. For the proper operation of different administrative services, the office of the Vice-Chancellor maintains various administrative sections namely Establishment section, Academic Section, Examination section, Accounts section, Security section, Transport section, Procurements Section, Engineering Sections (construction, maintenance and repairs), etc. Registrar is the custodian of records, the properties, the common seal and such other property of the university as the syndicate may commit to his charges.

Department of Civil Engineering, at a glance

Traditionally Civil Engineering deals with a large diversity of engineering problems. Because of its general nature, Civil Engineering allows a number of multidisciplinary activities to be conventionally organized within it. Department of Civil Engineering, one of the first academic disciplines of KUET started its first academic curriculum in 1974 with 40 students. In this department, the existing total number of UG students is 533 including 76 female students, while PG students are 176 including 22 female students. However, the yearly intake of fresh students is 120 in UG and 20 in PG levels. The Department of Civil Engineering offers basic and advanced regular and optional courses in the area of Geotechnical Engineering,

Environmental Engineering, Structural Engineering and Concrete Technology, Transportation Engineering and Water Resources Engineering. Research on the above fields is extremely important in the national context. These include areas like behavior of available building and road materials with emphasis on indigenous materials, engineering properties of soil in various regions of the country, effectiveness of granular piles as a ground improvement technique. Moreover, It also covers foundation engineering, retaining structures, solid waste management, environmental pollution control, environmental impact assessment, geometric design of highways, transportation planning and management, advanced concrete technology, durability of concrete structures, seismic zoning of Bangladesh etc.

Undergraduate Program

The Bachelor of Science in Civil Engineering (B.Sc. Eng.) curriculum covers the fundamental aspects of Civil Engineering, emphasizes basic principles and teaches the students in the use of these principles to reach optimal design solution for engineering problems. Emphasis is given on Engineering Mechanics, Surveying, Civil Engineering Drawing, Mathematics, Physics, Chemistry, English and Economics in the first year. The other three years are devoted to the Engineering Mathematics, Mechanics of Solids, Engineering Materials, Numerical Analysis & Computer Programming, Engineering Geology & Geomorphology, Geotechnical Engineering, Concrete Technology, Details of Construction, Structural Analysis and Design, Pre-stressed Concrete, Solid Waste management, Environmental Engineering, Transportation Engineering, Fluid Mechanics, River Engineering, Engineering Hydraulics, Hydrology, Irrigation and Flood Control, Details of Estimating, Construction Management and the application of fundamentals to the diverse problems in Civil Engineering. The curriculum includes theoretical courses, laboratory works, industrial training and different field trips.

Postgraduate Program

In the Department of Civil Engineering, the postgraduate program is very vigorous. The rapidly expanding program in the areas of Geotechnical Engineering is Fundamentals of Soil Mechanics, Ground Improvement Techniques, Foundation Engineering, Soil Dynamics, Earth Pressure and Retaining Structures, Soil Behavior and Critical State Soil Mechanics, Earth Dam and Slope Stability. Moreover, the field of Structural Engineering mainly emphasizes on Structural Analysis and Design, Composite Structure and Advanced Concrete Technology, Durability of Concrete, Theory of Elasticity, Finite Element Method as well as Analysis and Design of Tall Building. Moreover, the field of Environmental Engineering covers Water/Air Pollution and its Control, Sewage Treatment,

Sanitation Practices and Faecal Sludge Treatment in Developing Countries, Climate Change Impacts on Water-Environment, Environmental Impact Assessment and Environmental Sustainability. Additionally, the Water Resources Engineering covers Hydrology, Open Channel Flow, Mathematical Modeling of Fluid Flow and Sediment Transport as well as Transportation Engineering also covers Geometric design of highways, traffic engineering. Moreover, the field of Geo-environmental Engineering covers up Solid Waste Management, Geoenvironmental Aspects of Waste Landfill, Design and Construction of Sanitary Landfill, Soil/Water Interaction, Landfill Lysimeter Technology, Source of Ground Contamination.

These postgraduate programs lead to the degree of Master of Science in Civil Engineering (M.Sc. Eng.) and Doctor of Philosophy in Civil Engineering (Ph.D). To be awarded a M.Sc. Eng., a student should have to complete minimum 36 credit hours of which 9 credit hours of project work or 18 credit hours of thesis work. Moreover, the degree requirements for Ph.D are 60 credit hours of which a maximum of 45 credit hours of thesis works.

The postgraduate program has the following area of specialization:

1. Geotechnical Engineering
2. Structural Engineering & Concrete Technology
3. Environmental Engineering
4. Water Resources Engineering
5. Transportation Engineering
6. Geoenvironmental Engineering

Research Facilities

The Department of Civil Engineering has many advance instruments and equipment with laboratories for study of various civil engineering problems. Some research projects of more practical oriented works viz. effectiveness of granular piles in improving soft organic soils, performance monitoring of Geotextiles used in shallow foundations, numerical modeling in solving engineering problems. In addition, selection of deposits suitable for good quality bricks, consolidation characteristics of peat layer, load carrying capacity of piles in soil, salinity and arsenic problems in Khulna regions, solid waste management, design and construction of waste landfill, leachate treatment and management, traffic management system at Khulna City, dynamic behavior of multi storied buildings, soil structure interaction and cracking phenomena in concrete.

Moreover, at present, Civil Engineering Department has the following Laboratory facilities:

1. Geotechnical Engineering Lab
2. Environmental Engineering Lab
3. Geoenvironmental Engineering Lab
4. Hydrology Lab
5. Mechanics of Materials Lab
6. Concrete Lab
7. Surevey Lab
8. Transportation Engineering Lab
9. Computer Lab

Workshop, Training, Seminar and Conference

To address important issues of civil engineering problems for ensuring sustainable development, the Department of Civil Engineering has already been taken several initiatives through Workshop, Training, Seminar and Conference. The activities related to Geotechnical Engineering: Foundation Practice in Khulna City, Practice of Ground Improvement in the South-West Region of Bangladesh, Effect of Perfect Sampling Disturbance, Training and Demonstration on Soil Remediation; Structural Engineering: Role of Admixture to Produce Super-plasticized Concrete, General Design Approach for Strengthening of Concrete, Steel and Masonry Structures, Recycling of Demolished Concrete as a Source of Fine Aggregate for New Concrete. Additionally; Environmental Engineering: Community Participation and Management of Water Supply and Sanitation through ITN Sub-centre, KUET, Training Program on Laboratory Analysis of Faecal Sludge, Quality Assessment of Rain Water Harvesting, Development of a Community Based Arsenic-iron Removal Unit. In addition, in Transportation Engineering: Planning of Bicycle Parking Lots Considering Tolerable Distance as well as in Geoenvironmental Engineering: WasteSafe Stakeholders' Dialogue, MSW management training and workshops in six major cities of Bangladesh, Solid Waste Composting: An Overview, Integrated Management and Safe Disposal of MSW in LDACs, Application of Innovative Technologies for the Reclamation and Environmental Improvement of Derelict Urban Areas in Dhaka City. This department also organized some special training program such as ArcGIS and ETABS. Moreover, national and international funded research works and projects have been going in this department.

To enhance professional and research competence as well as to buildup knowledge based platform, International Conference on Solid Waste Management in developing countries, WasteSafe, have been organizing by

this department since 2009 in every odd year such as WasteSafe 2009, WasteSafe 2011, WasteSafe 2013 and WasteSafe 2015. The next WasteSafe 2017 will be held on 25-27 February 2017. In addition, this department also organizes International Conference on Civil Engineering for Sustainable Development ICCESD since 2012, in every even year such as ICCESD 2012 and ICCESD 2014. The next ICCESD 2016 will be held on 12-14 February 2016.

Consultancy, Research and Testing Services

Consultancy Research and Testing Services (CRTS) in Civil Engineering Department, a leading consulting platform having more than thirty experts in various fields of Civil Engineering, has been satisfying the demand of various engineering problems of the nation by providing services of international standard. Highly qualified and diversely experienced consultants of various fields of Civil Engineering such as *Structural Engineering, Geotechnical Engineering, Water Resources Engineering, Environmental Engineering, Transportation Engineering, Project Planning & Management and Geoenvironmental Engineering* have been involved in solving various engineering problems. Wide ranges of quality control testing facilities are also available for materials used in the Civil Engineering constructions. Expert consultancy services ranging from the analysis, design, construction and rehabilitation of buildings, bridges and other structures, diagnosis, retrofitting, restoration and protection of reinforced concrete and masonry structures using advanced techniques are regularly performed at CRTS (Civil). In the quality parameterization of water and waste water, as an engineering university in south-west part of Bangladesh, it has been playing a vital role in providing technological support in solving acute water supplying problems in this region. The highly compressible soil in this region is a great regional concern for Civil Engineering infrastructure construction. Geotechnical experts in this department are involved in continuous research and consultancy services in solving the foundation problems.

FACULTY MEMBERS

HEAD OF THE DEPARTMENT

Professor Dr. Md. Saiful Islam

PROFESSORS

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B.Sc. Eng. (Civil), RU; M.Eng. (Geotechnical Eng.), AIT, Thailand; Ph.D. (Geotechnical Eng.), IIT, Kharagpur, India

Research Interest: Soil Dynamics, Earth Structure, Foundation Engineering, Compensated Foundation, Soil Improvement, Soil-structure Interaction. Design of Retaining Structures, Sheet Piles, Cofferdams etc., Design of Floating Structures, Land Reclamation, Use of Rich Hush Ash for Civil Engineering Projects.

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Khulna University of Engineering & Technology

Academic Ordinance for Undergraduate Studies

(Effective from 2nd Term of Session 2011-2012)

(Approved by 38th meeting of Academic Council on 08/07/12 & 15/07/12 and confirmed by 39th meeting of Academic Council on 13/11/12 & 15/11/12)

1. Definitions

- 1.1. **‘University’** means the Khulna University of Engineering & Technology.
- 1.2. **‘Syndicate’** means the Syndicate of the University.
- 1.3. **‘Academic Council’** means the Academic Council of the University.
- 1.4. **‘Vice-Chancellor’** means the Vice-Chancellor of the University.
- 1.5. **‘Dean’** means the Dean of a Faculty of the University.
- 1.6. **‘Head of the Department’** means the Head of a Department of the University.
- 1.7. **‘Central Equivalence Committee’** means the Central Equivalence Committee of the University.
- 1.8. **‘Academic Committee’** means the Academic Committee for Undergraduate Studies (ACUG) of a degree awarding department of the University.
- 1.9. **‘Degree’** means the degree of “Bachelor of Science in Engineering” or “Bachelor of Urban & Regional Planning” offered by the University.
- 1.10. **‘Senior most Head/Dean’** means the most senior teacher among Heads/Deans.

2. Departments

2.1. Degree Awarding Departments:

The University shall have the following degree awarding departments:

- i) Department of Civil Engineering
- ii) Department of Electrical and Electronic Engineering
- iii) Department of Mechanical Engineering
- iv) Department of Computer Science and Engineering
- v) Department of Electronics and Communication Engineering
- vi) Department of Industrial Engineering and Management
- vii) Department of Urban and Regional Planning
- viii) Department of Leather Engineering
- ix) Department of Textile Engineering

- x) Department of Building Engineering and Construction Management
- xi) Department of Biomedical Engineering
Any other department that may be instituted by the Syndicate on the recommendation of the Academic Council from time to time.

2.2. Teaching Departments:

The University shall have the following teaching departments:

- i) Department of Civil Engineering
- ii) Department of Electrical and Electronic Engineering
- iii) Department of Mechanical Engineering
- iv) Department of Computer Science and Engineering
- v) Department of Electronics and Communication Engineering
- vi) Department of Industrial Engineering and Management
- vii) Department of Energy Technology
- viii) Department of Bio-Medical Engineering
- ix) Department of Urban and Regional Planning
- x) Department of Leather Engineering
- xi) Department of Textile Engineering
- xii) Department of Building Engineering and Construction Management
- xiii) Department of Mathematics
- xiv) Department of Chemistry
- xv) Department of Physics
- xvi) Department of Humanities

Any other department that may be instituted by the Syndicate on the recommendation of the Academic Council from time to time

3. Degrees Offered

The University shall offer courses leading to the award of the following degrees:

- i) Bachelor of Science in Civil Engineering, abbreviated as B. Sc. Eng. (CE)
- ii) Bachelor of Science in Electrical & Electronic Engineering, abbreviated as B. Sc. Eng. (EEE)
- iii) Bachelor of Science in Mechanical Engineering, abbreviated as B. Sc. Eng. (ME)
- iv) Bachelor of Science in Computer Science & Engineering, abbreviated as B. Sc. Eng. (CSE)

- v) Bachelor of Science in Electronics & Communication Engineering, abbreviated as B. Sc. Eng. (ECE)
 - vi) Bachelor of Science in Industrial & Production Engineering, abbreviated as B. Sc. Eng. (IPE)
 - vii) Bachelor of Urban & Regional Planning, abbreviated as BURP
 - viii) Bachelor of Science in Leather Engineering, abbreviated as B. Sc. Eng. (LE)
 - ix) Bachelor of Science in Textile Engineering, abbreviated as B. Sc. Eng. (TE)
 - x) Bachelor of Science in Building Engineering & Construction Management, abbreviated as B. Sc. Eng. (BECM)
 - xi) Bachelor of Science in Biomedical Engineering, abbreviated as B.Sc. Eng. (BME)
- Any other degree that may be awarded by a department on the recommendation of the Academic Council and approval of the Syndicate from time to time.

4. Students Admission

- 4.1 The four academic years of study for the degree of Bachelor of Science in Engineering (B. Sc. Eng.)/ Bachelor of Urban & Regional Planning (BURP) shall be designated as first year, second year, third year and fourth year class in succeeding higher levels of study. Students shall generally be admitted into the first year class.
- 4.2 An Admission Committee shall be formed in each academic year/session by the Academic Council for admission into first year B. Sc. Eng./BURP class consisting of the following members:
- i) One of the Deans in order of seniority
(as Professor) for each year by rotation Chairman
 - ii) All other Deans Member
 - iii) Five senior most Heads of the Departments Member
 - iv) Registrar Secretary
- The Committee is empowered to co-opt member/members (if required) not below the rank of a professor.
- 4.3 A candidate for admission into the first year class must have passed the H.S.C. Examination from an Education Board in Bangladesh

(after 12 years of schooling) with Physics, Chemistry and Mathematics as his/her subjects of examination in Higher Secondary level or examination recognized as equivalent thereto, and must also fulfill all other requirements as may be prescribed by the Academic Council on the recommendation of the Admission Committee. In case of confusion regarding the equivalence the case may be referred to Central Equivalence Committee.

- 4.4 The rules and conditions for admission into different departments shall be framed by the Academic Council on the recommendation of the Admission Committee in each year.
- 4.5 All candidates for admission into the courses of B. Sc. Eng./BURP must be citizens of Bangladesh unless the candidature is against the seats those are reserved for foreign students. Candidates for all seats except the reserved ones, if any, shall be selected on the basis of merit. The rules for admission into the reserved seats shall be framed by the Academic Council on the recommendation of the Admission Committee.
- 4.6 No student shall ordinarily be admitted in the first year class after the start of the corresponding classes or after the call goes out for the admission whichever is later. The date of commencement of classes for the newly admitted students will be announced in advance.
- 4.7 Admission of a newly admitted student in the first year class will be cancelled if he/she remains absent without prior permission of the Registrar through the Head of the Department for first 2 (two) consecutive weeks after the start of class. If any student fails to report due to unavoidable circumstances within the stipulated first two weeks, he/she may appeal within the next 2 (two) weeks to the Academic Council through the Head of the Department. The decision of the Academic Council will be final.
- 4.8 Prior to admission to the University every student shall be examined by a competent medical officer as prescribed in the admission rules.

5. Admission on Transfer

- 5.1 There shall be no admission on transfer in the first year class. In special cases, students may be admitted into a higher class.

- 5.2 A student may be allowed to transfer a maximum of 50% of the required theory courses of this University completed by the student at other public universities/institutions. The candidate must have a minimum CGPA of 3.0 without any F grade in any course and there should not be any discontinuity of study.
- 5.3 A candidate seeking admission on transfer from other public university should apply to the Registrar of this University. The Registrar will refer the case to the Head of the Department concerned and also to the Central Equivalence Committee. On receiving the opinions of the Departmental Monitoring Committee, the Central Equivalence Committee will consider the matter and it will be placed before the Academic Council. The decision of the Academic Council will be final and it will be communicated to the Head of the Department and the candidate.

5.4 Central Equivalence Committee

The Central Equivalence Committee will be formed as follows:

- | | |
|---|-----------|
| i) One of the Deans (by rotation of
CE, EEE and ME faculties) of this University | |
| Chairman | |
| ii) All other Deans | Member |
| iii) All Heads of the Undergraduate Departments | Member |
| iv) Deputy Registrar (Academic) of this University | Secretary |

Duration of Chairman of this committee will be 2 (two) years.

6. Academic Calendar

- 6.1 The academic year shall ordinarily be divided into two regular Terms, each ordinarily having duration of not less than 13 (thirteen) weeks of classes.
- 6.2 There shall be a final examination at the end of each Term and the examination will be conducted as per Academic regulations.
- 6.3 The Head of the Department will announce the academic schedule for each Term ordinarily before the start of the class subject to the approval of the Academic Council.

6.4 Academic schedule may be prepared according to the following guidelines based on two regular Terms:

Term I	No. of weeks
Classes	13
Recess before examination/Preparatory leave	1.3*
Term Final Examination	3.1*
Publication of results including Term break	<u>2.3*</u>
Sub-Total:	20
Term II	
Classes	13
Recess before examination/Preparatory leave	1.3*
Term Final Examination	3.1*
Publication of result including Term break	<u>2.3*</u>
Sub-Total:	20
Recess	1**
Vacations throughout the session	<u>11</u>
	Total: 52 Weeks

* The digit after the decimal point indicates number of days.

** This recess may be utilized near the mid position of a Term when no vacation of minimum 7 (seven) days will be available during 13 (thirteen) week classes in that Term.

7. Duration and Credit of Courses

- 7.1 The B. Sc. Eng./BURP courses shall be extended over a period of four academic years, each with a normal duration of one calendar year. Each academic year will be divided into two Terms for the purpose of academic programs and conducting of examinations.
- 7.2 The curricula of the B. Sc. Eng./BURP degree in the different departments shall be as proposed by the concerned ACUG through the Executive Committee of the concerned Faculty and approved by the Academic Council.
- 7.3 The ACUG may review the curricula once in every academic year and put forward suggestions to the Academic Council through the Executive Committee of the concerned Faculty.
- 7.4 Teaching for the courses is reckoned in credits and the credits allotted to various courses will be determined by the ACUG with the following guidelines:

Type of Course	Contact Hour (in a Term)	No. of Credit
i) Theory/Lecture	: 1 hour/week	1.00
ii) Tutorial	: 1 hour/week	1.00
iii) Independent Lab/ Sessional/Design/ Seminar/Special Study/Project/Thesis	: 3/2 hours/week	0.75
iv) Field work	: 2 weeks of field work	1.00

7.5 The minimum number of credits that a student has to complete successfully for the award of B. Sc. Eng./ BURP degree will be 160 of which a maximum of 150 credits to be assigned as core courses.

7.6 The total contact hours for students including lecture, tutorial and laboratory/sessional should be around 30 periods per week, each period being of 50 minutes duration.

7.7 A course plan for each course proposed by the course teacher with the consultation of the Head of the Department showing details of lectures is to be announced at the start of each Term.

7.8 Project/Thesis should preferably be of 1.5 to 3.0 credits in each Term. Credit in any theory course should not exceed 4.0 and that in sessional/laboratory course should not exceed 3.0.

