Bangladesh University of Engineering and Technology (BUET)

Information Booklet for Postgraduate Studies

Department of Civil Engineering
BUET, Dhaka

July 1997

Chapter 1
General Information

1.1 HISTORICAL BACKGROUND

Bangladesh University of Engineering and Technology, abbreviated as BUET, is the oldest institution for the study of Engineering and Architecture in Bangladesh. The history of this institution dates back to the days of Dhaka Survey School which was established at Nalgola in 1876 to train surveyors for the then Government of Bengal of British India. As the years passed, the Survey School became the Ahsanullah School of Engineering offering three-year diploma course in Civil, Electrical and Mechanical Engineering. In 1948, the School was upgraded to Ahsanullah Engineering College (on its present premises) as a Faculty of Engineering under the University of Dhaka, offering four-year bachelor's courses in Civil, Electrical and Mechanical Engineering with a view to meeting the increasing demand for engineers in the country and to expanding the facilities for post graduate studies and research. Ahsanullah Engineering College was upgraded to the status of a University under the name of East Pakistan University of Engineering and Technology in the year 1962. After independence of Bangladesh in 1971, it was renamed as the Bangladesh University of Engineering and Technology (BUET). Starting with two faculties, the university has now been enlarged into five faculties. The faculty of Civil Engineering, opened in 1980, is now the largest faculty with about 830 undergraduate and 320 postgraduate students.

The BUET campus is in the heart of the city of Dhaka. It has a compact campus with halls of residence within walking distances of the academic buildings. The physical expansion of the University over the last few years has been impressive with construction of new academic buildings, auditorium complex, students halls of residences, medical centre, etc.

1.2 ACADEMIC ACTIVITIES

Undergraduate courses in the faculties of Engineering, Civil Engineering, Electrical and Electronic Engineering, and Mechanical Engineering usually extend over four years and lead to a B.Sc. Engineering degree in Civil, Electrical and Electronic, Mechanical, Chemical, Metallurgical Engineering, Computer Science and Engineering, and Naval Architecture and Marine Engineering. In the faculty of Architecture and Planning the degree of Bachelor of Architecture is usually obtained in five years.

Postgraduate studies and research are now among the primary functions of this University. Most of the departments under the different faculties offer M.Sc. Engg. and M.Engg. degrees and some departments have started offering the Ph.D. degree. Postgraduate degrees in Architecture (M. Arch.) and Urban and Regional Planning (MURP) are offered by the Faculty of Architecture and Planning. In addition to its own research programmes, the University undertakes research programmes sponsored by outside organizations such as UN Organizations, Commonwealth Secretariat., University Grants Commission (UGC). The expertise of the University teachers and the laboratory facilities of the University are also utilised to solve problems and to provide up-to-date engineering and technological knowledge to the various organisations of the country. The University is persistent in its effort to improve its research facilities, staff position and course and curricula to meet the growing technological challenges confronting the nation.

1.3 FACULTIES AND TEACHING DEPARTMENTS

The University has sixteen teaching departments under five faculties. All departments, with the exception of the department of Humanities, offer degree programmes. Some of the departments, however, offer postgraduate (PG) degrees only. Faculty wise list of the departments with the status of the degrees offered is given below :

Faculty of Civil Engineering

Civil Engineering :	Both UG and PG
Water Resources Engineering:	PG only

Faculty of Architecture and Planning

Architecture	Both UG and PG
Urban and Regional Planning:	Both UG and PG
Humanities:	No degree offered

Faculty of Electrical and Electronic Engineering

Electrical and Electronic Engineering:	Both UG and PG
Computer Science and Engineering:	Both UG and PG

Faculty of Engineering

Chemical Engineering:	Both UG and PG
Metallurgical Engineering:	Both UG and PG
Petroleum and Mineral Resources Engineering:	PG only
Chemistry:	PG only
Mathematics:	PG only
Physics:	PG only

Faculty of Mechanical Engineering

Industrial and Production Engineering:	PG only
Mechanical Engineering:	Both UG and PG
Naval Architecture and Marine Engineering:	Both UG and PG

1.4 UNIVERSITY ADMINISTRATION

Vice Chancellor :	Professor M. Shajahan

List of Administrative Officers

Registrar:	Mr. Md. Shahjahan
Controller of Examinations :	Mr. Md. Asadullah Khan
Comptroller :	Mr. K.M. Anisur Rahman Khan
Director of Students Welfare :	Dr. A.S.W. Kurny
Director, Advisory, Extension and Research Services :	Dr. M.A. Taher Ali
Director Bureau of Research, Testing	

and Consultation (BRTC) :	Dr. Ehsanul Haque
Director of Planning and Development :	Dr. Abdur Rouf
Director, Computer Center:	Dr. Md. Alee Murtaza