8. Course Designation and Numbering System

Each course is designated by a two to four letter code (e.g. CE, EE, ME, Hum, Math, Ch, Ph, etc) identifying the course offering department followed by a four digit number with the following criteria:

8.1 The first digit will correspond to the year in which the students normally take the course.

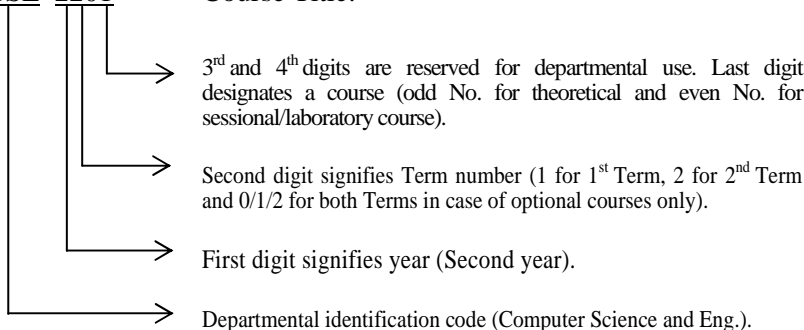
8.2 The second digit will correspond the Term (1 for 1st Term, 2 for 2nd Term and 0/1/2 for both Terms in case of optional courses only) in which the course is normally taken by the students.

8.3 The third and fourth digits will be reserved for departmental use, of which the last digit will be odd for theoretical and even for sessional/laboratory course.

8.4 The course designation system is illustrated by the following example:

CSE 2201

Course Title:



N.B.: There will be one blank space after departmental identification code.

8.5 Project/thesis courses shall be designated by the departmental identification code followed by 4000 (Example: CE 4000) applicable for both the Terms.

9. Classification of Courses

The courses included in undergraduate curricula are classified as follows:

9.1 Core Courses

In each department a number of courses will be identified as core courses which form the nucleus of the respective Bachelor's degree program. A student has to complete all the designated core courses for his/her degree.

9.2 Pre-requisite Courses

Some of the core courses are identified as pre-requisite courses. A pre-requisite course is one which is required to be completed/appeared at the examination before some other course(s) can be taken. Any such course, on which one or more subsequent courses built up, may be offered in each of the two regular Terms (if possible).

9.3 Optional Courses

Apart from the core courses, a student will have to take a number of courses which he/she can choose from a specified group/number of courses to complete the credit requirements.

9.4 Non Credit Courses

Non credit course(s) may be offered to a student to improve his/her knowledge in some specific fields. The credits in these courses will not be counted for GPA and CGPA calculation but will be reflected in the transcript as satisfactory (S)/unsatisfactory (U). Non-credit course(s) may be offered under the following circumstances:

If a student's Thesis/Project supervisor feels that the study/design is highly related to course(s) offered by any department for their students, he can recommend to the concerned Head of the Department for participation of the student(s) in the course(s). Such registration of course(s) will not affect the normal course registration of the student.

9.5 Backlog Courses

The course(s) which a student registered in a Term but after Term final examination he/she obtained 'F' grade in that course(s) and also the withdrawal courses as defined by Article 23.1(ii).

9.6 Withdrawal Courses

The courses which were withdrawn by a student due to some reasons as mentioned in Article 11.8.

9.7 Incomplete Courses

The unregistered course(s) and the course(s) that a student has registered but cancelled according to Article 11.3 will be defined as incomplete course(s).

10. Departmental Functional Bodies

10.1 Departmental Monitoring Committee

Each degree-awarding department will form a Departmental Monitoring Committee with Head of the Department as Chairman and 4 (four) senior most teachers of the department as members. The Committee may propose any change and modifications time to time needed for upgrading/changing the Undergraduate Course Curriculum to ACUG. The Committee will also nominate Course Coordinator and Advisers for the student.

10.2 Student Adviser

An Adviser (normally not below the rank of Assistant Professor) will be nominated for one or more students for the entire period of study by the Departmental Monitoring Committee. He/She will advise each student on the courses to be taken in a Term. However, it is the student's responsibility to keep contact with the Adviser who will review and eventually approve the student's specific plan of study and monitor on subsequent progress of the student.

For a student of second and subsequent Terms, the type of courses for which he/she can register will be decided on the basis of his/her academic performance during the previous Term. The Adviser will advise the students to register the courses during the next Term within the framework of the guidelines in respect of minimum/maximum credit hours limit. He/She may advise the student to change one or more courses among the offered courses based on student's academic performance.

10.3 Course Coordinator

In each degree-awarding department, one of the Teachers (normally not below the rank of Assistant Professor) nominated by the Departmental Monitoring Committee, will act normally for 2 (two) Terms as Course Coordinator and Member Secretary to the ACUG.

11. Course Registration for Regular/Incomplete/Withdrawal Course(s)

11.1 Pre-condition for Registration

A student will be allowed to register courses, depending upon his/her performance. If a student fails in a pre-requisite course in any term, he can register for a course which builds on the pre-requisite course provided his attendance does not fall below 60%. A student having outstanding dues to the University or a Hall of Residence shall not be permitted to register.

11.2 A regular student can register a maximum of 5 (five) theoretical courses in addition to sessional/project/ thesis/ field work/seminar/sessional related courses in a Term those offered in that Term in any Year. No student will be allowed to register courses from different Terms in any Term (For example: In case of registration for 1st Year 1st Term, a student can register maximum five theoretical courses in addition to sessional courses/sessional

related courses among the offered courses for 1st Year 1st Term only). No student can register any backlog course along with the regular courses in a Term. The total number of credit hours shall generally be between 15 to 24 credits in a Term. However, a student may be allowed to register less than 15 (fifteen) credits in a Term if-

- i) the number of credits required for graduation is less than 15 (fifteen) in that Term and
- ii) he/she cannot find appropriate courses for registration.

11.3 If a student fails to attend 60% of the classes of any registered course in a Term whatever be the reasons, then the registration will be cancelled for that course and the course be treated as Incomplete course.

11.4 Registration Procedure

The date and time for registration will be announced in advance by the Registrar's office. Students will register his/her courses in a Term according to following guidelines:

- i) A student must pay Hall dues before the course registration of a Term.
- ii) The student must pay the course registration fees as per rule.
- iii) The student will finalize courses to be taken in consultation with his/her Adviser from the courses offered by the respective Department.
- iv) The student will complete the registration and respective Adviser and Head of the Department will confirm it.

The Registrar's office will distribute course-wise list of registered students to the concerned department and Controller of examinations.

11.5 Registration Deadline

A student must register for the courses to be taken within first 8 (eight) working days of class of each Term. However, late registration will be permitted within next 7 (seven) working days of class on payment of late registration fee. No registration will be accepted after first 15 (fifteen) working days of class of each Term.

For the newly admitted first year students, relaxation up to a maximum of 10 (ten) working days of class from the beginning of the Term may be allowed. Late registration of first year student will not be accepted after these days unless the student submits a written appeal to the Registrar through the concerned Head of the Department and can document extenuating circumstances such as medical problems (Physically incapacitated and not able to be present) or some other academic commitments which precluded enrolling prior to the last date of registration. Proper certificates from concerned authorities must be submitted along with the application.

11.6 Penalty for Late Registration

Students who fail to register within the specified dates for registration will be charged a late registration fee (an amount as may be decided by the authority). This extra fee will not be waived whatever be the reason for late registration.

11.7 Course Adjustment Procedure

A student would have some limited options to add or delete courses from his/her registration list. Addition of course is allowed within the 10 (ten) working days of class from the beginning of the Term. Dropping of a course is allowed within 15 (fifteen) working days of class from the beginning of the Term. Adjustment of initially registered courses in any Term can be done only by duly completing the Course Adjustment Form.

Any student willing to add or drop courses will have to fill up a Course Adjustment Form in consultation with his/her Adviser. The original copy of the Course Adjustment Form will be submitted to the Registrar's office through the Adviser and Head of the Department.

11.8 Withdrawal from a Term

If a student is unable to complete the Term Final Examination due to illness, accident or any other valid reason, etc. he/she may apply in prescribed form to the Registrar through his/her Adviser and Head of the Department for total withdrawal from the Term within 7 (seven) working days after the end of the Term final examination. However, he/she may choose not to withdraw any laboratory/sessional/design course if the grade obtained in such a course is 'D' or better and that he/she has to indicate clearly in his/her withdrawal application. In

case of illness the withdrawal application must be supported by a medical certificate from University Medical Officer. The Academic Council will take final decision about such an application.

12. Striking off the Names and Readmission

- 12.1 The names of the students shall be struck off and removed from the rolls on the following grounds:
- i) Non-payment of University fees and dues within the prescribed period.
 - ii) Forced to discontinue his/her studies under disciplinary rules.
 - iii) Withdrawal of names from the rolls of the University on grounds acceptable to the Vice-Chancellor of the University after having cleared all dues.
 - iv) A student failing to earn a minimum of 36 (thirty six) credits in the first 4 (four) consecutive Terms or 54 credits in the first 6 (six) consecutive Terms will cease to be student of this University. However, any student forced to discontinue his/her studies under Article 12.6(iii), the period of discontinuance should be excluded in calculating the time (4 consecutive Terms or 6 consecutive Terms).
 - v) Could not earn required credits for graduation as outlined in the respective curriculum and/or fulfill CGPA requirement within the maximum allowed time of 7 (seven) consecutive academic years.
- 12.2 Every student whose name has been struck off from the rolls by exercise of the clause (ii) of Article 12.1 seeking readmission after expiry of the period for which he/she was forced to discontinue his/her studies, shall submit an application to the Head of the Department in the prescribed form before the commencement of the session to which he/she seeks readmission. The Head of the Department shall forward the application to the Vice-Chancellor of the University with his remarks. In case the readmission is allowed, the student will be required to get him/her-self admitted on payment of all dues not later than one week from the date of permission given by the Vice-Chancellor. All readmission should preferably be completed before the Term starts.
- 12.3 No student who has withdrawn his/her name under clause (iii) of Article 12.1 shall be given readmission.

- 12.4 A student, whose name has been struck off from the rolls by exercise of clause (v) of Article 12.1, is not eligible to seek readmission.
- 12.5 In case a student whose name has been struck off from the rolls under clause (i) of Article 12.1 seeks readmission before the start of the next Term he/she shall be readmitted on payment of all arrear fees and dues (excluding course registration fees). But if he/she seeks readmission in any subsequent year the procedure for his/her readmission will be the same as described in Article 12.2
- 12.6 Readmission for discontinuance of studies
A student will be considered to discontinue his studies under the following conditions:
- i) Non-payment of University fees and other dues for Terms concerned.
 - ii) Withdrawal from a Term/absent in the Term final examination.
 - iii) Forced to discontinue under disciplinary rules.

The maximum allowable period of discontinuance is 4 (four) regular Terms during his/her whole studentship whatever may be the reason as specified above and at the same time s/he will have to fulfill the conditions of Article 12.1 (iv). A student seeking readmission within the allowable period of discontinuance may be readmitted after payment of all arrear fees and dues.

- 12.7 In case any application for readmission is rejected, the student may appeal to the Academic Council for re-consideration. The decision of the Academic Council shall be final.

13. Grading System and Calculation of GPA and CGPA

13.1 Grading System

The letter grade system shall be used to assess the performance of the student and shall be as follows:

Numerical grade	Letter Grade	Grade point
80% or above	A+ (A plus)	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A- (A minus)	3.50
65% to less than 70%	B+ (B plus)	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B- (B minus)	2.75
50% to less than 55%	C+ (C plus)	2.50
45% to less than 50%	C	2.25
40% to less than 45 %	D	2.00
Less than 40%	F	0.00
Continuous assessment	X	

(For courses extended over two regular Terms, such as project/thesis/design, etc.)

Withdrawal W

Incomplete I

Non Credit Course S/U (Satisfactory/Unsatisfactory)

13.2 Calculation of GPA and CGPA

Grade point average (GPA) is the weighted average of the grade points obtained in all the courses passed/completed by a student in a Term. 'F' grades will not be counted for GPA calculation. GPA of a Term will be calculated as follows:

$$GPA = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

where n is the total number of courses passed by the student, C_i is the number of credits allotted to a particular course i and G_i is the grade point corresponding to the grade awarded for i -th course.

Cumulative Grade Point Average (CGPA) gives the cumulative performance of the student from first Term up to any other Term to which it refers and is computed by dividing the total weighted grade points ($\sum C_i G_i$) accumulated up to the date by the total credit hours ($\sum C_i$).

Both GPA and CGPA will be rounded off to the second place of decimal for reporting.

14. Distribution of Marks

14.1 The distribution of marks for a given course will be as follows:

i) Theory courses:

Class participation, attendance and assignments	10%
Class tests, Quizzes, Spot test, etc.	20%
Term Final Examination (3 hours duration)	70%
Total:	100%

ii) Independent laboratory/design/field work courses:

Class participation and attendance	10%
Quizzes, Viva-Voce conducted in lab class	20%
Viva-Voce conducted centrally	20%
Performance and reports	50%
Total:	100%

iii) Project/thesis: (Continued for two Terms)

a) At the end of 4th year 1st Term: 30% of total marks to be evaluated as follows:

Presentation and Viva-Voce (conducted by a Viva-Voce committee)	10%
Supervisor	20%

b) At the end of 4th year 2nd Term 70% of the total marks to be evaluated as follows:

Presentation and Viva-Voce (conducted by a Viva-Voce committee)	20%
Supervisor	40%
External examiner (any other teacher of the Department/a member of examination committee)	10%

Total (in two Terms) 100%

14.2 Attendance

i) Eligibility for Scholarship/Stipend/Grant

The students whose percentage of attendance will fall short of 75% in any of the theory, lab/sessional courses for which he/she has registered in any Term of an academic year shall not be eligible for the award of any type of scholarship/stipend/grant for the following academic year.

- ii) Basis for awarding marks for attendance will be as follows:

Attendance	Marks (%)
90% and above	100%
85% to less than 90%	90%
80% to less than 85%	80%
75% to less than 80%	70%
70% to less than 75%	60%
65% to less than 70%	50%
60% to less than 65%	40%

15. Class Tests, Quiz and Spot Test

- 15.1 For theory courses 3 class tests will be taken. Normally no more class tests will be taken on any course.
- 15.2 The class teacher will assign problems to the students and take spot test and quiz examination for assessment.
- 15.3 The date of class tests/quiz shall be fixed by the course teacher in consultation with the Head of the Department.
- 15.4 Duration of class tests should be 20-30 minutes and quizzes and spot tests should be 10-20 minutes.
- 15.5 All class tests shall ordinarily be of equal value. The result of each individual class test shall be posted for information of the students preferably before the next class test is held.

16. Earned Credits, Backlog and CGPA Improvement

The courses in which a student has obtained 'D' or a higher grade will be counted as credits earned by him/her. Any course in which a student has obtained 'F' grade will not be counted towards his/her earned credits calculation. A student who obtains an 'F' grade in any core course in any Term, he/she will have to repeat the course. If a student obtains an 'F' in an optional course he/she may choose to repeat the course or take a substitute course, if available. F grades will not be counted for GPA calculation but will stay permanently on the grade sheet and transcript. When a student will repeat a Backlog course in which he/she previously obtained 'F' grade, he/she will not be eligible to get a grade better than B+ (B plus) in such a course.

A student obtaining D grade in a course, will be allowed to repeat the course for the purpose of grade improvement if CGPA of the student falls below 2.20. In such case he/she will be awarded the new grade thus he/she obtains or retains his/her previous grade if he/she fails. A student obtaining 'C' or a better grade in a course will not be allowed to repeat the course for the purpose of grade improvement if CGPA of the student falls below 2.20. Absence in Term final examination will result 'F' grade unless he/she has withdrawn from the Term as per Article 11.8.

17. Performance Evaluation

The minimum CGPA requirement for obtaining a B. Sc. Eng. or BURP degree is 2.20. The performance of a student will be evaluated in terms of two indices, viz. GPA and CGPA.

Students will be considered to be making normal progress toward a degree if their CGPA for all courses passed is 2.20 or more. Students whose GPA will fall below 2.20 will have to appeal to the Head of the Department through Adviser for the course registration so that the necessary remedial measures can be taken.

18. Honors, Dean's List and University Gold Medal

18.1 Honors

Candidates for Bachelor's degree will be awarded the degree with Honors if their CGPA is 3.75 or better.

18.2 Dean's List

In recognition of excellent performance, the names of students who maintains an average GPA of 3.75 or above in two regular Terms of an academic year may be published in the Dean's List in each Faculty and he/she will be given a certificate from respective Dean as recognition. Students who have received an 'F' grade in any course during any of the two consecutive regular Terms will not be considered for Dean's List in that year.

18.3 University Gold Medal

University Gold Medal for outstanding graduates will be presented to the students who secure the 1st position in each Department and whose CGPA is above or equal to 3.75. The student must have completed his/her undergraduate course work within four consecutive academic

years with no 'F' grades and have a satisfactory attendance to his credit.

19. Student Classification

Regular students of the University are normally classified according to the number of credit hours earned from first admission in the University. The following year wise classification applies to the students.

Year	Earned Credits
First Year	> 0 to 30
Second Year	> 30 to 60
Third Year	> 60 to 90
Fourth Year	> 90

20. Probation and Suspension

Students who fail to maintain minimum GPA of 2.20 and could not complete the minimum credit requirements may be placed on academic probation.

The status of academic probation is a reminder/warning to the student that satisfactory progress towards graduation is not being made. A student may be placed on academic probation when either of the following conditions exists:

- i) The GPA falls below 2.20, or
- ii) The CGPA falls below 2.20

Students on probation are subjected to such restrictions with respect to courses and extracurricular activities as may be imposed by the respective Head of the Department. The minimum period of probation is one Term, but the usual period is one academic year. A student must improve himself during this period and will be required to pass the backlog courses. Any student who doesn't improve himself/herself during probation period may be suspended on receiving report from the Head of the Department.

A student on academic probation who fails to maintain a GPA of at least 2.20 during two consecutive academic years may be suspended from the University. A student who has been suspended may apply for consideration to the Vice-Chancellor.

Petitions for reinstatement must indicate clearly the reasons for the

previous unsatisfactory academic record. It must describe the improved conditions that have been created to prevent the recurrence of such work. Each such petition will be considered individually on its own merits.

After consideration of the petition and after consultation with the student Adviser and the respective Head of the Department, the Vice-Chancellor in some cases may reinstate the student if this is the first suspension. However, a second suspension case will be placed before the Academic Council for final decision.

21. Measures to Complete Backlog Courses

The following provisions will be made as far as possible to help the students to enable them to complete their studies within the maximum period of seven consecutive years (fourteen Terms). In this context, the students may be allowed to take backlog courses subject to the approval of his/her Adviser and Head of the Department based on the following rules:

- i) The Backlog examination will be held once in an academic year.
- ii) A student can register backlog courses normally during 6th to 8th weeks of classes of each even Term from 1st Year 2nd Term to 4th Year 1st Term as self study (i.e., retaining the already obtained marks of class tests and class attendance with class performance & assignments).
A student can register backlog courses as backlog with his any regular Term registration if it is possible to attend the classes in that Term. At that case his previous marks of class tests and class attendance will not be retained. However, in any academic year he can register maximum 12 credits as backlog including backlog courses for Backlog Examination after each even Term.
- iii) A student can register maximum 12 (twelve) credits among the backlog courses of previous all Terms and the name of backlog examination is Backlog Examination with the year of

examination same as regular examination.

- iv) The backlog examination will be started after 10 (ten) days from the last examination of the regular even Term courses of the concerned department and the interval between the backlog courses will be same as regular examination.
- v) The date and time for registration will be announced in advance by the Registrar's office.

22. Special Backlog Examination

The Special Backlog Examination on only backlog courses may be conducted for the students who have participated in their 4 year degree course (up to 4th Year 2nd Term) and have a shortage of maximum 12 (twelve) credits to obtain Bachelor degree. The special backlog examination will be arranged in a convenient time by the Head of the Department after 30 (thirty) days of publication of results of the 4th Year 2nd Term regular examination. The evaluation system will be the same as backlog with self study. The students willing to appear at the special backlog examination have to apply to the Head of the Department and with his permission must register within 7 (seven) working days of publication of 4th Year 2nd Term and Backlog examination results (which ever is later). A student who has failed in the special backlog examination will register the course(s) in the regular Terms.

23. Rules for Backlog/Withdrawal/Incomplete Courses

In addition to that mentioned in Article 21 students having Backlog/Withdrawal/Incomplete courses may register the courses according to the following rules. Any Backlog course (theory) will be registered as self-study or backlog; but in sessional/sessional related Backlog / Withdrawal / Incomplete course(s) he/she must attend the classes and secure minimum 60% attendance.

23.1 Students having Withdrawal/Incomplete Courses

- i) If any student withdraws all the courses or only theoretical courses in any Term, he/she may be allowed to register all the withdrawal courses or theoretical courses in any subsequent Term

when those courses are offered for regular students.

- ii) If any student fulfilled the attendance requirement of 60% in any withdrawal course, in that particular case, he/she may be allowed to register those courses as backlog courses with the evaluation system same as backlog courses.
- iii) If any student has incomplete courses and the number of courses is more than 2 (two), he/she may be allowed to register the courses in any Term as mentioned in 23.1(i).

23.2 Students having Backlog/Withdrawal/Incomplete Courses after participating 4th year 2nd Term

- i) A student can register maximum 5 (five) theory courses from the backlog courses in addition to sessional/other sessional related backlog courses of all previous 1st Terms in any 1st Term or of all previous 2nd Terms in any 2nd Term with a total maximum credit hour limit of 24.0. In no situation, courses of both (1st and 2nd) Terms can be registered in any Term.
- ii) A student will not be allowed to register any withdrawal or incomplete course as self-study in any Term. He/She can register one or more withdrawal or incomplete courses from the courses as mentioned in 23.2(i).
- iii) He/She will follow the rules for registration of regular students as mentioned in Article 11.4.

23.3 Final Examination for the Backlog/Withdrawal/Incomplete courses

Final examination for the backlog/withdrawal/incomplete courses should be conducted with the regular students in the same question paper and on the same date and time, if possible. Otherwise, final examination for the backlog/ withdrawal/incomplete courses will be arranged by the respective Head of the Department as soon as possible at an interval not more than the interval given for regular examination.

24. Minimum Earned Credits and GPA Requirements for Obtaining Degree

The credit requirements for the award of Bachelor degree will be

decided by the respective ACUG following Article No.7.5. The minimum CGPA requirement for obtaining a Bachelor degree is 2.20.

A student may take additional courses with the consent of his/her Adviser in order to improve CGPA, but he/she may take a maximum of 15 (fifteen) such additional credits beyond respective credit requirements for the degree during his/her entire period of study.

25. Time Limit for Completion of the Degree

A student must complete his studies within a maximum period of 7 (seven) consecutive academic years (fourteen regular Terms) for completion of the degree.

26. Industrial/Professional Training Requirements

Depending on each Department's requirement a student may have to complete a prescribed number of days of industrial/professional training in addition to minimum credit and other requirements, to the satisfaction of the concerned Department.

27. Absence during Term

A student should not be absent from quizzes, class tests, and spot tests etc. during the Term. Such absence will naturally lead to reduction in points/marks that count towards the final grade. Absence in Term final examination will result in 'F' grades.

A student who has been absent for short periods, up to a maximum of 3 (three) weeks due to illness or participating in extra-curricular activities outside of the University (sent by the University authority) should approach to the course teacher(s) on the recommendation of his Adviser and Head of the Department for a make-up class tests, quizzes, spot tests, sessional classes or assignments immediately on returning to the classes. Such request should be supported by medical certificate from University Medical Officer or the relevant office order. The medical certificate issued by a registered medical practitioner and endorsed by University Medical Officer will also be acceptable only in those cases where the student has valid reason for his/her absence from the University. The course teacher will take necessary measures.

28. Application for Graduation and Award of Degree

A student who has fulfilled all the academic requirements for the degree will have to apply to the Controller of Examinations through his/her Adviser and Head of the Department for graduation. Degree will be awarded on completion of the minimum Credit and CGPA requirements subject to the approval of the Academic Council.

29. Grade Conversion

CGPA of any student may be converted into percentage of marks using following rules:

$$\% \text{ of Marks} = 79 + 80 \times (\text{CGPA} - 3.75) \quad \text{for } 3.75 \leq \text{CGPA} \leq 4.00$$

and

$$\% \text{ of Marks} = 44 + 20 \times (\text{CGPA} - 2.00) \quad \text{for } 2.20 \leq \text{CGPA} < 3.75$$

SUMMARY OF UNDERGRADUATE COURSES

Year / Term	No. of Theory Courses	Theory Contact hours	Theory Credit hours	No. of Lab/Sess. Courses	Lab/Sess. Contact hours	Lab/Sess. Credit hours	Total Contact hours	Total Credit hours
1-1	5	16.0	16.0	5	9.0	4.50	25.0	20.50
1-2	5	18.0	18.0	3	6.0	3.0	24.0	21.00
2-1	5	16.0	16.0	3	9.0	4.5	25.0	20.50
2-2	5	16.0	16.0	4	12.0	6.0	28.0	22.00
3-1	5	16.0	16.0	5	10.5	5.25	26.5	21.25
3-2	5	17.0	17.0	5	9.0	4.5	26.0	21.50
4-1	5	15.0	15.0	4	10.5	5.25	26.5	21.25
4-2	5	10.0	10.0	3	12.0	6.0	22.0	16.00
Total	40	124.0	124.00	32	78.0	39.0	203.00	164.00

Group of Courses	Required Credits
A. Basic Science	15.00
B. Mathematics	15.00
C. Humanities	08.75
D. Allied Engineering	00.75
E. Civil Engineering (Core Courses)	107.00
F. Civil Engineering (Optional Courses)	13.00
G. Project & Thesis	04.50
Total	164.00

1st Year 1st Term

SL. No.	Course No.	Course Title	Theory		Sessional		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	CE 1109	Surveying	4.0	4.00	--	--	4.00
2.	Ch 1101	Chemistry-I	3.0	3.00	--	--	3.00
3.	Math 1101	Mathematics-I	4.0	4.00	--	--	4.00
4.	Ph 1101	Physics-I	3.0	3.00	--	--	3.00
5.	Hum 1101	English	2.0	2.0	--	--	2.0
6.	CE 1100	Civil Engg. Drawing-I	--	--	3.0	1.50	1.50
7.	Ch 1102	Sessional on Chemistry -I	--	--	1.5	0.75	0.75
8.	Ph 1102	Sessional on Physics-I	--	--	1.5	0.75	0.75
9.	Hum 1102	English Skills Practices	--	--	1.5	0.75	0.75
10.	EE 1172	Sessional on Basic Electrical Engineering	--	--	1.5	0.75	0.75
Total =			16.0	16.00	9.0	4.50	20.50

Contact hours: 16.0 (T) + 9.0 (S) = 25.0 hrs./week
Total credits: 20.50

No. of theory courses : 5
No. of lab/sessional courses: 5

1st Year 2nd Term

SL. No.	Course No.	Course Title	Theory		Sessional		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	CE 1211	Engineering Mechanics	4.0	4.00	--	--	4.00
2.	Ch 1201	Chemistry-II	3.0	3.00	--	--	3.00
3.	Math 1201	Mathematics-II	4.0	4.00	--	--	4.00
4.	Ph 1201	Physics-II	3.0	3.00	--	--	3.00
5.	Hum 1201	Economics & Accounting	4.0	4.00	--	--	4.00
6.	CE 1200	Civil Engg. Drawing-II	--	--	3.0	1.50	1.50
7.	Ch 1202	Sessional on Chemistry -II	--	--	1.5	0.75	0.75
8.	Ph 1202	Sessional on Physics-II	--	--	1.5	0.75	0.75
Total=			18.0	18.00	6.0	3.00	21.00

Contact hours: 18.0 (T) + 6.0 (S) = 24.0 hrs./week
Total credits: 21.00

No. of theory courses : 5
No. of lab/sessional courses: 3

2nd Year 1st Term

SL. No.	Course No.	Course Title	Theory		Sessional		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	CE 2105	Engineering Materials	4.0	4.00	--	--	4.00
2.	CE 2111	Mechanics of Solids-I	3.0	3.00	--	--	3.00
3.	CE 2161	Fluid Mechanics	4.0	4.00	--	--	4.00
4.	Math 2101	Mathematics-III	3.0	3.00	--	--	3.00
5.	Hum 2101	Sociology & Government	2.0	2.00	--	--	2.00
6.	CE 2100	Details of Construction -I	--	--	3.0	1.50	1.50
7.	CE 2106	Sessional on Engineering Materials	--	--	3.0	1.50	1.50
8.	* CE 2110	Practical Surveying	--	--	3.0	1.50	1.50
Total=			16.0	16.00	9.0	4.50	20.50

Contact hours: 16.0 (T) + 9.0 (S) = 25.0 hrs./week
 Total credits: 20.50

No. of theory courses : 5
 No. of lab/sessional courses: 3

* This course may be conducted within any term of 1st year 2nd term and 2nd year 1st term depending on the condition of weather.

2nd Year 2nd Term

SL. No.	Course No.	Course Title	Theory		Sessional		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	CE 2207	Numerical Analysis and Computer Programming	3.0	3.00	--	--	3.00
2.	CE 2211	Mechanics of Solids-II	3.0	3.00	--	--	3.00
3.	CE 2231	Engineering Geology & Geomorphology	3.0	3.00	--	--	3.00
4.	CE 2261	Hydrology	3.0	3.00	--	--	3.00
5.	Math 2201	Mathematics-IV	4.0	4.00	--	--	4.00
6.	CE 2200	Details of Estimating	--	--	3.0	1.50	1.50
7.	CE 2208	Sessional on Computer Programming	--	--	3.0	1.50	1.50
8.	CE 2212	Sessional on Mechanics of Solids-II	--	--	3.0	1.50	1.50
9.	CE 2262	Sessional on Fluid Mechanics	--	--	3.0	1.50	1.50
Total=			16.0	16.00	12.0	6.00	22.00

Contact hours: 16.0 (T) + 12.0 (S) = 28.0 hrs. /week
 Total credits: 22.00

No. of theory courses : 5
 No. of lab/sessional courses: 4

3rd Year 1st Term

SL. No.	Course No.	Course Title	Theory		Sessional		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	CE 3111 Prq. CE 2111	Structural Analysis and Design-I	3.0	3.00	--	--	3.00
2.	CE 3113	Reinforced Concrete Structures-I	3.0	3.00	--	--	3.00
3.	CE 3131	Geotechnical Engg.-I	3.0	3.00	-	--	3.00
4.	CE 3141	Environmental Engg.-I	3.0	3.00	--	--	3.00
5.	CE 3161	Engineering Hydraulics	4.0	4.00	--	--	4.00
6.	CE 3100	Details of Construction - II	--	--	1.5	0.75	0.75
7.	CE 3112	Sessional on Structural Analysis and Design-I	--	--	3.0	1.50	1.50
8.	CE 3132	Sessional on Geotechnical Engg.-I	--	--	1.5	0.75	0.75
9.	CE 3142	Sessional on Environmental Engg.-I	--	--	1.5	0.75	0.75
10.	CE 3162	Sessional on Engineering Hydraulics	--	--	3.0	1.50	1.50
Total=			16.0	16.00	10.5	5.25	21.25

Contact hours: 16.0 (T) + 10.5 (S) = 26.5 hrs./week

Total credits: 21.25

Prq. = Prerequisite

No. of theory courses : 5

No. of lab/sessional courses: 5

3rd Year 2nd Term

SL. No.	Course No.	Course Title	Theory		Sessional		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	CE 3211	Structural Analysis and Design-II	4.0	4.00	--	--	4.00
2.	CE 3213	Reinforced Concrete Structures-II	4.0	4.00			4.00
3.	CE 3231	Geotechnical Engg.-II	3.0	3.00	--	--	3.00
4.	CE 3241	Environmental Engg.-II	3.0	3.00	--	--	3.00
5.	CE 3251	Transportation Engg.-I	3.0	3.00	--	--	3.00
6.	CE 3200	Project and Seminar			1.5	0.75	0.75
7.	CE 3214	Sessional on Reinforced Concrete Structures	--	--	3.0	1.50	1.50
8.	CE 3232	Sessional on Geotechnical Engg.-II	--	--	1.5	0.75	0.75
9.	CE 3242	Sessional on Environmental Engg.-II	--	--	1.5	0.75	0.75
10.	CE 3252	Sessional on Transportation Engg.-I	--	--	1.5	0.75	0.75
Total =			17.0	17.00	9.0	4.50	21.50

Contact hours: 17.0 (T) + 9.0 (S) = 26.0 hrs./week

Total credits: 21.50

No. of theory courses : 5

No. of lab/sessional courses: 5

4th Year 1st Term

SL. No.	Course No.	Course Title	Theory		Sessional		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	*CE 4000	Project & Thesis	--	--	3.0	1.50	1.50
2.	CE 4101	Project Planning & Construction Management	3.0	3.00	--	--	3.00
3.	CE 4111	Structural Analysis and Design-III	4.0	4.00	--	--	4.00
4.	CE 4131	Geotechnical Engg. -III	3.0	3.00	--	--	3.00
5.	CE 4151	Transportation Engg-II	3.0	3.00	--	--	3.00
6.	CE 4161	Irrigation and Flood Control	3.0	3.00	-	-	3.00
7.	CE 4112 Prq. CE 3213	Sessional on Structural Analysis and Design-II	--	--	3.0	1.50	1.50
8.	CE 4114	Sessional on Structural Analysis and Design-III	--	--	3.0	1.50	1.50
9.	CE 4152	Sessional on Transportation Engg.-II	--	--	1.5	0.75	0.75
Total =			16.0	16.00	10.5	5.25	21.25

Contact hours: 16.0 (T) + 10.5 (S) = 26.5 hrs./week

No. of theory courses : 5

Total credits: 21.25

No. of lab/sessional courses: 4

* This credit will be assessed at the end of 4th Year 2nd Term.

4th Year 2nd Term

Option	Course No.	Course Title	Theory		Sessional		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
	CE 4000	Project & Thesis	--	--	6.0	3.00	3.00
I	CE 4210	Sessional on Structural Analysis & Design-IV	--	--	3.0	1.50	1.50
	CE 4211	Prestressed Concrete	2.0	2.00	--	--	2.00
	CE 4213	Theory of Elasticity and Elastic Instability of Structures	2.0	2.00	--	--	2.00
	CE 4215	Introduction to Finite Element Method	2.0	2.00	--	--	2.00
	CE 4217	Structural Dynamics	2.0	2.00	--	--	2.00
	CE 4219	Design of Steel Structures	2.0	2.00	--	--	2.00
II	CE 4230	Sessional on Geotechnical Engineering-III	--	--	3.0	1.50	1.50
	CE 4231	Geotechnical Engineering-IV	2.0	2.00	--	--	2.00
	CE 4233	Geotechnical Engineering-V	2.0	2.00	--	--	2.00
	CE 4235	Geotechnical Engineering-VI	2.0	2.00	--	--	2.00
III	CE 4240	Sessional on Environmental Engineering-III	--	--	3.0	1.50	1.50
	CE 4241	Environmental Pollution Control	2.0	2.00	--	--	2.00
	CE 4243	Solid Waste Management	2.0	2.00	--	--	2.00
	CE 4245	Environmental Development Project	2.0	2.00	--	--	2.00
IV	CE 4250	Sessional on Transportation Engineering-III	--	--	3.0	1.50	1.50
	CE 4251	Transportation Engineering.-III	2.0	2.00	--	--	2.00
	CE 4253	Transportation Engineering.-IV	2.0	2.00	--	--	2.00
	CE 4255	Transportation Engineering.-V	2.0	2.00	--	--	2.00
V	CE 4260	Sessional on Water Resources Engineering-I	--	--	3.0	1.50	1.50
	CE 4261	River Engineering	2.0	2.00	--	--	2.00
	CE 4263	Coastal Engineering	2.0	2.00	--	--	2.00
	CE 4265	Hydraulic Structures	2.0	2.00	--	--	2.00
	CE 4267	Ground Water Engineering	2.0	2.00	--	--	2.00
VI	Hum 4201	Professional Practices & Communication Skills	2.0	2.00	--	--	2.00
	Hum 4203	Socio-economic Aspects of Development Projects	2.0	2.00	--	--	2.00
	Hum 4205	Integrated Water Resources Planning and Management	2.0	2.00	--	--	2.00
Total =			10.0	10.00	12.0	6.00	16.00

Contact hours: 10.0 (T) + 12.0 (S) = 22.0 hrs./week
Total credits: 16.0

No. of theory courses : 5
No. of lab/sessional courses: 3

Students shall take one optional thesis related theory course & the corresponding sessional course from any optional group of I-V and four more optional theory courses from other options of I-VI but not more than one from each option & another corresponding sessional course.

DETAIL OUTLINE OF UNDERGRADUATE COURSES

1st Year 1st Term

CE 1109: Surveying

Credits: 4.00

Contact hours: 4.0 hrs/week

Reconnaissance survey; linear measurements; traverse survey; plane table survey; levelling & contouring; calculation of areas and volumes; problems on heights & distances; curves and curve ranging, transition curve, vertical curve; Tacheometry: introduction, principles and problems on tacheometry; Astronomical surveying: definition, instruments, astronomical corrections, systems of time; Photogrammetry: introduction of terrestrial photography, aerial photography, reading of photo mosaic, scale; project surveying; errors in surveying; remote sensing; introduction and application of global positioning system (GPS) and geographical information system (GIS).

Ch 1101: Chemistry-I

Credit: 3.00

Contact hours: 3.0 hrs/week

Electronic configuration; Various properties of elements in terms of periodic table; Physical and chemical properties of liquids; Chemical equilibrium; Reaction, kinetics and theories of reaction rates.

Chemistry of cement, silicates and limes; Chemistry of polymerization: different types of polymers and their properties, polymer degradation, elastomers and composite materials.

Introduction to paints and varnishes, pretreatment of the surface, metallic, nonmetallic and organic protective coating, types of paints and their uses.

Adsorption chemistry: surface growth, surface composition, adsorption isotherms; Metallic bonds; structures of elements and compounds; Defects in crystal.

Math 1101: Mathematics-I

Credit: 4.00

Contact hours: 4.0 hrs/week

Differential Calculus: Limit; continuity; differentiability; Differentiation: review of differentiation of various types of function, application of differentiation; Successive differentiation: successive differentiation of different types of function, Leibnitz theorem; Expansion of function: Rolle's theorem, mean value theorem; Taylor's theorem (finite and infinite forms); Maclaurin's theorem (finite and infinite forms); Cauchy's form of remainders and Lagrange's form of remainder; Indeterminate form: evaluation of limits; L'Hospital's rule; Partial differentiation: partial differentiation, Euler's theorem; Maximum and minimum: maximum and minimum of different types function, physical application; Tangent and Normal: tangent

& normal, subtangents & subnormal in Cartesian and polar coordinates; Asymptotes, Curvature: curvature, radius of curvature, center of curvature, circle of curvature, chord of curvature in Cartesian and polar coordinates; Curve tracing; evolute and involute; Envelopes.

Integral Calculus: Definition of integration, integration by the method of substitution; integration by parts; standard integrals; integration by the method of successive reduction; definite integrals, its properties and use in summation of series; Wallis' formula; improper integrals; differentiation under sign of integration; integration under sign of integration; beta & gamma function; length of plane curves, area bounded by plane curves, volumes and surfaces of solids of revolution.

Ph 1101: Physics-I

Credit: 3.00

Contact hours: 3.0 hrs/week

Heat and Thermodynamics:

Thermometry: Zeroth law of thermodynamics; concepts of temperature; measurement of low and high temperature; constant volume thermometers; resistance thermometer and thermocouple & radiation parameters.

Calorimetry: Newton's law of cooling and radiation correction; determination of C_p and C_v .

Kinetic theory of gases: Fundamental assumptions; pressure exerted by a gas; deduction of Boyle's law, Charles's law, Avogadro's law and Graham's law of diffusion; Kinetic interpretation of temperature; principle of equipartition of energy; atomocity of gases; mean free path.