Dean of Faculties

Dean of Civil Engineering :	Dr. M. Feroze Ahmed
Dean of Architecture & Planning :	Dr. Md. Golam Rahman
Dean of Electrical & Electronic Engineering:	Dr. Saiful Islam
Dean of Mechanical Engineering:	Dr. M. Mizanur Rahman
Dean of Engineering:	Dr. M. A. Kader

Provosts of Residential Halls

Provost, Ahsanullah Hall :	Dr. Md. Sadrul Islam
Provost, Ladies Hall :	Dr. Mominul Huq
Provost, Nazrul Islam Hall:	Dr. Md. Motiur Rahman
Provost, Shahid Smrity Hall :	Dr. Safder Ali
Provost, Sher-e-Bangla Hall:	Dr. Md. Mirjahan Mia
Provost, M.A. Rashid Hall:	Dr. Abdul Quiyum
Provost, Shohrawardy Hall:	Dr. A. M. M. T. Anwar
Provost, Titumir Hall:	Dr.

Chapter 2
The Department of Civil Engineering

2.1 INTRODUCTION

The Department of Civil Engineering comprises four major divisions: Structural Engineering and Concrete Technology, Environmental Engineering, Geotechnical Engineering, and Transportation Engineering. The divisions offer basic and advanced optional courses in the above disciplines. Research in the above fields include areas like behaviour of available building and road materials with emphasis on indigenous materials, engineering soil properties of various regions of the country, low-cost cyclone resistant housing, seismic zoning of Bangladesh, waste management, environmental pollution control, environmental impact assessment, traffic safety studies, etc. The results of some of these research works have been incorporated in the Bangladesh National Building Code completed in 1993. Some research projects of more fundamental nature such as application of finite element techniques in tackling engineering problems, dynamic behaviour of multistoried buildings, soil-structure interaction, etc. pursued in this department have greatly contributed to advancement of knowledge. To meet the national demand, the department of Water Resources Engineering trains engineers specializing in hydrology, hydraulics, river morphology, salinity intrusion, irrigation, drainage, flood control, land reclamation, bank protection, river stabilisation, ground water, sedimentation problems and coastal engineering.

2.2 LIST OF FACULTY MEMBERS

Professor and Head

M. Azadur Rahman : B. Sc. Engg.(Civil), BUET; M.Sc. in Bridge Engineering, University of Surrey, U.K.; Ph.D., University of Aston in Birmingham, U.K. (Structural Engineering)

Professors

Shorabuddin Ahmad : B. Sc. Engg.(Civil), BUET; M.Sc.; University of Wales, U.K.; Ph.D., University of Wales, U.K. (Structural Engineering)

Jamilur Reza Choudhury : B. Sc. Engg.(Civil), BUET; M.Sc.; University of Southampton, U.K.; Ph.D., University of Southampton, U.K. (Structural Engineering)

Alamgir Habib : B. Sc. Engg.(Civil), BUET; M.Engg.; Carleton University, Canada; Ph.D., Carleton University, Canada (Structural Engineering)

M. Shamim Z. Bosunia : B. Sc. Engg.(Civil), BUET; M.Sc.Engg.; BUET; Ph.D., University of Liverpool, U.K. (Structural Engineering)

Md. Alee Murtuza : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Strathclyde, U.K. (Structural Engineering)

Alamgir Mojibul Hoque : B. Sc. Engg.(Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Leeds, U.K. (Transportation Engineering)

M. Feroze Ahmed : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Strathclyde, U.K. (Environmental Engineering)

Md. Hossain Ali : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Strathclyde, U.K. (Geotechnical Engineering)

Md. Humayun Kabir : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Strathclyde, U.K. (Geotechnical Engineering)

Md. Abdur Rouf : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Liverpool, U.K. (Structural Engineering)

Muhammad Zakaria: B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Birmingham, U.K. (Transportation Engineering)

Md. Mazharul Hoque : B. Sc. Engg. (Civil), BUET; M.Sc. Engg. AIT, THAILAND; Ph.D., Monash University, Australia (Transportation Engineering)

Sk. Sekender Ali : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of New Castle, Australia (Structural Engineering)

A. M. M. Taufiqul Anwar: M.Sc. Engg., Leningrad Civil Engineering Institute, U.S.S.R.; Ph.D. Leningrad Civil Engineering Institute, U.S.S.R. (Structural Engineering)

Ahsanul Kabir : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Strathclyde, U.K. (Structural Engineering)

Md. Zoynul Abedin: B. Sc. Engg.(Civil), BUET; Dipl. in Soil Engg., AIT, Thailand; M.Sc. Engg. BUET; Ph.D., University of Strathclyde, U.K. (Geotechnical Engineering)