Equation of State: Equation of state; Andrew's experiment; Vander Waal's equation; critical constants and deficiency of Vander Waal's equation and Boyle's temperature.

Thermodynamics: First law of thermodynamics and its application; adiabatic and isothermal transformations; work done by a gas; second law of thermodynamics; reversible and irreversible processes; Carnot cycle; efficiency of heat engines; entropy and its physical concept.

Waves and Oscillations:

Simple harmonic motion: Simple harmonic motion, simple harmonic motion of a mass between two springs; simple harmonic motion of a loaded spring; superposition principle; damped oscillations; forced oscillations; resonance, sharpness of resonance; vibration of membranes and columns.

Lissajous Figures: Lissajous figures, combination and composition of simple harmonic motions.

Wave motion: Transverse and longitudinal nature of waves; progressive and stationary waves; power and intensity of wave motion; energy calculation of progressive and stationary waves; interference of sound waves; wave velocity, group velocity and phase velocity; sound waves: audible, ultrasonic, infrasonic and supersonic waves; Beat, Melde's experiment, Doppler's effect, application of Doppler's effect.

Acoustics: Intensity of sound, Bel, acoustic intensity, architectural acoustics, noise insulation and reduction, sound distribution, Sabine's formula; room acoustics; requisites of a good auditorium.

Properties of Matter:

Atomic structure of matter: Atoms, ions and molecules; states of matter: solids, liquids and gases; interparticle forces.

Surface tension: Molecular forces; surface tension; surface effects; free surface energy; molecular theory of surface tension; excess pressure theorem; capillarity and the angle of contact.

Crystallography:

Types of bonds, types of crystals, X-ray diffraction and Bragg's law, plasticity and crystal defects, metals, insulator and semiconductor.

Hum 1101: English

Credit: 2.00

Contact hours: 2.0 hrs/week

English phonetics: the places and manners of articulation of the English sounds; Vocabulary; English grammar: construction of sentences and paragraphs, common mistakes in grammar, phrases and idioms, proverbs, punctuation. Amplification; Clause; Comprehension; Composition on current affairs; Precis writing; Commercial correspondence and tender notice.

Technical report writing: Preparation of report on project management and planning.

CE 1100: Civil Engineering Drawing-I

Credit: 1.50

Contact hours: 1.5 hrs/week

Introduction: lettering, numbering and heading;

Plane geometry: pentagon, hexagon, octagon, ellipse, parabola, hyperbola;

Projection (Solid Geometry): cube, triangular prism, square prism, pentagonal prism, hexagonal prism, cone, and cylinder;

Development: cube, pyramid, cone, prism; Isometric drawing;

Section and true shape: cube, pyramid, cone, prism; Interpretation of Solids.

Ch 1102: Sessional on Chemistry-I

Credit: 0.75

Contact hours: 1.5 hrs/week

Volumetric analysis: acid-base titration, oxidation-reduction titration, iodometric titration; Determination of pH of a solution.

Ph 1102: Sessional on Physics-I

Credit: 0.75

Contact hours: 1.5 hrs/week

To draw a graph showing the sensitivity of a balance with load; Determination of Young's modulus of a short wire by Searle's dynamic method; Determination of surface tension of water by capillary tube method; Determination of specific heat of liquid by method of cooling; Determination of thermal conductivity of a bad conductor by Lee's and Charlton's method; Determination of frequency of a tuning fork by Melde's experiment; Determination of focal length of a concave lens by an auxiliary convex lens.

Hum 1102: English Skills practices

Credit: 0.75

Contact hours: 1.5 hrs/week

Grammar: tense, article, preposition, subject-verb agreement, clause, conditional and sentence Structure.

Vocabulary building: Correct and practice diction, affixes, level of appropriateness, colloquial and standing, informal and formal.

Developing reading skill: Strategic of reading, skimming, scanning, predicting, inferring, analyzing and interpreting variety of texts, practicing comprehension from literary and nonliterary texts.

Developing writing skill: Sentences, sentence variety, generating sentences, clarity and correctness of sentences, linking sentences to form paragraphs, writing paragraphs, essays and reports, formal and informal letters.

Listening skill and note talking: Listening sentences to recorded texts and class lectures and learning to take useful notes based on listening,

Developing speaking: oral skills including communicative expressions for personal identification, life at home, giving advice and option, instruction and directions, requests, complaints, apologies people and places, narrating events.

EE 1172: Sessional on Basic Electrical Engineering

Credit: 0.75

Contact hours: 1.5 hrs/week

Experiments based on fundamental concepts of electrical series and parallel circuits; Measurement of AC quantities; Measurement of power; Electrical wiring: house wiring & industrial installation wiring.

1st Year 2st Term

CE 1211: Engineering Mechanics

Credit: 4.00

Contact hours: 4.0 hrs/week

Introduction; coplanar concurrent forces; moments and parallel coplanar forces; non-concurrent non-parallel coplanar forces; non-coplanar forces; centroids; moment of inertia of areas; moment of inertia of masses; friction; flexible cords; plane motion; force systems that produce rectilinear motion; work, kinetic energy & power; impulse and momentum.

Ch 1201: Chemistry-II

Credit: 3.00

Contact hours: 3.0 hrs/week

Thermodynamics: First, second and third laws of thermodynamics; Entropy, Reversible work, Gibb's free energy; Phase rule and its application.

Thermo-Chemistry: Laws of thermo-chemistry and problems based on them; Kirchoff's equation.

Electro-Chemistry: Electrolytes; Source of E.M.F.; Electro-chemical series: pH value and its determination.

Colloid and colloidal solution: Classification, preparation, purification, properties, protective action and application of colloids.

Chemical corrosion: Introduction to chemical corrosion, corrosion of metals and alloys in dry and wet environments, mechanism of corrosion, atmospheric and soil corrosion and their protective measures.

Chemistry of environmental pollution: Environment and its characteristics, chemistry of toxic metal and non-metal pollutants, analytical techniques used in the determination of pollutants, chemical concept of DO, BOD, COD and threshold odor number, chemistry involved in water treatment plants, quality of industrial wastewater.

Math 1201: Mathematics-II

Credit: 4.00

Contact hours: 4.0 hrs/week

Statistics: Frequency distribution and its graphical representation; Mean, Median, Mode and other measures of central tendency; Standard deviation and other measures of dispersion; Moments; Skewness and Kurtosis; Elementary probability theory; Expectation; Discontinuous probability distributions (Binomial, Poisson and Negative binomial); Continuous probability distributions (Normal and Exponential); Sampling theory; Estimation theory; Hypothesis testing; Correlation and regression analysis.

Differential Equations: Formation of differential equation; Order and degree of differential equation; Solution of first order and first degree ordinary differential equations by various

methods, Equation of first order and higher degree; Solution of linear differential equation of second and higher order with constant coefficients; Application of differential equations in physical problems; Solution of differential equations when the dependent or independent variable is absent; Application of differential equation.

Partial Differential Equations: Method of separation of variables with the use of initial and boundary conditions.

Series Solution of Differential Equation: Ordinary points, Singularities, Power series; Solution of linear differential equations by the method of Frobenius.

Special Functions: Bessel's differential equation, Bessel's function and its properties; Legendre differential equation, Legendre polynomial and its properties.

Ph 1201: Physics-II

Credit: 3.00

Contact hours: 3.0 hrs/week

Modern Physics:

Relativity: Special theory of relativity, reference frames, Michelson-Moreley experiment, Galilean transformation, Lorentz transformation, time Dilation, length contraction, variation of mass, mass energy relation, mass less particles, velocity transformation.

Particle Properties of Waves: Photoelectric effect, quantum theory of light, Compton effect.

Wave Properties of Particles: De Broglie waves, phase velocity and group velocity.

Atom Structure: Bohr's atom model, nature of electron orbits, orbital energy, origin of spectral lines, different series of spectral lines of hydrogen, orbital energy level diagram of hydrogen atom, correspondence principle, vector atom model, orbital states, space quantization, spin quantization, magnetic moment of orbital electron, quantization of magnetic moment, electron shell.

Nuclear Physics:

Introduction to nuclear physics: Nuclear constituents, nuclear properties, binding energy; packing fraction, nuclear force, fission and fusion processes.

Radioactivity: Introduction to radioactivity, laws of radioactive disintegration, half-life, mean life, laws of successive disintegration, practical application of radioactivity.

Magnetism:

Magnetic properties of matter, magnetomotive force, magnetic field intensity, magnetic induction, permeability and susceptibility, classification of magnetic materials, magnetization curves of ferromagnetic materials, magnetic circuits, magnetostriction.

Physical Optics:

Interference: Theories of light, Huygen's principle and construction, interference of light, Young's double slit experiment, interference due to multiple reflection, Newton's rings.

Diffraction: Fresnel and Fraunhofer diffraction, diffraction by single slit, diffraction by double slit, diffraction gratings.

Polarization: Production and analysis of polarized light, optical activity, optics of crystals.

Hum 1201: Economics & Accounting

Credit: 4.00

Contact hours: 4.0 hrs/week

Economics:

Definition of economics; principle of economics.

Micro Economics: Theory of demand & supply and their elasticities; price determination; nature of an economic theory; applicability of economic theories to the problems of developing countries; indifference curve technique; marginal analysis; optimization, market; production, production function, types of productivity; fixed cost and variable cost; internal and external economics and diseconomies.

Macro Economics: Savings, investment; national income analysis; inflation; monetary policy, fiscal policy and trade policy with reference to Bangladesh; planning in Bangladesh.

Accounting:

Introduction: Definition of accounting, its needs and importance, various images of accounting, accounting and its environment, Users of accounting information, Generally Accepted Accounting Principles (GAAP) between book-keeping and accounting, relationship of accounting with engineering education

Accounting Cycle: The recording process, Business transactions, Steps in the recording process, the accounting equation, the account, Rules of Debit and Credit, Double entry systems of accounting.

The Journal, the Ledger, Cash book, the trail balance, Financial statement (considering adjusting entries).

Cost accounting, concept of cost, classification of cost, statement of cost, operating and service costing.

CE 1200: Civil Engineering Drawing-II

Credit: 1.50

Contact hours: 3.0 hrs/week

Plan, elevation and sections of one storied and multi-storied buildings; reinforcement details of beams, slabs, stairs etc.; plan and section of septic tank; detail drawing of roof truss; plan, elevation and sections of culverts, bridges and other hydraulic structures; Building services drawings; introduction to computer aided drafting.

Ch 1202: Sessional on Chemistry-II

Credit: 0.75

Contact hours: 1.5 hrs/week

Salts analysis (qualitative), Gravimetric analysis: determination of Fe, Cu, Ca, Cl⁻, SO₄²⁻ volumetrically.

Ph 1202: Sessional on Physics-II

Credit: 0.75

Contact hours: 1.5 hrs/week

Determination of angle of prism & refractive index of the material of a prism by rotation of telescope of a spectrometer; Determination of wave length of sodium light by plane diffraction grating; Determination of resolving power of a plane diffraction grating; Determination of wave length of sodium light by measuring the diameter of Newton's ring; Determination of specific rotation of sugar solution by a polarimeter; Determination of the value of unknown resistance & to verify the laws of series and parallel resistance by means of P.O. Box; Comparison of the E.M.F's of two cells with the help of a potentiometer; Determination of the specific resistance per cm of the wire of Cary Foster's bridge.

2nd Year 1st Term

CE 2105: Engineering Materials

Credit: 4.00

Contact hours: 4 hrs/week

Introduction and importance of Engineering materials.

Bricks: Constituents of brick clay, harmful ingredients of brick clay.

Manufacture, characteristics, test and specification, classification and use; Different types of bricks (hollow, perforated, angular, mud etc.), sand cement block, ceramic products, different types of tiles.

Aggregate: Classification and properties of aggregate, bulking of aggregate, grading of aggregate, testing of aggregate; Classification, properties, test and function of sand.

Cement and Lime: Properties, uses and classification of lime; Difference between cement and lime; Manufacture of cement, types of cement, composition of cement, Functions of various ingredients of cement, physical properties of Portland cement, testing of cement.

Mortar and Plaster: Types of mortar, function of sand and surki in mortars, uses of mortar, preparation of cement mortar, precautions in using mortars, special mortars; Plastering; Pointing.

Paints & Varnishes: White and color washing, distempering, plastic and cement paint, water repellent paints, epoxy coating.

Concrete: Function of aggregate and water in concrete, segregation, bleeding, properties of concrete, strength and workability of concrete, factors influencing the properties of concrete, creep of concrete, chemical attack of concrete; Design of concrete mixes; Use of admixtures in concrete and their properties.

Other materials: Introduction to ply wood, plastic wood, and their properties, Geo-textiles, FRP, Synthetic fiber, Ferrocement etc; Properties and uses of rubber, timber, plastics, glass and aluminium.

Corrosion of metals.

CE 2101: Mechanics of solids-I

Credit: 3.00

Contact hours: 3.0 hrs/week

Fundamental concepts of stress and strain; Mechanical properties of materials; Strain energy; stresses and strains in members subjected to tension, compression, shear and temperature changes; Bending moment and shear force diagrams of beams and frames; Flexural and shearing stresses in beams; Shear center; Thin walled pressure containers; Riveted and welded joints.

CE 2161: Fluid Mechanics

Credit: 4.00

Contact hours: 4 hrs/week

Development and scope of fluid mechanics; Fluid properties; Fluid statics: Manometers, pressure head, center of pressure, application of hydrostatics; kinematics of fluid flow; Concepts and basic equations – continuity equation, Bernoulli's equation, momentum equation and forces of fluid flow; similitude and dimensional analysis; steady incompressible flow in pressure conduits; Laminar and turbulent flow; General equation for fluid friction; Empirical equations for pipe flow; Minor losses in pipe flow; Pipes in series and parallel, branching of pipes, pipe networks; Fluid measurement: pitot tube, orifice, mouthpiece, nozzle, venturimeter, weir, notch.

Math 2101: Mathematics-III

Credit: 3.00

Contact hours: 3.0 hrs/week

Coordinate Geometry of three dimensions: System of co-ordinate; Distance between two points; Section formula; Projection; Direction cosines; Equation of planes and lines; Condition of perpendicularity and parallelism of planes and straight lines; Perpendicular distance of a point from a straight line; Coplanar lines; Shortest distance between two straight lines; Volume of a tetrahedron; Sphere, cone and cylinder with their properties.

Spherical Trigonometry: Spherical triangle; Properties of Spherical triangle; Relations between sides and angles of a spherical triangle; Solution of spherical triangle.

Vector Analysis: Review of vector algebra; Multiple product; Vector differentiation: elementary differentiation, gradient, divergence, curl; Vector integration: ordinary integrals, line integrals, surface integrals, volume integrals; Integral theorems: Green's theorem, Gauss' divergence theorem, Stokes' theorem; Curvilinear coordinates: Orthogonal coordinates, spherical polar coordinates, cylindrical polar coordinates.

Hum 2101: Sociology and Government

Credit: 2.00

Contact hours: 2.0 hrs / week

Sociology:

Meaning and scope of sociology; Basic concepts: society, community, association, group, family; Social structure of Bangladesh; Population and world resources; Industrial revolution; Urban ecology; Social contract; Social change; Social problems; Population crime; Juvenile delinquency.

Government:

Some basic concepts of government and politics; Functions, organs and forms of modern state and government; Citizenship; U.N.O.; Government and politics of Bangladesh; Some major administrative systems of developed countries; Local self-government.

CE 2100: Details of Construction-I

Credit: 1.50

Contact hours: 3.0 hrs/week

Foundations, different types of foundations; Brick masonry; framed structure and bearing walls; Arches and lintels; Details of floors and roofs; Pointing; Plastering and interior finishing; Scaffolding and staging; Shoring and underpinning; Thermal insulation and acoustics; Types and construction details of stairs; House plumbing; Detection, alarm & fire-fighting system.

CE 2106: Sessional on Engineering Materials

Credit: 1.50

Contact hours: 3 hrs/week

Test for specific gravity, unit weight, moisture content and absorption of coarse and fine aggregates; Gradation of coarse and fine aggregates; Abrasion test of coarse aggregates; Normal consistency, setting time, fineness, soundness, specific gravity test of cement; Tensile and compressive strength test of cement mortar; design and testing of concrete mix; Tests on bricks.

CE 2110: Practical Surveying

Credit: 1.5

Contact hours: 3.0 weeks in field

Practice on handling of instruments; Chain survey; Plane table survey; Traverse survey by theodolite; Leveling; Contouring; Route project; House setting; Curve setting; Stadia surveying; Height and distance problem.

2nd Year 2nd Semester

CE 2207: Numerical Analysis and Computer Programming

Credit: 3.00

Contact hours: 3.0 hrs/week.

Numerical Analysis:

Solutions of algebraic and transcendental equations: Bisection method, Regular falsi method, Newton-Raphson method, Iteration method; Rate of convergence; Order of errors; Interpolation: simple differences, difference tables, differences of a polynomial, Newton's formula for interpolation, central difference interpolation formula, divided differences, tables of divided differences, Newton's general interpolation formula, Lagrange's interpolation formula, inverse interpolation by Lagrange's formula and by successive approximation; Solutions of system of linear equations: matrices, Gaussian elimination method, Gauss-Seidal iteration method; Numerical differentiation and integration; Finite differences; Curve fitting by least squares; Solution of differential equations: Picard's method, Euler's method and Runge-Kutta method.

Computer Programming:

Introduction; Detailed study of FORTRAN language; Introduction to C; Computer applications in Civil Engineering problems.

CE 2211: Mechanics of solids–II

Credit: 3.00

Contact hours: 3.0 hrs/week

Torsional stresses in shafts and tubes; Combined stresses; Helical springs; Transformation of stresses; Deflection of beams by direct integration and moment area methods; Buckling of columns.

CE 2231: Engineering Geology & Geomorphology

Credit: 3.00

Contact hours: 3.0 hrs/week

Role of engineering geology in Civil Engineering.

Minerals: Origin, identification and classification of minerals; Physical properties of minerals, mineraloids.

Rocks: Qualitative and quantitative description and classification of rock masses, their physical and mechanical properties; Earthquake, landslides and other geological hazards; Geology of Bangladesh; Seismic and geological map of Bangladesh.

Structural geology: Faults: types of faults; fold and fold type; domes; basins; erosional process; quantitative analysis of erosional land forms.

Geomorphology of Bangladesh, role of geomorphology in Civil Engineering.

Channel development; Channel widening, valley shape; Stream terraces; Alluvial flood plains; Deltas and alluvial fans; Channel morphology; Channel patterns and river basin.

CE 2261: Hydrology

Credit: 3.00

Contact hours: 3.0 hrs/week

Hydrologic cycle; Weather and hydrology; Precipitation, evaporation and transpiration; Infiltration; Stream flow; Application of telemetry and remote sensing in hydrologic data acquisition; Rainfall-runoff relations; Hydrographs, unit hydrographs; Hydrologic routing; Statistical methods in hydrology; Ground water hydrology.

Math 2201: Mathematics–IV

Credit: 4.00

Contact hours: 4.0 hrs/week

Matrices: Types of matrices; Review of matrix algebra; Elementary transformations; Inverse by elementary transformation; Rank; Linear dependence and independence of vectors and matrices; Solution of linear equations using matrix; Vector spaces; Linear transformation; Eigen values and eigen vectors; Cayley-Hamilton theorem; Digitalization of square matrices; Orthogonal reduction of symmetrical matrices.

Laplace Transform: Definition; Sufficient condition for existence of Laplace transform; Laplace transform of elementary functions; Properties of Laplace transform; Inverse Laplace transform; Properties of inverse Laplace transform; Solution of differential equation and evaluation of improper integrals by using Laplace transform.

Fourier Series: Periodic function; Odd and even function; Sufficient condition for Fourier series representation; Representation of function in Fourier series; Half range series; Parseval's identity; Fourier integral; Evaluation of improper integrals using Fourier integrals.

CE 2200: Details of Estimating

Credit: 1.50

Contact hours: 3.0 hrs/ week

Analysis of rates; Detailed estimate and specification of all major items of work of a building and highway; Fundamentals of costing and estimating of electrical and mechanical works

CE 2208: Sessional on Computer Programming

Credit: 1.50

Contact hours: 3.0 hrs/week

Operating system for computer; Development of FORTRAN & C program and solution of Civil Engineering problems; Use of different software packages.

CE 2212: Sessional on Mechanics of solids-II

Credit: 1.50

Contact hours: 3.0 hrs/week

Tension, direct shear and impact tests of mild steel specimen; Compression test of timber specimen; Hardness test of metals; Determination of shear center; Helical spring test; Static bending test; Load-deflection behavior of simple beam; Slender column test.

CE 2262: Sessional on Fluid Mechanics

Credit: 1.50

Contact hours: 3.0 hrs/ week

Center of pressure; Proof of Bernoulli's theorem; Flow through venturimeter, orifice and mouthpiece; Flow over V- notch, sharp-crested and broad-crested weir; Coefficient of velocity by co-ordinate method; Fluid friction in pipe.

3rd Year 1st Semester**CE 3111: Structural Analysis and Design-I**

Credit: 3.00

Contact hours: 3.0 hrs/week

Stability and determinacy of structures; Analysis of statically determinate trusses and arches; Shear force and bending moment diagrams of statically determinate structures; Influence lines for statically determinate structures; Moving loads on beams, frames and trusses; Cables and cable supported structures; Suspension bridge.

CE 3113: Reinforced Concrete Structures-I

Credit: 3.00

Contact hours: 3.0 hrs/ week

Fundamental behaviour of reinforced concrete members; Introduction to WSD and USD methods; analysis and design of singly & doubly reinforced beams; T-beams; One way and two way slab according to WSD and USD methods; Diagonal tension, bond and anchorage according to WSD and USD methods.

CE 3131: Geotechnical Engineering –I

Credit: 3.00

Contact hours: 3.0 hrs/week

Introduction to geotechnical engineering; Formation, composition, structure and fabrics of soils; Index properties of soils; Identification and classification of soils; Phase relationships; Soil compaction; Principles of total and effective stresses; Permeability and seepage; Capillarity and flow net; Shear strength; Stress distribution.

CE 3141: Environmental Engineering –I

Credit: 3.00

Contact hours: 3.0 hrs/week

Introduction to Environmental Engineering.

Drinking water; Water, sanitation and health; Introduction to water supply; Population forecasting, water requirement.

Water supply sources; Ground water exploration and problems; Aquifer properties and ground water flow; Well hydraulics and well design; Common water supply systems with

specific reference to Bangladesh; Different types of hand pumps; Installation and O&M of hand pumps; Problems in water supply; Alternative water supply technologies for problematic areas in Bangladesh.

Water collection and intake; Water transmission and distribution system; Analysis and design of distribution network; Pressure conduits; Fire hydrants; Leak detection; Unaccounted loss of water.

Water quality parameters and standards; Water treatment: plain sedimentation, coagulation and flocculation, filtration, softening, disinfection; other treatment methods; Small scale iron and arsenic removal units, arsenic mitigation in Bangladesh.

Socio- economic aspects of water supply and sanitation.

CE 3161: Engineering Hydraulics

Credit: 4.00

Contact hours: 4.0 hrs /week

Introduction: open channel flow definition, its classification, velocity and pressure distributions; Energy principles and its application: energy equation, specific energy, critical flow, transition problems, and controls; Momentum principles and its application: momentum equation, specific momentum, hydraulic jump and stilling basins; Uniform flow and its computation; Steady-Gradually Varied Flow (GVF) and its computation; Design of channels; Flow measurements with and without structures in open channel. Impact of water jet; Principles of hydraulic machines.

Pumps: turbine, submergible and others.

CE 3100: Details of Construction-II

Credit: 0.75

Contact hours: 1.5 hrs /week

Introduction to construction equipments for road, bridge and building, Safety in constructions; definition and classification of construction accidents, safety program for construction, Locating hazards, safety equipments.

Building Services: Introduction, Systems of plumbing, Water supply fittings, Sanitary fittings, Building drainage system.

CE 3112: Sessional on Structural Analysis & Design-I

Credit: 1.5

Contact hours: 3.0 hrs/ week

Design of members and connections of a roof truss and a plate girder bridge.

CE 3132: Sessional on Geotechnical Engineering –I

Credit: 0.75

Contact hours: 1.5 hrs/week.

Field identification of soil samples; Specific gravity test; Atterberg limits tests; Grain size analysis by sieve and hydrometer; Standard Proctor compaction test; Modified Proctor compaction test; Permeability (constant & variable) test.

CE 3142: Sessional on Environmental Engineering –I

Credit: 0.75

Contact hours: 1.5 hrs/week

Laboratory safety and introduction to laboratory equipments and accessories; Sampling procedure; Physical and chemical tests of water and wastewater.

CE 3162: Sessional on Engineering Hydraulics

Credit: 1.5

Contact hours: 3.0 hrs/week

Experiments on sluice gate, venture flume, Parshall flume, cut-throat flume, hydraulic jump, velocity distribution profile, Manning's roughness coefficient, specific force and specific energy; GVF profile computation; Pipe surge and water hammer; Preparation and analysis of hydrographs; Aquifer characteristics and estimation of yield from wells.

3rd Year 2nd Semester

CE 3211: Structural Analysis and Design-II

Credit: 4.00

Contact hours: 4.0 hrs/week

Analysis of wind and earthquake loads on structures; Approximate analysis of statically indeterminate structures: mill bents, portal frames, braced trusses and multi storied building frames; Deflection of beams, frames and trusses by different methods: unit load, elastic load, conjugate beam etc; Analysis of space trusses; Analysis of statically indeterminate beams by three moment equation.

CE 3213: Reinforced Concrete Structures–II

Credit: 4.00

Contact hours: 4.0 hrs/ week

Lintels; Staircases; Columns; Footings; Retaining walls; Reinforced concrete floor and roof systems; Flat slabs and flat plates; Plastic hinge idea and collapse mechanism; Yield line method; Introduction to prestressed concrete.

CE 3231: Geotechnical Engineering–II

Credit: 3.00

Contact hours: 3.0 hrs/week

Soil investigation techniques; Direct measurement of consistency and relative density; Correlation of strength parameters with N-values; Lateral earth pressure; Compressibility and settlement; Bearing capacity; Slope stability analysis.

CE 3241: Environmental Engineering–II

Credit: 3.00

Contact hours: 3.0 hrs/ week

Environmental Sanitation: Introduction, environmental pollution, protection and management; Sanitation practices in Bangladesh; Different sanitation options- pit latrines, pour flush latrines etc.; Community latrine cum bio-gas plant; Design and construction of inspection pit, septic tank and soak well; Building sanitation; Code of practice.

Wastewater: Estimation of wastewater; Wastewater collection system; Design, construction and maintenance of sanitary sewer and storm drainage system; Small bore sewer system; Wastewater characterization, BOD, COD, SS etc.; Microbiology of wastewater; Preliminary, primary and secondary treatment; Waste stabilization ponds and other methods and disposal of wastewater; Treatment and disposal of industrial effluents.

Health & Hygiene: Disease description, transmission and control; Integrated approach for water, sanitation and health education.

CE 3251: Transportation Engineering-I

Credit: 3.00

Contact hours: 3.0 hrs/week

Introduction to transportation engineering; Development of transportation system; Elements of transportation system; Transportation in Bangladesh; Modal share; Transportation planning concepts; Collection, study and analysis of basic data; Highway location and surveys; Geometric design of highways; Elements of design, cross-section elements, curves and sight distances; Road intersections; Traffic engineering; the road/traffic system, vehicle and traffic characteristics; Traffic control devices, traffic studies, parking and roadway lighting.

Highway materials; Production, properties and uses of bituminous materials; Introduction to highway machineries.

CE 3200: Project and Seminar

Credit: 0.75

Contact hours: 1.5 hrs/week

Introduction to Technical Writing and Presentation techniques; Assignment on technical Writing for a specific Topic; presentation and Submission of report.

CE 3214: Sessional on Reinforced Concrete Structures

Credit: 1.50

Contact hours: 3.0 hrs/week

Design of a slab bridge and a deck-girder bridge and preparation of drawing using CAD software; Introduction to segmental prestressed cantilever bridge.

CE 3232: Sessional on Geotechnical Engineering-II

Credit: 0.75

Contact hours: 1.5 hrs/week

Relative density test; Field compaction test; Unconfined compression test; Direct shear test; Triaxial compression test; Consolidation test.

CE 3252: Sessional on Transportation Engineering-I

Credit: 0.75

Contact hours: 1.5 hrs/week

Roadway capacity studies; Tests on bituminous materials.

CE 3242: Sessional on Environmental Engineering–II

Credit: 0.75

Contact hours: 1.5 hrs/week

Bacteriological tests of water; Design of water supply system.

4th Year 1st Semester

CE 4000: Project and Thesis

Credit: 1.50

Contact hours: 3.0 hrs/week

Experimental and theoretical investigation of various topics in structural engineering, concrete technology, environmental engineering, transportation engineering, geotechnical engineering and water resource engineering; Individual or group study of one or more topics from any of the above fields; The students will be required to submit thesis / project report at the end of the work.

CE 4101: Project Planning & Construction Management

Credit: 3.00

Contact hours: 3.0 hrs/week

Principles of management; Principles of construction management; Construction contracts and specifications; Inspection and quality control; Construction safety; Construction planning and scheduling; PERT, CPM, case studies, resource scheduling; PERT: a cost accounting system, linear programming; Decision making and simulation; Psychology in administration; Materials management; Demand forecasting; Inventory control; Personnel management; Stores management; Procurement; Project planning and evaluation; Feasibility reports, cash flow, pay back period, internal rate of return; Benefit-cost ratio; Construction equipment and plants; Replacement studies.

CE 4111: Structural Analysis and Design–III

Credit: 4.00

Contact hours: 4.0 hrs/week

Difference between force and displacement method; Analysis of statically indeterminate structures (beams, frames, trusses) by slope deflection, moment distribution, force methods; Analysis of composite structures; Influence lines for statically indeterminate beams, frames, arches and grids; Stiffness matrix; Member stiffness; Stiffness transformation; Assembly of stiffness matrices & solution for beams, frames and plane trusses; Flexibility matrix; Basic concepts on shell structures; Structural forms and their application.

CE 4131: Geotechnical Engineering–III

Credit: 3.00

Contact hours: 3.0 hrs/week

Types of foundation, Foundation engineering report and selection of foundation; Design of

footings (spread footings and special footings), mat foundations; Pile foundations; Caissons, Sheet-piling wall; Introduction to Cofferdams, machine foundations and soil improvement techniques.

CE 4151: Transportation Engineering–II

Credit: 3.00

Contact hours: 3.0 hrs/week

Highways: Subgrade, subbase and base courses; Soil stabilization in road constructions; Low-cost roads; Mix design methods; Design of flexible & rigid pavements, construction and maintenance of flexible and rigid pavements.

Railways: General requirements, alignment, permanent way, station and yards; Signaling, points and crossings, maintenance.

Waterways: Introduction to waterways, description of main features of waterways.

CE 4161: Irrigation and Flood control

Credit: 3.00

Contact hours: 3.0 hrs/week

Irrigation: Importance of irrigation; Source and quality of irrigation water; Soil-water relationship; Consumptive use; Estimation of irrigation water requirements and scheduling; Methods of irrigation; Design of irrigation canal system; Irrigation structures; Irrigation pumps; Problems of irrigated land; Irrigation projects and institutional constraints.

Flood control: Flood and its causes; Methods of flood management: structural and non-structural measures; Economic aspects of flood management; Flood risk and vulnerability analysis, direct and indirect losses of flood, Flood damage assessment, flood damage in urban and rural areas.

CE 4112: Sessional on Structural Analysis and Design–II

Credit: 1.50

Contact hours: 3.0 hrs/week

Introduction to tall buildings in different countries of the world; Design of a high rise office/residential building.

CE 4114: Sessional on Structural Analysis & Design -III

Credit: 1.5

Contact hours: 3.0 hrs/week

Principles of different types of bridges over rivers and wide canals; Detailed design of a balanced cantilever bridge.

CE 4152: Sessional on Transportation Engineering–II

Credits: 0.75

Contact hours: 1.5 hrs/week

Tests on subgrade, subbase and base materials; Mix design.

4th Year 2nd Semester

Hum 4201: Professional Practices and Communication Skills

Credit: 2.00

Contact hours: 2.0 hrs / week

The project cycle; Project proposal; Contractual provisions; Techniques of specification writing; Evaluation of bids; Project evaluation.

Interpretation of literature, documents etc; Communicating; Preparation of report; Industrial and labor relations; Professional ethics in Civil Engineering.

Hum 4203: Socio-economic Aspects of Development Projects

Credit: 2.00

Contact hours: 2.0 hrs/week

Economic and social structure; Development and economic growth; Socio-economic indicators; Population, prosperity and poverty; Employment of work force; Population displacement; Rehabilitation strategy; Productivity, land loss, land use and land ownership patterns; Fisheries and aqua culture; Deforestation and afforestation; Communication, commerce, industries and other economic benefits; Water supply, sanitation, health and nutrition; Inequalities in distribution of benefits and losses; Socio-economic survey; Case studies.

CE 4205: Integrated Water Resources Planning and Management

Credit: 2.00

Contact hours: 2.0 hrs/week

Basic concepts in integrated water resources management; Economic, environmental and industrial aspects of integrated water resources; Participation of beneficiaries; Formation of users' group; Fisheries and navigation management; Strategic planning; System analysis approach, conceptual framework, models, and analytical techniques of integrated water resources planning and management.

CE 4211: Prestressed Concrete

Credit: 2.00

Contact hours: 2.0 hrs/week

Introduction; Materials; Losses of prestress; Analysis and design for flexure; Diagonal tension or shear; Deflections; Bond and bearing; Design of post-tensioned slab.

CE 4213: Theory of Elasticity and Elastic Instability of Structures

Credit: 2.00

Contact hours: 2.0 hrs/week

Introduction to theory of elasticity; Plane stress and plane strain conditions; Two-dimensional problems in rectangular and polar coordinates; Torsion of circular and non-circular shafts; Instability of structures; Stability functions.

CE 4215: Introduction to Finite Element Method

Credit: 2.00

Contact hours: 2.0 hrs/ week

Introduction to finite element method as applied to Civil Engineering problems; One dimensional stress deformation and time dependent flow problem; Two dimensional plane stress and plane strain analysis of stress deformation problems.

CE 4217: Structural Dynamics

Credit: 2.00

Contact hours: 2.0 hrs/week

Formulation of equation of motion; Vibration; SDOF and MDOF systems; Response to harmonic and impulse loading and vibration analysis by Rayleigh's method.

CE 4219: Design of Steel Structures

Credit: 2.00

Contact hours: 2.0 hrs/week

Behaviour of structural steel members and steel frames; Code requirements; Design of tension and compression members by WSD and LFD methods; Design of beam, beam-columns; Joint design.

CE 4210: Sessional on Structural Analysis and Design-IV

Credit: 1.50

Contact hours: 3.0 hrs/week

Design of various reinforced concrete structures, e.g. water tank and precast roof etc.

CE 4231: Geotechnical Engineering-IV

Credit: 2.00

Contact hours: 2.0 hrs/week

Retaining walls, Cofferdams, Pier and abutments; Piles subjected to lateral loads; Analysis and design of machine foundation, Dewatering and slurry wall construction, soil improvement techniques.

CE 4233: Geotechnical Engineering -V

Credit: 2.00

Contact hours: 2.0 hrs/week

Introduction to critical state soil mechanics, SHANSEP and stress path methods; One, two and three dimensional consolidation problems; Pore pressure coefficients; Soil structure-interaction; Earthquake and liquefaction problems; Numerical solution of geotechnical engineering problems.

CE 4235: Geotechnical Engineering–VI

Credit: 2.00

Contact hours: 2.0 hrs/week

Introduction to soil-water interaction problems; Permeability, capillarity and soil suction; Seepage analysis, stability of natural, man made slope; and excavation subjected to seepage, water current, wave action etc.; Theories of filters and revetment design; Hydraulic fills.

CE 4230: Sessional on Geotechnical Engineering–III

Credit: 1.50

Contact hours: 3.0 hrs/week.

Preparation of soil report, interpretation of soil test result, establishment of sub-soil profile and design of foundations.

CE 4241: Environmental Pollution Control

Credit: 2.00

Contact hours: 2.0 hrs/week.

Water pollution: sources and types of pollutants; Waste assimilation capacity of streams; Dissolved oxygen modeling; Ecological balance of streams; Industrial pollution; Heavy metal contamination; Detergent pollution and eutrophication; Ground water pollution; Marine pollution; Pollution control measures; Water quality monitoring and management.

Air pollution: Sources and types of pollutants; Effects of various pollutants on human health, Materials and plants; Air pollution meteorology; Global warming and greenhouse effects; Emission standards from industrial sources; Air pollution monitoring and control measures; Ozone layer depletion; Acid rain deposition.

Noise pollution: Noise and people, Noise standards, measurements and controls.

CE 4243: Solid Waste Management

Credit: 2.00

Contact hours: 2.0 hrs/week

Sources and types of solid wastes; Physical and chemical properties of solid wastes; Solid wastes generation; On-site handling, storage and processing, collection of solid wastes; Community and municipal collection systems; Transfer stations and transport; Recycling, reuse and resources recovery; Treatment methods: composting, incineration etc; Landfills; Integrated solid waste management; Hazardous waste management.

CE 4245: Environmental Development Project

Credit: 2.00

Contact hours: 2.0 hrs/week

Environment and sustainable development; Environmental policies, legislation and act; Environmental implication of sectoral development; Environmental quality standards; Environmental issues and priorities; Environmental impact assessment of development

schemes: baseline studies, assessment methodologies; Economics of environmental management; Special topics.

CE 4240: Sessional on Environmental Engineering –III

Credit: 1.50

Contact hours: 3.0 hrs/week

Design of sewerage systems; Field visits/assignments on existing water supply and sanitation technologies; Case study on users participation; O & M practices and ownership; Community managed projects.

CE 4251: Transportation Engineering–III

Credit: 2.0

Contact hours: 2.0 hrs/week

The transportation planning process; Traffic management concepts; Traffic accident investigations, city road and street networks: grade separation and interchanges, pedestrian and bicycle facilities; The urban bypass, environmental aspects of highway traffic and transportation projects; Elements of traffic flow

CE 4253: Transportation Engineering–IV

Credit: 2.00

Contact hours: 2.0 hrs/week

Highways drainage and drainage structures; Evaluation and strengthening of pavements; Importance, advantages and trends in air transportation; Planning and design of airports; Aircraft characteristics related to airport design; Types and elements of airport planning studies; Airport configuration; Geometric design of the landing area; Terminal area; Heliports; Design of airport pavements; Lighting, marking and signing; Airport drainage.

CE 4255: Transportation Engineering–V

Credit: 2.00

Contact hours: 2.0 hrs/week

Highway needs study; Highway planning, economics and financing; Evaluation and analysis of transportation projects; Management, monitoring, organization and implementation of transportation projects; Selected case studies; Traffic engineering administration and legislation; Urban public transportation and freight movement.

CE 4250: Sessional on Transportation Engineering–III

Credit: 1.50

Contact hours: 3.0 hrs/week

Design of flexible and rigid pavements for highways and airfield pavements; Geometric

design; Roadway intersections design, roadway capacity calculation; Traffic studies and design.

CE 4261: River Engineering

Credit: 2.00

Contact hours: 2.0 hrs/week

Behavior of alluvial rivers; River channel pattern and fluvial processes; Aggradation and degradation; Local scours, river training and bank protection works; Navigation and dredging; Sediment movement in river channels, bed forms and flow regimes.

CE 4263: Coastal Engineering

Credit: 2.00

Contact hours: 2.0 hrs/week

Coast and coastal features; Tides and currents; Tidal flow measurement; Waves and storm surges; Docks and harbour; Forces of waves and tides in the design of coastal and harbour structures; Coastal sedimentation processes; Deltas and estuaries; Shore protection works; Dredging and dredgers.