Farooque Ahmed : B. Sc. Engg.(Civil), Chittagong University; M.Sc. Engg. BUET; Ph.D., University of Strathclyde, U.K. (Environmental Engineering)

Md. Mujibur Rahman : B. Sc. Engg.(Civil), BUET; M.Sc. Engg.Sc., University of Melbourne, Australia; Ph.D., University of Adelaide, Australia (Environmental Engineering)

Abdul Muqtudir: B. Sc. Engg.(Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Arizona, U.S.A. (Geotechnical Engineering)

Associate Professors

A. F. M. Abdur Rauf: B. Sc. Engg.(Civil), DU; M.Sc. Engg., A & M College, Texas, U.S.A. (Transportation Engineering)

Syed Noor-ud-deen Ahmed : B. Sc. Engg.(Civil), BUET; M.Sc. Engg., University of Maine, U.S.A. (Transportation Engineering)

Md. Shafiul Bari : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Glasgow, U.K. (Structural Engineering)

Md. Habibur Rahman : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Strathclyde, U.K. (Environmental Engineering)

Md. Delwar Hossain: B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Strathclyde, U.K. (Environmental Engineering)

Abu Siddique: B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Surrey, U.K. (Geotechnical Engineering)

Salek Muhammad Seraj: B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of London, U.K. DIC, Imperial College of Science, Technology & Medicine, U.K. (Structural Engineering)

Md. Abdul Jalil : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; D. Engg. University of Tokyo, Japan, (Environmental Engineering)

Ishtiaque Ahmed: B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Sheffield, U.K. (Structural Engineering)

Md. Zakaria Ahmed: B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; M. S., University of Cincinnati, U.S.A.; Ph.D., University of Arizona, U.S.A. (Structural Engineering)

Md. Shamsul Hoque: B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Southhamton, U.K. (Transportation Engineering)

Assistant Professors

A. B. M. Badruzzaman: B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D., University of Virginia, U.S.A. (Environmental Engineering)

Md. Kabirul Islam : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. Johns Hopkins U., U.S.A. (Geotechnical Engineering)

Md. Nasser Bin Hossain : B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; (Structural Engineering)

Rowshan Mamtaz : B. Sc. Engg.(Civil), BUET; M.Sc. Engg., BUET; (Environmental Engineering)

Tahmeed M. Al-Hussaini: B. Sc. Engg.(Civil), BUET; M.Sc. Engg. AIT, Thailand; Ph.D. State U. of New York at Buffalo, U.S.A. (Geotechnical Engineering)

M. Ashraf Ali: B. Sc. Engg.(Civil), BUET; M.Sc. Engg., Carnegie Mellon Univrsity, U.S.A., Ph.D., Carnegie Mellon University, U.S.A. (Environmental Engineering)

Mehedi Ahmed Ansary: B. Sc. Engg.(Civil), BUET; M.Sc. Engg. BUET; Ph.D. University of Tokyo, Japan, (Geotechnical Engineering)

Md. Shameed Ahmed Dewan: B. Sc. Engg.(Civil), BUET; M.Sc. Engg., BUET (Geotechnical Engineering)

Abdul Jabber Khan: B. Sc. Engg.(Civil), BUET; M.Sc. Engg., BUET (Geotechnical Engineering)

Lecturers

Md. Shafiqul Bari: B. Sc. Engg.(Civil), BUET; (Structural Engineering)

A. N. M. Ahsanuzzaman: B. Sc. Engg.(Civil), BUET; (Environmental Engineering)

Saniya Sharmeen: B. Sc. Engg.(Civil), BUET; (Transportation Engineering)

Akhter Bin Hossain: B. Sc. Engg.(Civil), BUET; (Transportation Engineering)

2.3 Divisional In-Charges

The following faculty members act as the in-charge of the four divisions of the Civil Engineering Department:

Structural Engineering Division: Professor Sohrabuddin Ahmad
Geotechnical Engineering Division: Professor A. M. M. Shafiullah
Environmental Engineering Division: Professor M. Feroze Ahmed
Transportation Engineering Division: Professor Alamgir Mojibul Hoque

2.4 Divisional Course Advisors

The following faculty members act as postgraduate course advisors of the of the four divisions of the Civil Engineering Department:

Structural Engineering Division: Dr. Salek M. Seraj
Geotechnical Engineering Division: Dr. Md. Hossain Ali
Environmental Engineering Division: Dr. Feroze Ahmed
Transportation Engineering Division: Dr. Alamgir M. Hoque

2.6 In-Charges for Various Facilities

Following members of the staff are responsible for the various laboratories of the Civil Engineering Department.