CE 4265: Hydraulic Structures

Credit: 2.00

Contact hours: 2.0 hrs/week

Design principles of hydraulic structures, types of hydraulic structures; Design of dams, barrages, weirs, spillways, energy dissipaters and spillway gates; Cross drainage works.

CE 4267: Ground Water Engineering

Credit: 2.00

Contact hours: 2.0 hrs/week

Groundwater in hydrologic cycle and its occurrence; Physical properties and principles of groundwater movement; Groundwater and well hydraulics; Groundwater resource evaluation; Groundwater levels and environmental influences; Water pollution and contaminant transport; Recharge of groundwater; Saline water intrusion in aquifers; Groundwater management.

CE 4260: Sessional on Water Resources Engineering-I

Credit: 1.50

Contact hours: 3.0 hrs/week

Design of hydraulic structures, river training works; Groundwater resource assessment and water well design.

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Academic Ordinance for Post Graduate Studies

(Effective from July-2013 semester)

(Approved by 41th meeting of Academic Council on 18/02/13 and 25/02/13 and confirmed by 43th meeting of Academic Council on 12/09/13)

1. Definitions

1.1. 'University' means the Khulna University of Engineering & Technology.

1.2. 'Syndicate' means the Syndicate of the University.

1.3. 'Vice-Chancellor' means the Vice-Chancellor of the University.

1.4. 'Academic Council' means the Academic Council of the University.

1.5. 'CASR' means the Committee for Advanced Studies and Research of the University.

1.5.1. The **CASR** shall consist of the following members:

- i) Vice-Chancellor Chairman
- ii) Three Professors to be nominated by the Member Syndicate
- iii) Two teachers having research experience to Member be nominated by the Academic Council
- iv) Two experts, at least one from outside the Member University, to be nominated by the Vice-Chancellor
- v) The Director (Research and Extension) Member-Secretary

1.5.2. At least one-third members will fulfill the quorum.

1.5.3. The term of office of the nominated members shall be three years.

1.6. 'EC' means the Executive Committee of any Faculty of the University.

1.6.1. The **EC** shall consist of the following members:

- i) Dean of the Faculty Chairman

- ii) Head of the Departments under the Faculty Member
- iii) All Professors and Associate Professors of the Departments under the Faculty Member
- iv) Three teachers, not related to the subjects of the Faculty but closely related to the subjects according to the Academic Council, nominated by the Academic Council Member
- v) Two persons, having special knowledge to one or more subjects of the Faculty and not serving in the University, nominated by the Academic Council Member

1.6.2. At least one-third members will fulfill the quorum.

1.6.3. The term of office of the nominated members shall be three years.

1.7. 'ACPG' means the Academic Committee for Post-Graduate studies in a degree-awarding department of the University.

1.7.1. The **ACPG** shall consist of the following members:

- i) Head of the Department Chairman
- ii) All Professors and Associate Professors of the respective Department and all teachers who teach in the post-graduate classes Member
- iii) One Professor from the relevant field from any other University to be nominated by the Vice-Chancellor Member
- iv) One expert from the relevant field having experience in any industry, research or commercial organization to be nominated by the Academic Council Member

1.7.2. The Chairman will nominate one of the members from 1.7.1 (ii) to act as the Member-Secretary.

1.7.3. At least one-third members will fulfill the quorum.

1.7.4. The term of the office of the nominated members shall be three years.

1.8. 'DSC' means the Doctoral Scrutiny Committee.

1.8.1. The **DSC** shall consist of the following members:

- i) Supervisor Chairman
- ii) Joint Supervisor/Co-supervisor (if any) Member

- iii) Head of the Department Member
 - iv) Not less than three experts of which at Member
least one from outside the Department
- 1.8.2.** There shall be a DSC for each Ph. D. student proposed by the Head of the Department and approved by the CASR.
- 1.8.3.** The committee should be formed within 3 (three) months from the date of the student's provisional admission in consultation with the supervisor.
- 1.8.4.** The DSC will meet from time to time (at least on three occasions) on the request of the supervisor to review the progress of the student.
- 1.8.5.** In special circumstances, the CASR may approve any addition and/or alteration in the DSC on the recommendation of the supervisor through the Head of the Department.

2. Degree Awarding Departments

The University shall have the following post-graduate degree awarding Departments:

- i) Department of Civil Engineering
- ii) Department of Electrical and Electronic Engineering
- iii) Department of Mechanical Engineering
- iv) Department of Computer Science and Engineering
- v) Department of Electronics and Communication Engineering
- vi) Department of Industrial Engineering and Management
- vii) Department of Bio-Medical Engineering
- viii) Department of Mathematics
- ix) Department of Chemistry
- x) Department of Physics
- xi) Any other Department to be instituted by the Syndicate on the recommendation of the Academic Council from time to time.

3. Degrees Offered

The Post-Graduate degrees to be offered by the University under this ordinance are as follows:

3.1.

Master of Science in Engineering

- i) Master of Science in Civil Engineering abbreviated as M. Sc. Eng. (CE)
- ii) Master of Science in Electrical & Electronic Engineering abbreviated as M. Sc. Eng. (EEE)

- iii) Master of Science in Mechanical Engineering abbreviated as M. Sc. Eng. (ME)
- iv) Master of Science in Computer Science & Engineering abbreviated as M. Sc. Eng. (CSE)
- v) Master of Science in Electronics & Communication Engineering abbreviated as M. Sc. Eng. (ECE)
- vi) Master of Science in Industrial Engineering & Management abbreviated as M. Sc. Eng. (IEM)
- vii) Master of Science in Bio-Medical Engineering abbreviated as M. Sc. Eng. (BME)
- viii) Any such other degree as may be approved by the Syndicate on the recommendation of the Academic Council from time to time.

3.2 Master of Science

- i) Master of Science in Mathematics abbreviated as M. Sc. (Math)
- ii) Master of Science in Chemistry abbreviated as M. Sc. (Chem)
- iii) Master of Science in Physics abbreviated as M. Sc. (Phy)
- iv) Any such other degree as may be approved by the Syndicate on the recommendation of the Academic Council from time to time.

3.3.

Master of Philosophy

- i) Master of Philosophy in Mathematics abbreviated as M. Phil. (Math)
- ii) Master of Philosophy in Chemistry abbreviated as M. Phil. (Chem)
- iii) Master of Philosophy in Physics abbreviated as M. Phil. (Phy)
- iv) Any such other degree as may be approved by the Syndicate on the recommendation of the Academic Council from time to time.

3.4. Doctor of Philosophy

- i) Doctor of Philosophy in Civil Engineering abbreviated as Ph. D. (CE)
- ii) Doctor of Philosophy in Electrical & Electronic Engineering abbreviated as Ph. D. (EEE)
- iii) Doctor of Philosophy in Mechanical Engineering abbreviated as Ph. D. (ME)
- iv) Doctor of Philosophy in Computer Science & Engineering abbreviated as Ph. D. (CSE)
- v) Doctor of Philosophy in Electronics & Communication Engineering abbreviated as Ph. D. (ECE)
- vi) Doctor of Philosophy in Industrial Engineering & Management abbreviated as Ph. D. (IEM)

- vii) Doctor of Philosophy in Bio-Medical Engineering abbreviated as Ph. D. (BME)
- viii) Doctor of Philosophy in Mathematics abbreviated as Ph. D. (Math)
- ix) Doctor of Philosophy in Chemistry abbreviated as Ph. D. (Chem)
- x) Doctor of Philosophy in Physics abbreviated as Ph. D. (Phy)
- xi) Any such other degree as may be approved by the Syndicate on the recommendation of the Academic Council from time to time.

4. Admission Requirements

4.1. Master of Science in Engineering

For admission to the courses leading to the award of the degree of M. Sc. Eng. in any department, a candidate must have obtained a B.Sc. Eng. or an equivalent degree with at least a CGPA of 2.65 in the scale of 4.00 or its equivalent from any recognized University/Institution in the relevant field/branch and must have obtained at least a CGPA of 3.50 in the scale of 5.00 or its equivalent both in SSC and HSC levels

4.2 Master of Science

For admission to the courses leading to the award of the degree of M. Sc. in any department, a candidate must have obtained a 4 years B.Sc. (Hon's) or an equivalent degree with at least a CGPA of 2.65 in the scale of 4.00 or its equivalent from any recognized University/Institution in the relevant field/branch and must have obtained at least a CGPA of 3.50 in the scale of 5.00 or its equivalent both in SSC and HSC levels.

Or

A candidate having B.Sc. Engineering degree with good academic records from relevant field/branch, as decided by the ACPG of the respective department, is also eligible; provided that he/she completes some pre-requisite courses as determined by the Selection Committee, constituted under Art 5.3 of this ordinance.

4.3. Master of Philosophy

For admission to the courses leading to the award of the degree of M.Phil. in any department, a candidate must have obtained an M.Sc. or an equivalent degree in the relevant field/branch with at least Second Class/CGPA of 2.65 in the scale of 4.00 in both B.Sc. (Hon's/Pass) and M.Sc. with good previous academic records.

Or

A candidate having B.Sc. Engineering degree with good academic records from relevant field/branch, as decided by the ACPG of the respective department, is also eligible; provided that he/she completes some pre-requisite courses as determined by the Selection Committee, constituted under Art 5.3 of this ordinance.

4.4. Doctor of Philosophy

4.4.1. For admission to the courses leading to award of the degree of Doctor of Philosophy in any department, a candidate must have obtained an M.Sc. Eng./M.Eng./M.Sc. with 4 years B.Sc. (Hon's)/M. Phil or its equivalent degree with good academic records in the relevant field/branch of Engineering/Science or its equivalent from any recognized University/Institution.

4.4.2 A student already working for an M.Sc. Eng./M.Sc. with 4 years B.Sc. (Hon's)/M.Phil. degree in this University and showing excellent progress and promise in thesis work may be provisionally transferred to Ph.D. program after completion of his/her M.Sc. Eng./M.Phil. course work with a minimum CGPA of 3.50 out of 4.00 on the recommendation of the ACPG and approval of the CASR.

4.5 The above requirements may be relaxed for candidates on deputation or sponsored by Academic Institutions/Research Organizations/Government and Semi-Government Organizations. Such relaxation shall be recommended by the ACPG to the CASR for approval.

5. Admission Procedures

- 5.1. Applications for admission to the above programs shall be invited before commencement of each semester through regular means of advertisement and received by the Registrar.
- 5.2. On the recommendation of the appropriate EC, the Academic Council shall frame the rules for admission to the University for M.Sc. Eng./M.Sc./M.Phil. /Ph.D. program from time to time.
- 5.3. There shall be a Selection Committee in each department as constituted by the respective ACPG on the recommendation of the Head of the Department.
- 5.4. Before being finally selected for admission, a candidate may be required to appear at an interview by the Selection Committee.
- 5.5. Every selected candidate other than a Ph. D. candidate shall have to get himself/herself admitted to the University within the prescribed time limit on payment of prescribed fees.
- 5.6. A Ph. D. candidate selected by the Selection Committee shall be provisionally admitted to the University within the prescribed time limit on payment of prescribed fees and he/she may be required to pass the prerequisite credit and non-credit courses, if any, as prescribed by the DSC.
- 5.7. A provisionally admitted Ph.D. candidate shall be deemed to be eligible for final admission as a Ph.D. student with effect from the date of his/her provisional admission if and when he/she qualifies the comprehensive examination (Art 6.10.3(iii) of this ordinance).

6. Academic Regulations

- 6.1. There shall be two semesters in one academic year. One will start in January and the other in July.
- 6.2. The courses of study in a department shall be proposed by the respective ACPG and approved by the Academic Council on the recommendation of the Executive Committee of the respective Faculty. The ACPG may review the curriculum from time to time and propose for any modification if necessary.

6.3. The courses to be offered by a department in any semester shall be determined by the respective department.

6.4. Academic progress shall be assessed in terms of credit hours earned by the student. One credit hour theoretical course shall normally require 14 periods of lecture during one semester while one credit hour of laboratory/project/thesis work should normally require 42 periods of laboratory/project/thesis work in a semester. The number of credit hours for each course shall be specified in the syllabus of the respective department.

6.5. Status of a Student

There shall be two categories of student, namely,

- i) Full-time: A full-time student shall not ordinarily be an employee of any organization; however, employees serving in different organizations may be registered as full-time student with prior permission from the concerned authority/employer. A full-time student may be employed as teaching/research assistant in this University.
- ii) Part-time: Students serving in different organizations may be admitted as part-time student with a written consent from the employer.

6.6. Course Registration

6.6.1. Every admitted student shall have to get himself/herself registered into the courses on payment of prescribed fees.

6.6.2. Course registration by a student must be completed within two weeks from the start of a semester; otherwise the student shall not be allowed to continue the course in that semester.

6.6.3. A full-time student must register a minimum of 12 (twelve) credit hours and a maximum of 15 (fifteen) credit hours per semester.

6.6.4. A part-time student should normally register a minimum of 6 (six)-credit hours and a maximum of 9 (nine) credit hours per semester.

6.6.5. A student may be permitted to withdraw and/or change his/her registered course within three working weeks from the commencement of that semester on the recommendation of his/her supervisor (if any) and upon approval of the concerned teacher(s) and Head of the Department.

- 6.6.6.** No student will be allowed to register a course for grade improvement. A student having a F grade in a compulsory course (if any) shall be allowed to repeat.

6.7. Credit Transfer

On the recommendation of the respective ACPG through EC and by the approval of the Academic Council, a student may be allowed to transfer a maximum of 50% of the required theory courses of this University completed by the student at other universities/institutions where he/she enrolled earlier for M.Sc. Eng./M.Sc./ M.Phil/ Ph.D program provided that the courses were not taken earlier than 3 (three) calendar years from the date of his/her first enrollment in the respective program in this University. In addition the student must obtain a minimum Grade Point of 3.00 out of 4.00 or its equivalent in each course to be transferred and the courses should be equivalent to the approved courses of this University.

6.8. Course Duration

6.8.1.1 M. Sc. Eng. Degree

The minimum duration to complete the requirements of M.Sc. Eng. degree shall normally be 3 (three) semesters and generally not be more than 5 (five) academic years from the date of his/her admission.

6.8.1.2 M. Sc. Degree

The minimum duration to complete the requirements of M.Sc. degree shall normally be 3 (three) semesters and generally not be more than 5 (five) academic years from the date of his/her admission.

6.8.2. M. Phil. Degree

The minimum duration to complete the requirements of M. Phil. degree shall normally be 4 (four) semesters and generally not be more than 5 (five) academic years from the date of his/her admission.

6.8.3. Ph. D. Degree

The minimum duration to complete the requirements of Ph.D. degree shall normally be 4 (four) semesters from the date of his/her provisional admission and generally not be more than 7 (seven) academic years from the date of his/her provisional admission.

6.9. Requirements for Continuation of the Post-Graduate Program

- 6.9.1.** A student will not be allowed to continue the program if he/she obtains F grades in three or more courses in the first two registered semesters.

- 6.9.2.** A student will not be allowed to continue the program if his/her CGPA falls below 2.5 (including C grades) at the end of the second or any subsequent semester.
- 6.9.3.** A Ph.D. student will not be allowed to continue the program if he/she fails to qualify the Comprehensive Examination [Art 6.10.3(iii)] in 2(two) chances.

6.10. Requirements for the Degrees

6.10.1.1 M. Sc. Eng. Degree

The following are the requirements for M. Sc. Eng. degree:

- i) A student must obtain a minimum CGPA of 2.65 in his/her course works.
- ii) A student must have to complete a minimum of 36 credit hours of which 18 credit hours shall be assigned to a thesis or 9 credit hours for a project.
- iii) In addition to the successful completion of course works, every student shall have to submit a thesis on his research work or a dissertation on his project work, as applicable, fulfilling the requirements as detailed in Art. No. 9.

6.10.1.2 M. Sc. Degree

The following are the requirements for M. Sc. degree:

- i) A student must obtain a minimum CGPA of 2.65 in his/her course works.
- ii) A student must have to complete a minimum of 36 credit hours of which 18 credit hours shall be assigned to a thesis or 9 credit hours for a project.
- ii) In addition to the successful completion of course works, every student shall have to submit a thesis on his/her research work or a dissertation on his/her project work, as applicable, fulfilling the requirements as detailed in Art. No. 9.

6.10.2. M. Phil. Degree

The following are the requirements for M. Phil. degree:

- i) A student must obtain a minimum CGPA of 2.65 in his/her course works.
- ii) A student must have to complete a minimum of 48 credit hours of which 24 credit hours shall be assigned to a thesis.
- iii) In addition to the successful completion of course work, every student shall have to submit a thesis on his/her research work fulfilling the requirements as detailed in Art. No.9.

6.10.3. Ph.D. Degree

The following are the requirements for Ph. D. degree:

- i) A student must obtain a minimum CGPA of 2.65 in his/her course works.

- ii) A student must have to complete a minimum of 60 credit hours of which 45 credit hours shall be assigned to a thesis.
- iii) He/she must have to pass the Comprehensive Examination. Comprehensive Examination shall comprise a written examination and/or an oral examination to test the knowledge of the student in his/her field of study and research. Comprehensive Examination shall ordinarily be held after the completion of the course work by the student. The DSC on the request of the supervisor shall fix a date and time for the Comprehensive Examination. The DSC shall conduct the Comprehensive Examination.
- iv) In addition to the successful completion of course works and Comprehensive Examination, every student shall have to submit a thesis/dissertation on his/her research work fulfilling the requirements as detailed in Art. No. 9.

7. Grading System

7.1. Numerical marks may be made in answer scripts, tests etc. for assessing the performance of the students but all the final grading shall be made in letter grade/grade point as follows:

Numerical Marks	Letter Grade	Grade Point (G _i)	Performance
90% and above	A+	4.0	Excellent
≥80% but <90%	A	3.5	Very good
≥70% but <80%	B+	3.0	Good
≥60% but < 70%	B	2.5	Average
≥50% but <60%	C	2.0	Pass
Below 50%	F	0.0	Fail
Incomplete	I	--	--
Satisfactory	S	--	--
Unsatisfactory	U	--	--

7.2. The Grade Point Average (GPA) shall be computed for each semester as follows:

$$GPA = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where n is the number of courses completed during the semester, C_i is the number of credits allotted to a particular course, and G_i is the grade point corresponding to the letter grade awarded for that course.

A Cumulative Grade Point Average (CGPA) shall also be computed at the end of second and subsequent semesters. The CGPA will be computed as follows:

$$CGPA = \frac{\sum_{j=1}^m S_j T_j}{\sum_{j=1}^m T_j}$$

where m is the total number of semesters being considered,
 S_j is the GPA of the j -th semester,
 T_j is the total number of credits registered during j -th semester.

Both GPA and CGPA will be rounded off to the second place of decimal for reporting.

- 7.3. On the written request from a student, a maximum of two courses, having B or C grade in each, may be ignored for the calculation of CGPA. In such case the CGPA must not be less than 2.65 in the remaining courses.
- 7.4. Courses in which a student gets F grade shall not be counted towards credit hour requirements and for the calculation of GPA.
- 7.5. A student shall get I grade in a course with prior permission from the Head of the Department if he/she is unable to complete the course due to any unavoidable circumstances. He/she has to complete the course within the next two consecutive semesters; otherwise he/she will get F grade in that course. He/she may, however, be allowed to register that course without further payment of course registration fees.
- 7.6. Satisfactory (S) and unsatisfactory (U) shall be used for grading of thesis/project and non-credit prerequisite courses. If, however, thesis is discontinued an I grade shall be recorded.

8. Conduct of Examination for Theoretical Courses

- 8.1. In addition to class tests, assignments, term papers etc. there shall be a written examination on all theoretical courses at the end of each semester. The Head of the Department shall announce a date of the examination generally two weeks before its commencement. The final grade in a theoretical course shall be based on the performance of all class tests, assignments, term papers and written examination.
- 8.2. The respective course teacher will be solely responsible for the performance evaluation of a student as detailed in Art. No. 8.1. He/she will announce the final grade of the course within three weeks from the date of examination of that course and will also

submit a copy to the Head of the Department.

- 8.3. The Controller of Examinations shall keep up-to-date record of all the grades obtained by a student in individual Academic Record Card. A student can get an official grade sheet from the office of the Controller of Examinations on payment of prescribed fees.

9. Project/ Thesis

9.1. Appointment of Supervisor/Co-Supervisor/Joint-Supervisor

9.1.1. Research works for a project/thesis shall be carried out under the supervision (Supervisor/Co-Supervisor/Joint-Supervisor) of a teacher, not below the rank of an Assistant Professor with sufficient research experience, publications and at least posses the degree which he/she is going to supervise, from the respective department or from any other department of this University proposed by the Head of the Department and recommended by the ACPG. A teacher of this University who is studying in postgraduate level shall not be allowed to supervise any Postgraduate student. A Co-Supervisor/Joint Supervisor is not encouraged in Masters Level unless there is an absolute necessity. In the Ph. D. Level, Co-Supervisor/Joint-Supervisor(s) are acceptable with proper justification by the supervisor. A Joint-Supervisor or Co-Supervisor (if necessary) may be appointed from within/outside the University recommended by the ACPG.

9.1.2. In case of selecting a Supervisor/Joint supervisor/Co-supervisor from other than the respective department, an approval from the supervisor's Head of the Department has to be taken.

9.1.3. The Supervisor, Joint-supervisor/Co-supervisor (if any) shall be approved by the CASR on the recommendation of the ACPG.

9.1.4. A thesis/project supervisor has to be normally appointed after the completion of the first semester for M.Sc. Eng./M.Sc./M.Phil and within three months for Ph.D. students.

9.2. Research Proposal

9.2.1. M. Sc. Eng./M.Sc./ M. Phil

A student shall submit a project/thesis proposal to the ACPG through supervisor(s). The ACPG shall examine the proposal and recommend it for the approval of the CASR through the Head of the Department. In special circumstances, the ACPG may recommend any

subsequent changes in the research topic and forward it through the Head of the Department to CASR for approval.

9.2.2. Ph. D.

After the successful completion of the Comprehensive Examination a student shall submit a research proposal to the DSC through the supervisor(s). The DSC shall examine the proposal and recommend it for the approval of the CASR through the Head of the Department. In special circumstances, the DSC may recommend any subsequent changes in the research topic and forward it to CASR for approval through the Head of the Department.

9.3. The project/research work should normally be carried out in the University. However, if necessary, the supervisor can allow his/her student to carry out the research work outside the University with the approval of the ACPG in the case of M. Sc. Eng./M.Sc./M. Phil. student or with the approval of the DSC in the case of Ph.D. student. The work schedule and financial involvement should be mentioned in the research proposal for carrying out research work.

9.4. At the end of a student's research work on the advice of the supervisor the student shall submit a thesis which must be an original contribution to engineering/sciences and worthy of publication. Every student shall have to submit required number of printed copies of his/her thesis/project dissertation in the approved format to the Head of the Department through his/her supervisor on or before a date to be fixed by the Head of the Department in consultation with the supervisor(s).

9.5. A student shall have to declare that he/she has carried out the project/research work and it not been submitted elsewhere for any purpose, except for publication, duly countersigned by the supervisor(s).

9.6. Project/ Thesis Examination

9.6.1. M. Sc. Eng. Project/Thesis, M.Sc. Project/Thesis, M. Phil. Thesis

9.6.1.1. The CASR shall constitute an examination committee for each project/thesis examination and oral examination from the panel of examiners proposed by concerned Head of the Department in consultation with supervisor(s) and recommended by the concerned ACPG. The

examination committee shall be as follows:

- | | | |
|------|---|-------------------|
| i) | Supervisor | Chairman |
| ii) | Joint supervisor/Co-supervisor (if any) | Member |
| iii) | Head of the Department | Member |
| iv) | One or two teachers from within the department not below the rank of Assistant Professor. | Member |
| v) | One external Examiner outside the University | Member (External) |

9.6.1.2. The supervisor(s) and the external examiner shall examine the thesis/dissertation; whereas the examination committee shall assess the performance in the oral examination only.

9.6.1.3. If any examiner is unable to accept the appointment or wants to relinquish his/her appointment before the examination, the Vice-Chancellor shall appoint another examiner from the panel.

9.6.2. Ph. D. Thesis

9.6.2.1. Each student has to submit 10 (ten) copies of synopsis at the end of the research work and has to appear in an Oral Examination arranged by the Chairman of DSC. After satisfactory completion of the Oral Examination the student shall submit at least 5 (five) printed copies of the thesis in the final form to the Head of the Department through the supervisor in the approved format.

9.6.2.2. The DSC will propose a panel of external examiners for each thesis. Board of Examiners shall consist of the DSC and 2 (two) more external examiners, at least one from outside the country, from the relevant field to be appointed by the Vice-Chancellor in consultation with the thesis supervisor. The supervisor shall act as the Chairman of the Board of Examiners. A copy of the thesis is to be sent to each external examiner for evaluation and written opinion.

- 9.6.2.3.** If any examiner is unable to accept the appointment or wants to relinquish his/her appointment before the examination, the Vice-Chancellor shall appoint another examiner from the panel in his/her place, without further reference to the DSC. The Vice-Chancellor may also appoint a third external examiner, if referred by the DSC in case of major contradiction to the external examiners' viewpoint.
- 9.6.2.4.** On receipt of satisfactory report from the thesis examiners, an oral examination shall be arranged on a date or dates fixed by the Chairman of DSC in which the student shall defend his/her thesis. The student must satisfy the Board of Examiners as constituted under Art. 9.6.2.2 that he/she is capable of intelligently applying the results of his/her research to the solution of the problems and of undertaking independent research work. Besides he/she should show the evidence of satisfactory knowledge related to the theory and technique used in his/her research work.
- 9.6.2.5.** In case a student fails to satisfy the Board of Examiners in thesis and/or Oral Examination, he/she shall be given one more chance to resubmit the thesis and/or re-appear in Oral Examination as recommended by the Board of Examiners.
- 9.6.2.6.** A student may be awarded an M. Sc. Eng./M. Phil degree on the recommendation of the supervisor, if the student fails to qualify for the award of Ph. D degree.

10. Striking off and Removal of Names from the Rolls

The name of the student shall be struck off and/ or removed from the rolls of the University on the following grounds:

- i) Unsatisfactory progress of the student reported by the supervisor through the ACPG and approved by the CASR.
- ii) Failing to proceed with the program according to the Art. 6.8. and 6.9 of this ordinance.
- iii) Forced to discontinue his/her studies under disciplinary rules.

- iv) Withdrawal of his/her name from the roll-sheet of the University.
- v) Non-payment of dues of the University and the Halls of residence within a prescribed period.

11. Academic Fees:

The amount of academic fees shall be decided by the University from time to time.

12. Refund of Fees:

12.1. A student withdrawing officially from all courses and/or including thesis/project as per Art 10(iv) is entitled to get a refund of the course registration fees provided he/she withdraws in writing through the respective Head of the Department before the expiry of two working weeks from the commencement of the classes. Thesis/project registration fees in any case are not refundable.

12.2. In case of Art.10 (ii) or after successful completion of the course, a student can get refund of University and Hall caution money after producing the clearance from all concerned.

13. Admission Co-ordination Committee for Post-graduate studies:

The Post-graduate Admission Co-ordination Committee shall consist of the following members:

- i) Vice-Chancellor, who shall also be the Chairman
- ii) Pro-Vice-Chancellor (if any)
- iii) All Deans
- iv) Director (Research and Extension), who shall also be its Secretary
- v) All Post-graduate degree offering Head of the Departments.

The Committee will decide upon the number of students to be admitted to any department each year on the basis of the present facilities of the said department.

14. Extension of time for completion of Degree:

The application for extension of time span of a student should be processed through the CASR. A recommended proforma may be used for this purpose. The application must be submitted within 6 (six) months after the normal time span has elapsed.

SUMMARY OF POSTGRADUATE COURSES

Sl.No	Course No.	Course Title	Credits
1	CE 6000	Project for M.Sc. Eng.	9.0
		Thesis for M.Sc. Eng.	18.0
		Thesis for Ph.D.	45.0
2	CE 6001	Selected Topics	2.0-3.0
3	CE 6002	Special Studies	3.0
4	CE 6004	Seminar	1.0-2.0
5	CE 6101	Soil Mechanics-I	3.0
6	CE 6103	Soil Mechanics-II	3.0
7	CE 6105	Foundation Engineering	3.0
8	CE 6107	Earth Pressure and Retaining Structures	3.0
9	CE 6109	Earth Structures	3.0
10	CE 6111	Soil Dynamics	3.0
11	CE 6113	Reinforced Earth	3.0
12	CE 6115	Rock Mechanics	3.0
13	CE 6117	Advanced Engineering Geology	3.0
14	CE 6119	Soil Behavior and Critical State Soil Mechanics	3.0
15	CE 6121	Soil Improvement	3.0
16	CE 6123	Earth Dams and Stability of Slopes	3.0
17	CE 6201	Theory of Elasticity	3.0
18	CE 6203	Plate Structure	3.0
19	CE 6205	Bridge Engineering	3.0
20	CE 6207	Plastic Design of Structures	3.0
21	CE 6209	Elastic Stability of Structures	3.0
22	CE 6211	Analysis and Design of Shells	3.0
23	CE 6213	Finite Element Methods-I	3.0
24	CE 6215	Computer Methods in Engineering	3.0
25	CE 6217	Advanced Reinforced Concrete	3.0
26	CE 6219	Analysis and Design of Tall Buildings	3.0
27	CE 6221	Finite Element Methods-II	3.0
28	CE 6223	Structural Dynamics and Seismic Design of Structures	3.0
29	CE 6225	Structural Brickwork	3.0
30	CE 6227	Advanced Concrete Technology	3.0
31	CE 6229	Construction Planning and Scheduling	3.0
SI. No	Course No.	Course Title	Credits
			3.0

Sl. No	Course No.	Course Title	Credits
33	CE 6233	Construction Cost Estimating and Control	3.0
34	CE 6235	Pre-stressed Concrete Structures	3.0
35	CE 6237	Durability of Concrete Structures	3.0
36	CE 6301	Theory of Water Treatment	3.0
37	CE 6303	Theory of Sewage Treatment	3.0
38	CE 6305	Water Pollution and Its Control	3.0
39	CE 6307	Biological Process in Waste Water Treatment	3.0
40	CE 6309	Air Pollution and Its Control	3.0
41	CE 6311	Environment Management	3.0
42	CE 6313	Environmental Impact Assessment(EIA)	3.0
43	CE 6315	Surface Water Quality Modeling	3.0
44	CE 6317	Aquatic Chemistry for Environmental Engineers	3.0
45	CE 6401	Hydrology	3.0
46	CE 6403	Statistical Methods in Hydrology	3.0
47	CE 6405	Open Channel Flow	3.0
48	CE 6407	Environmental Hydraulics	3.0
49	CE 6409	Integrated River Management	3.0
50	CE 6411	Water Resources Systems	3.0
51	CE6413	Integrated Water Resource Management	3.0
52	CE 6415	Hydrodynamics	3.0
53	CE 6417	Groundwater Development and Management	3.0
54	CE 6419	Mathematical Modeling of Fluid Flow	3.0
55	CE 6421	Sediment Transport	3.0
56	CE 6501	Transportation Engineering	3.0
57	CE 6503	Geometric Design of Highways	3.0
58	CE 6505	Geometric Design of Engineering	3.0
59	CE 6507	Geometric Engineering - I	3.0
60	CE 6509	Georisk Engineering -II	3.0
61	CE 6601	Geoenvironmental Engineering-I	3.0
62	CE 6603	Geoenvironmental Engineering-II	3.0
63	CE 6605	Geoenvironmental Engineering-III	3.0
64	CE 6607	Georisk Engineering-I	3.0
65	CE 6609	GeorisK Engineering-II	3.0

DETAIL OUTLINE OF POST GRADUATE COURSES

Major: Geotechnical Engineering

CE 6101: Soil Mechanics-I

Credit: 3.0

Soil classification and identification; soil structure and fabric; Clay mineralogy; clay-water relation; one and three dimensional consolidation; Numerical solution of consolidation equation; Swelling, collapse and rheological properties; Concept of cohesion and internal friction; shear strength of soil; Failure theories; bearing capacity equations and factors; sub-soil exploration program; Use of statistics in soil mechanics; Laboratory and field testing of soils and interpretation of results for engineering purposes.

CE 6103: Soil Mechanics-II

Credit: 3.0

Effective stress principle; Capillarity, Permeability and frost action; Hydraulic fracturing; Principles governing flow of water through soils; Seepage analysis; Design of filters and drains; Dewatering techniques; Soil improvement methods (Preloading, Earth reinforcement, use of geotextile and geofabrics, dynamic consolidation, vibrocompaction, vibroreplacement, blasting densification, soil stabilization etc.).

CE 6105: Foundation Engineering

Credit: 3.0

Application of soil mechanics principle to foundation engineering problems; Bearing capacity and settlement analysis for foundations; Elastic foundations; Loads on infinite slabs; Soil foundation interaction for footing and mat designs; Analysis of single pile and pile group foundations; Laterally loaded pile; Shoring and underpinning.

CE 6107: Earth Pressure and Retaining Structures

Credit: 3.0

Earth pressure theories; Arching theories; Retaining wall and sheet piling; Braced excavation; Principles of cofferdam design; Tunneling in ground.

CE 6109: Earth Structures

Credit: 3.0

Cohesionless and cohesive soils as construction materials; Compaction and properties of compacted soils; stability analysis for natural and manmade slopes; design highway of earth embankments for highway fills and dams; ground water and seepage problems; embankments on soft foundations; field instrumentations.

CE 6111: Soil Dynamics Credit:

3.0

Types of dynamic loading; vibration of single and two degree of freedom systems; Normal mode vibration of continuous systems; Wave propagation in soils, dynamic soil properties; liquefaction; shear modulus and damping effects; vibration of foundations on elastic media; design criteria for machine foundations; earthquake response; blast effects including nuclear weapon effects.

CE 6113: Reinforced Earth Credit:

3.0

Materials used in reinforced earth; Stress-strain relationship of reinforced soil; Design parameters and testing techniques; Conceptual performance of reinforced soil; Bearing capacity of shallow foundation on reinforced earth; Analysis, design and construction of reinforced earth retaining structures; Reinforced slopes; Design and construction of reinforced paved and unpaved road; Analysis, design and construction of granular and in-situ stabilized columns; Soil nailing, root or micro piles; Random (non-oriented) Fiber Reinforced Soil; Recent developments.

CE 6115: Rock Mechanics

Credit: 3.0

Description and classification of rocks and rock structures; Mechanics of rock deformation; Brittle fracture theory; Characterization and properties of rock discontinuities; Criteria of rock failure; Engineering problems associated with construction in rocks; Stabilization, anchoring and rock bolting; Rock slope stability and reinforcement; Design of underground opening and structures. Geotechnical aspects of open pit and underground mining; Soft and hard rock; Material handling; Waste disposal.

CE 6117: Advanced Engineering Geology

Credit: 3.0

Transported and residual soils; Erosion and deposition; Geomorphology; Study of the formation of delta; Engineering geology of soft clays. Physical and mechanical properties of rocks; geologic structures; Historical geology; Geology of Bengal

basin; Earthquakes and seismology; Earthquake zones of Bangladesh; Geological considerations for engineering designs; Engineering geology of roads, bridges, dams and tunnels; Interpretation of topographic and geological soil maps.

CE 6119: Soil Behavior and Critical State Soil Mechanics

Credit: 3.0

Introduction: models and soil mechanics; Elasticity, plasticity and yielding of soils; Elastic-plastic model for soil; A particular elastic-plastic model: Cam clay; Introduction of critical states; Critical state line and soil responses; Strength of soils in term of critical states; Index properties and their correlation with critical state parameters; Stress dilatancy; Stress paths and soil tests; Application of elastic-plastic models.

CE 6121: Soil Improvement

Credit: 3.0

General concept of soft ground; Concept of ground improvement; Classification and method of selection of a ground improvement techniques; Compaction; Heavy tamping and blasting; Soil stabilization; Consolidation by preloading and/or vertical drains; Electro-osmosis; Thermal stabilization; Ground inclusions: Granular piles/Stone column, Sand compaction piles, Lime or cement columns; Soil reinforcement: Soil nailing, Micro piles and use of geosynthetics.

CE 6123: Earth Dams and Stability of Slopes

Credit: 3.0

Seepage in composite sections; Methods of stability analysis, stability of slopes; Compaction, measurement of performance, construction and control of embankment.

Major: Structural Engineering

CE 6201: Theory of Elasticity

Credit: 3.0

Notion of stress and strain; Basic equations of linear theory of elastic media; Plane-stress and plane-strain problems; Stress functions; Two dimensional problems in rectangular and polar coordinates; Torsion; Energy principles; Stress and strain in Three dimensions; General theorems; Three dimensional problems; Theories of failure; Computer solutions of elasticity problems.

CE 6203: Plate Structure

Credit: 3.0

Cylindrical and pure bending of plates; Axisymmetrical bending of circular plates; Rectangular plates with various boundary conditions; Plates of various shapes; Anisotropy plates; Combined Action of Lateral loads and in-plane forces; Large deflections of plates; Pales on elastic foundation; Thick plates.

CE 6205: Bridge Engineering

Credit: 3.0

Introduction, classification of bridges; Bridge loadings; Orthotropic plate decks; Grillage, space frame, finite element and finite strip methods of bridge deck analysis; Segmental Prestressed concrete bridges; Long span bridges, cable-stayed bridge, suspension bridge; Substructures: Design and construction.

CE 6207: Plastic Design of Structures

Credit: 3.0

Review of fundamental concepts-plastic hinges, collapse of beams and frames; Effects of axial load and shear forces; Investigation of plastic collapse mechanisms and calculation of collapse loads; Upper and lower bounds; Plastic analysis and design of beams, frames and grillages; Plastic collapse of reinforced concrete and masonry structures; Elastic-plastic analysis; Repeated loading; Shakedown theorems; Minimum weight design; numerical analysis; Design of multi storey frames.

CE 6209: Elastic Stability of Structures

Credit: 3.0

Stability of struts and beam-columns; Initial imperfections; Inelastic buckling; Stability functions; Stiffness matrix; Fixed end moments; Energy method; Elastic instability of plane frames; Critical load; Buckling modes; Failure load analysis; Torsional buckling under various conditions of end loads; Buckling by combined torsion and flexure; Lateral buckling of beams; Local buckling phenomenon; Buckling of thin plates and membrane shells; Buckling of built-up sections.

CE 6211: Analysis and Design of Shells

Credit: 3.0

Introduction to shells-historical development; economics of shells; Acoustics of

shell roofs; -classification of shell surfaces; Membrane theory of cylindrical shells; bending theory of cylindrical shells; Surfaces of revolution; Membrane theory of synclastic and anticlastic shells; New forms of shells; Finite element applications; Model analysis.

CE 6213: Finite Element Methods-I

Credit: 3.0

Fundamentals of finite element method, basic techniques, shape functions; Finite element formulation of various elastic problems-plane stress, plane strain, axisymmetric and three dimensional cases. Isoparametric elements, elastic membrane, thick shell and plate elements, body of revolution with pressure and sinusoidal loadings; Nodal loads from shape function routines. Bending of plates, axisymmetric shells, the semiloof beam and shell; Developing and implementing elements; Convergence-the patch test; Solution techniques-front and band solutions, element assembly and equation solving, roundoff errors; Variational principles in finite element analysis.

CE 6215: Computer Methods in Engineering

Credit: 3.0

Advanced programming techniques related to engineering problems; Program optimization; Computational pitfalls; Management of files and data bases; File structures; Direct access backing storage; Computational aspects of matrix algebra-relaxation methods, various reduction and elimination schemes; Eigen value problems, storage of and computation with large and sparse matrices; Numerical differentiation and integration; Interpolation and curve fitting; Linear and nonlinear programming algorithms; Software packages; Computer graphics; Interactive analysis and design; Programming for civil engineering problems on microcomputers.

CE 6217: Advanced Reinforced Concrete

Credit: 3.0

Review of principles: beams, slabs and columns; Design of columns; long columns, two way slab systems, grids, waffle slabs, ribbed slab, deep beams, curved beams, shear walls, building frames; Design for torsion; Bulk storage structures, creep and temperature effects; Details of reinforced concrete members; Advanced problems in foundations of structures; Codes and specifications and their influence in design; All individual or group project to design a complete

structural system; Design for seismic loading ..

CE 6219: Analysis and Design of Tall Buildings

Credit: 3.0

Definition of a tall building, Systems and concepts of tall buildings; Structural forms of tall building floor system, vertical load resisting systems, lateral load resisting systems. Choice of systems optimum design; Coupled shear walls-continuous medium, wide-column analogy, and finite element solutions; Interaction of walls and frames-approximate methods, analysis; Tubular structures-approximate methods, computer analysis; Masonry high-rise buildings; The future of high-rise buildings.

CE 6221: Finite Element Methods-II

Credit: 3.0

General sources of non-linearity in structures; Solution of nonlinear equations-incremental, iterative-Newton-Raphson and Modified NewtonRaphson solution procedures; Geometric Nonlinearity-large displacement and structural instability; Lagrangian approach-both total and updated, Eulerian approach; Material Nonlinearity-Material modeling; Yield criteria, plasticity, creep, elasto-plasticity, viscoplasticity, elastoviscoplasticity, modeling of reinforced concrete; Combined geometric and material non-linearity; Modeling of dynamic problems and solution procedure; Finite element analysis of non-structural problems-fluid flow, heat conduction, electromagnetic field analysis etc.

CE 6223: Structural Dynamics and Seismic Design of Structures Credit:

3.0

Introduction to structural dynamics; Single-degree-of-freedom system; undamped and damped time domain free vibration; transient response; time domain and frequency domain analysis; generalized systems; multidegree-of-freedom systems; Eigen value problem; mode shapes and Eigen frequencies; mode superposition technique; vibration of continuous systems; Lagrange equations of motion; earthquake excitations, characteristics of strong earthquakes; response spectra; design earthquakes; earth-quake analysis of structures; response spectrum analysis; earthquake codes and regulations; Earthquake resistant design of buildings, bridges and dams.

CE 6225: Structural Brickwork**Credit: 3.0**

Properties of bricks and mortar; Strength and deformation properties of brickwork; Strength of brick masonry compression element; Analysis and design of unreinforced brickwork structures; Reinforced and prestressed brickwork Structures; Composite action of brick masonry walls.

CE 6227: Advanced Concrete Technology**Credit: 3.0**

Review of constituent materials and properties of fresh concrete; Strength, elasticity and fracture of hardened concrete; Shrinkage and creep and their prediction; Durability of concrete; Use and effects of admixtures; Theories and applications of mix design methods including comparative studies; Manufacture and processes; Codes of practice; Special concretes.

CE 6229: Construction Planning and Scheduling**Credit: 3.0**

Planning, scheduling and progress control of construction operations; bar-charts, progress curves; principles of resource aggregation; deterministic arrow networks, time analysis, resource leveling, cost planning, network compression; Introduction to PERT; precedence networks; implications of schedule related matters in contract administration; implementation problems; computer application; Introduction to claims management; introduction to line-of-balance and simulation techniques.

CE 6231: Economic Decision Analysis in Construction**Credit: 3.0**

Basic economic concepts; principles of engineering economics; comparison of construction projects, structural system alternatives, materials substitutions; heavy construction equipment replacement policies; evaluation of public utility construction projects; effects of inflation; decision making under risk and under uncertainty, especially for the design of hydraulic structures; economic decision models; working examples from the construction industry in all topics.

CE 6233: Construction Cost Estimating and Control

Credit: 3.0

Types of estimates; organization of cost estimates; quantity take-offs, manual and Computer methods, cost of construction resources; design and cost estimating methods; contract cost estimates based on Construction Specifications Institute(CSI) Subdivisions; cost adjustments with and without indices; project cost control; construction cost accounting; financing business units and projects.

CE 6235: Pre-stressed Concrete Structures**Credit: 3.0.**

Pre-stressing Systems and Material Properties; The behavior and design of pre-stressed concrete structures and structural elements including beams, columns, slabs; Losses in Pre-stress ; Analysis and Design for Shear and Torsion; Calculations of Deflection and Crack Width; Transmission of Pre-stress forces, Principle of Linear Transformation; Concordant Tendon Profile , Partially Continuous Beams; Analysis for Ultimate Strength ; Analysis and Design of Composite Section; Analysis and Design for Horizontal Shear Transfer; Fractures in Modeling and analysis; Anchorage Devices; Analysis and Design of Pre-stressed Concrete Pipes and Poles.

CE 6237: Durability of Concrete Structures**Credit: 3.0.**

Properties of cement and concrete, Hydration of individual cement compounds, Chemical and Physical Processes Controlling C3S Hydration, Effect of Temperature on C3S Hydration; Admixtures and its function in concrete at different environment, Fire resistance and cover; Shrinkage, its prediction and effects on structures; Creep and thermal effects; Influence of creep on deformational behavior of beam structures at uniform temperatures; Normalization of experimental data with respect to stress and temperature, Testing on durability of concrete; Concrete in construction; Identification and analysis of cracks in concrete and their causes, Performance of concrete under cyclically varying temperatures; Corrosion and repair aspects of concrete; Special concrete and reinforcement.

Major: Environmental Engineering**CE 6301: Theory of Water Treatment****Credits: 3.0**

Water and its impurities; Criteria of water quality; Physical, chemical and

biological treatment processes; Desalinization and demineralization processes; Controls of aquatic growth; Control of taste and odor; Removal of organics from drinking water; Nitrogen and Phosphorus removal; Advanced methods of organic carbon removal; Dissolved inorganics removal.

CE 6303: Theory of Sewage Treatment

Credits: 3.0

Composition, properties and analysis of sewage; Biology and bio-chemistry of sewage treatment; Principles of physical, chemical and biological treatment processes; Tertiary treatment of effluents; Sludge treatment and digestion methods.

CE 6305: Water Pollution and Its Control

Credits: 3.0

Sources of water pollution and type of wastes, effects on water; Basic theory of control devices; Assessment of water quality in rivers and lakes; Monitoring and management planning; Pollution surveys and control programs; Water pollution problems in Bangladesh.

CE 6307: Biological Process in Waste Water Treatment

Credits: 3.0

Biological waste water treatment; Biological sludge treatment; Process kinetics; Biochemistry and Microbiology; Activated sludge process and its modification; Stabilization ponds; Aerobic bio-film processes; Anaerobic digestion process.

CE 6109: Air Pollution and Its Control

Credits: 3.0

Composition of air pollution; Source of Air pollution; Classification of air pollutants; General effect and specific effect of Air pollution; Sampling procedure and analytical methods; Methods of monitoring air pollutants; Green house effect and sustainable development; Photochemical smog; Ozone layer depletion; Acid Rain; Standards of air; Control of air pollution by equipments; Legislation and regulations.

CE 6311: Environmental Management

Credits: 3.0

Environment and sustainable development; Global and regional approach to environmental management; Environmental implications of sectoral development;

Infrastructure, water resources, industry, agriculture, transport and communication, energy, health and population, mineral resources, tourism, land use and urbanization; Environmental management at project level, Environmental resource management and conservation strategies; Environmental policy and legislation, Environmental Quality Standards (EQS); Economics of Environmental Management.

CE 6313: Environmental Impact Assessment (EIA)

Credits: 3.0

Historical development; Definition, aims and objectives of Environmental Impact Assessment (EIA); Environmental issues related to development projects; Project screening, Initial Environmental Examination (IEE); Impact identification, predication analysis and evaluation; EIA methodologies; Adhoc, Checklists, Matrices, Network, Simulation Modeling Workshops (SMW), Environmental Evaluation System (EES), Overlays, Geographical Information System Guidelines; Environmental Impact Statement (EIS); Impact mitigation plan; Environmental monitoring and post-development audits; Organization of EIA; Scope, Work plan, resource requirements and costs of EIA, TOR for EIA; EIA in developing countries; Case studies.

CE 6315: Surface Water Quality Modeling

Credits: 3.0

Introduction, objective of water quality modeling; Mass loading rate estimation; point source, tributary and intermittent sources; Low flow, travel time and velocity estimates; Mass balance equation and steady state solution; Principal components of dissolved oxygen (DO) analysis, sources, and sinks of DO kinetics, DO analysis of water bodies, engineering control of DO; Basic mechanisms of eutrophication, significance of Ni ratio, sources and sinks of N and P, phytoplankton and nutrient interaction phytoplankton-DO relationships, simplified river-stream eutrophication analysis for phytoplankton and rooted aquatic plants; One and Multidimensional models for rivers and lakes, solution techniques; physic and hydrologic characteristics of lakes, response of lake to waste input finite segment steady state lake models; model calibration and verification sensitivity analysis, parameter estimation; Case studies.

CE 6317: Aquatic Chemistry for Environmental Engineers

Credit: 3.0

Review of some fundamentals of Chemistry; Approaches to equilibrium problem solving; numerical solution, graphical solution, the table, method; Natural weak acids and bases, alkalinity and pH in natural waters, buffer capacity; Dissolved

carbonate equilibria (closed system dissolution of CO₂ (open system); Solubility of solids, coexistence of phases in equilibrium; Metal ions and ligands in natural waters, aqueous complexes, ion association among major aquatic constituents, inorgan and organic complexation of trace elements; Redox equilibria and electron activity, pre-pH diagrams, redox conditions in natural waters; Aquatic particles and coordinative properties of surfaces, adsorption of metals and ligands on aquatic particles, surface complexation models; Fate (organic compounds in natural environment; volatilization, sorption/partitioning, transformation reactions, structure-activity and property-activity relationships.

Major: Water Resource Engineering

CE 6401: Hydrology

Credit: 3.0

Hydrological Processes: The hydrological cycle; Elements of meteorology; precipitation; Hydrologic abstractions-evaporation and transpiration, infiltration; run-off, basin characteristics and climatic factors affecting run-off; Hydrograph analysis and the unit hydro graph; urban and small watershed hydrology.

Hydrological Modeling: Hydrological modeling and water resources systems; classification on hydrological models-Input/output or "black box" models, conceptual models, distributed physics-based model Hydrologic synthesis and simulation.

Application of Hydrology: Hydrologic design, hydrological forecasting, management of forecasting requirement, impact of modern technology on hydrological forecasting.

CE 6403: Statistical Methods in Hydrology

Credit: 3.0

Probability concept in hydrology: properties of random variables and estimation of parameters; Probability distribution functions in hydrology; Frequency analysis; Confidence intervals and hypothesis testing; Simple and multiple linear regressions; Time series analysis.

CE 6405: Open Channel Flow

Credit: 3.0

Energy and momentum principles; Flow resistance; Boundary Layer Theory; Non-uniform flow computation; Channel Controls; Transitions; Hydraulic jump and surges; Unsteady flow; Hydraulic method of flow routing; Overland flow; Mathematical models of open channel flow; Practical problems.

CE 6407: Environmental Hydraulics**Credit: 3.0**

Hydraulics and the Environment, outfall versus Treatment for wastewater disposal; Hydraulics of Wastewater Disposal: Jets and Plumes, Buoyant and Momentum jets, dimensional analysis, length scales and asymptotic formulae for dilution prediction, effect of stratification and effect of currents; Mathematical Models of Buoyant Jet Mixing: General integral jet model for stagnant water, basic analytical solutions and outfall design charts; Overview of models used for outfall design and environmental impact assessment, hands-on computer exercise using an initial mixing model; Multiport diffusers: general discussion and the line plume concept; Internal Hydraulics of multiport Diffusers; Turbulent Diffusion and subsequent dispersion; Thermal discharges and waste heat management.

CE 6409: Integrated River Management**Credit: 3.0**

River management issues: Flooding, erosion, environment and ecology, impoundment of rivers; River incision: Evolution process, causes, control and remedial strategies; Vegetation and erosion: Ecological stresses, vegetation-erosion dynamics, riparian vegetation; Debris flows and landslides: Phenomena and mechanism, prediction, prevention and control; Alluvial rivers: Sediment transport and fluvial process, sediment load, bed form, river pattern and resistance, river motion dynamic; Case studies on management of alluvial river: Flood disaster, erosion and modern training strategies, the strategies of water management; Integrated river management: Restoration and river ecosystem, ecological functions and dynamic equilibrium, ecological stresses, assessment of river ecosystem, restoration of instream habitats, watershed and channel restoration,

CE 6411: Water Resources Systems**Credit: 3.0**

Introduction to systems thinking, water resources systems, water resources development: objectives, characteristics, sustainable development; Concepts on water resources planning and management, system approach for water resources

system analysis, overview of socioeconomic and environmental issues; Economics of hydro-system:

Engineering economic analysis, benefit cost analysis, water pricing and allocation issues, theory of firm and consumer behavior; Mathematical modeling and simulation of water resources: Development of a simulation model, application of deterministic simulation, linear programming and dynamic programming to different water resources problems; Evaluation of water resources project alternatives: Evaluation theory and practice, multi-objective optimization, economic and subjective evaluation, evaluation of water resources functions.

CE 6413: Integrated Water Resource Management

Credit: 3.0

Basic concepts, principles and tools of integrated water resources management (IWRM); status and management of the water resources: surface and groundwater supplies, water pollution and health, demand forecasting and management, catchment management, water use efficiency, water conservation, recycling and reuse, risk management; economics of water resources: economic analysis of water projects, value of water, pricing of water services and cost recovery, economic instruments; conceptual framework and analytical techniques of integrated water resources management (IWRM); water policies, goals and strategies for IWRM; institutional arrangements and participatory approach for IWRM

CE 6415: Hydrodynamics

Credit: 3.0

Fluid properties: fluid pressure, fluid forces, fluid static, fluid velocity measurement; Macroscopic approach in hydrodynamics: theory of fluid flow, governing equations of continuity, momentum, energy and moment of flow momentum; Microscopic approach in hydrodynamics: Laminar and turbulent flows, Navier stokes equation, boundary layers of flow in pipes and open channels; Dimensional analysis and hydrodynamic similitudes; Flow in pipes, open channels, hydraulic structures and hydraulic machinery.

CE 6417: Groundwater Development and Management

Credit: 3.0

Fundamentals of groundwater flow and groundwater wells: Darcy's law, aquifer properties and flow characteristics, groundwater flow equations, pumping tests and analysis, arrays of multiple wells; groundwater resources assessment: Hydro geological surveys and groundwater exploration, hydrologic assessment; Environmental issues:

Overexploitation, groundwater quality and contamination, saltwater intrusion: Groundwater management: concept of basin management, quality and quantity aspects, alternative basin yield; Groundwater pollution: Sources, movement and attenuation of pollutants in aquifers, transport processes, modeling tools and techniques for management; Management of groundwater pollution: Principles, data requirement and database management, vulnerability assessment, groundwater protection, groundwater remediation.

CE 6419: Mathematical Modeling of Fluid Flow

Credit: 3.0

Definition of Mathematical Model, types of mathematical models, different stages of model development; Differential equations and solution techniques: Linear and non-linear differential equations, methodology of solution; Finite difference methods: Introduction, explicit and implicit schemes, solution of ODES, Thomas algorithm, solution of PDEs; Modeling of unsteady flow: Introduction, basic equations, characteristics of boundary and initial conditions; Kinematics, diffusion and dynamic wave models, numerical solution of the Saint Venant equations, calibration & verification; Convection-diffusion processes; Derivation of the convection-diffusion equation for turbulent flow, transport of pollutants by pure diffusion, Transport of pollutants by convection-diffusion, Ground water flow modeling: Basic Concepts and equations, modeling of ground water flow by the finite element method; Application of mathematical Modeling.

CE 6421: Sediment Transport

Credit: 3.0

Properties of sediment; Incipient motion of sediment: Shields diagram, equilibrium of a particle; Fall velocity, bank stability, beginning of motion and design of stable channels, experimental approaches; Bed load transport: Shear stress approach, energy slope approach, discharge approach, bed form approach, probabilistic approach, stochastic approach; Suspended-load transport: Exchange theory under equilibrium conditions, suspended load formulae; Total load transport: General approach, total load transport functions; Alluvial bed forms and flow resistance; Comparison and evolution of sediment transport function: Evaluation of basic assumption, analytical approaches, direct comparison of accuracy of different transport equations, indirect comparison based in computer model simulation; Sediment sampler and sampling techniques.

Major: Transportation Engineering

CE 6501: Transportation Engineering

Credit: 3.0

Historical development, systems of transportation, technical and operational characteristics of highways, railways, airways and pipelines; transportation planning and development.

CE 6503: Geometric Design of Highways**Credit: 3.0**

Highway classification; Design controls and criteria; Traffic, vehicle characteristics, speed capacity; Elements of design; Sight distance, horizontal and vertical alignment; cross-section elements; Road intersections, grade separation and interchanges; Highway drainage.

CE 6505: Highway Materials**Credit: 3.0**

Origin, production, specifications, properties and use of bituminous materials, binder mixtures, design and analysis of bituminous paving mixes, field operations, surface treatment, stabilization methods, aggregates base, sub-base and sub grade, cement concrete in pavement construction.

CE 6507: Structural Design of Pavement**Credit: 3.0**

Pavement types, wheel loads, stresses in flexible pavements, stresses in rigid pavements, pavement performance, evaluation of sub grade and base support, design theories and practices, construction methods and maintenance, pavement rehabilitation.

CE 6509: Traffic Engineering**Credit: 3.0**

Characteristics of vehicles and driver, traffic stream characteristics, traffic control and operation, traffic surveys, accidents and road safety, parking, road way lighting, traffic management and administration.

Major: Geo-environmental Engineering**CE 6601: Geo-environmental Engineering-I****Credit: 3.0**

Regulatory requirements, waste characteristics, source contamination, Classification of organic and inorganic compounds, hydro-geological characteristics of the ground, mass transport in saturated and unsaturated media. Contaminant transport including

geochemistry of contaminant species, transport mechanisms, soil/water interaction, contaminant retardation processes and transport modeling.

CE 6603: Geo-environmental Engineering-II

Credit: 3.0

Site requirements, geological and technological barriers, technology including clay mineralogy, geomembrances liners balance for landfills, leachate and gas production, stability of landfills.

CE 6605: Geo-environmental Engineering-III

Credit: 3.0

Contaminated land management strategies, site investigation contaminant monitoring, geophysical techniques for subsurface investigation, contaminated soil analysis, water analysis analysis/ extraction, redemption technologies, containment vertical cut-off walls, cover systems, recovery well systems, bio-re of soil and groundwater, soil washing, innovative redemption technologies.

CE 6607: Georisk Engineering-I

Credit: 3.0

Physical and chemical properties of geological media, hydro- geological characteristics of soil and rock masses, Disintegration and transportation processes of geological materials; Weathering, leaching transportation- sedimentation, creep; Quantification of physical rock properties.

CE 6609: Georisk Engineering-II

Credit: 3.0

Soil and rock slope stability; Landslides in soil and rock, debris mud slides, quick clay, sagging slopes, rock fall, rock avalanches failure, failure and post-failure characteristics, prediction techniques time of failure, rock fall modeling, prediction of area of reactivation; Drainage systems, torrent protection schemes, bio-stabilization.

Strength of Materials
Applied Mechanics
Waste Water
Irrigation
Surveying
Reinforced Concrete Design
Theory of Structures
Structural Analysis & Design
Environmental Engineering
Transportation Engineering
Soil Mechanics
Solid Waste Management
Concrete Technology
Building Materials
Construction Management
Estimating
Hydraulics
Costing
Green Building
Air Pollution

Civil Engineering