<u>Structures and Materials Laboratory:</u>

In-Charge : Professor Alamgir Habib
Assistant In-Charge : Dr. Ishtiaque Ahmed

Concrete Laboratory:
In-Charge : Professor Shamim Z. Bosunia
Assistant In-Charge : Dr. Salek M. Seraj

Environmental Engineering Laboratory:
In-Charge : Dr. Farooque Ahmed
Assistant In-Charge : Dr. Md. Habibur Rahman

Environmental Research Laboratory:
In-Charge : Dr. Md. Mujibur Rahman
Assistant In-Charge : Dr. M. Ashraf Ali

Geotechnical Engineering Laboratory:
In-Charge : Professor Md. Hossain Ali
Assistant In-Charge : Dr. Saiful Alam Siddiuqe

Transportation Engineering Laboratory:
In-Charge : Dr. Muhammad Zakaria
Assistant In-Charge : Mr. Akhter Bin Hossain

Traffic Engineering and GIS Laboratory:
In-Charge : Dr. Md. Mazharul Hoque
Assistant In-Charge : Dr. Md. Shamsul Hoque

Survey Store:
In-Charge : Dr. Hasib Md. Ahsan
Assistant In-Charge :

Civil Engineering Computer Laboratory:
In-Charge : Dr. A. B. M Badruzzaman
Assistant In-Charge :

Civil Engineering Library:
In-Charge : Dr. Jamilur Reza Chowdhury
Assistant In-Charge :

2.7 LABORATORY FACILITIES

The Department of Civil Engineering is equipped with a number of laboratories for pursue of routine academic programmes and postgraduate research. Presently there are five laboratories under the Department of Civil Engineering. Civil Engineering students also use laboratory facilities of the Department of Water Resources Engineering, Physics, and Chemistry. Facilities

of the various workshops under the university are also available to the students. A description of the various laboratories in the Department of Civil Engineering follows.

Structures and Materials Laboratory: The structures laboratory is housed in the ground floor of the Civil Engineering Building and has a floor area of 6,000 sft. It has facilities for routine strength tests of various civil engineering materials such as steel, rubber, plastic, etc. Models of structural frames and various structural components can also be tested to simulate prototype behaviour. A number of universal testing machines are available in the laboratory which include a 400,000 lb machine. Strain measuring devices and data acquisition facilities are also available.

Concrete Laboratory: This is situated in the ground floor of the Civil Engineering Building and has a floor area 6,000 sft. It has sufficient space and facilities to cast experimental beams, slabs and miscellaneous concrete structural elements. Besides it is well equipped for carrying out routine tests of concrete and concrete making materials. This laboratory provides facilities for prestressing and non-destructive testing of concrete. Facilities are also available for cutting concrete core and testing in the laboratory.

Environmental Engineering Laboratory: This laboratory spread over a floor area of 1,600 sft. is located in the 3rd floor of the Civil Engineering Building. It is well equipped for making routine physical, chemical and bacteriological analyses of water and waste water. Facilities are available for making bench scale treatment plant studies.

Environmental Research Laboratory: This laboratory has a floor area of 1600 sft and is located on the 3rd floor of the Civil Engineering Building. This laboratory is primarily used for post-graduate research. This laboratory is equipped with modern equipment for analyses of water and wastewater. Instruments in this laboratory include among others, a Atomic Absorption Spectrophotometer, a TOC analyzer, and a modern Spectrophotometer.

Transportation Engineering Laboratory: This laboratory situated in the ground floor of the Old Academic Building and has a floor area of about 2,000 sft. It has equipment for carrying out all sorts of routine tests of various highway materials such as soil, aggregate and bitumen.

Traffic Engineering and GIS Laboratory: Traffic Engineering and GIS (Geographic Information System) is housed in the second floor of the Civil Engineering Building and has a floor area of 1,700 sft. It facilitates analyses and interpretation of field traffic studies and observational works of traffic behavior which form an essential part of lecture/sessional courses as well as research in the fields of traffic and transportation engineering both at undergraduate and postgraduate levels. It also facilitates detail geometric design of road links, bridge approaches, intersections, signals, modeling for the study of traffic and pedestrian behavior, synthesis of alternative traffic schemes. This laboratory is being equipped further with modern tools such as GIS, remote sensing technology, video image processing and devices for measuring and monitoring the road environment.

Geotechnical Engineering Laboratory: The Geotechnical Engineering Laboratory housed in the 2nd floor of the Civil Engineering Building has a floor area of 4,250 sft. It provides routine soil testing facilities such as those for soil classification, particle characteristics and geotechnical characterization. Facilities are available for soil sample preparation and development of equipment for specialized tests. A number of triaxial testing equipment are available for routine

as well as specialized soil testing. Testing facilities for small scale models of foundation elements are also available.

Hydraulics and River Engineering Laboratory: This laboratory occupies the entire west block of the ground floor of the Civil Engineering Building and has a floor area of 10,500 sft. Besides standard laboratory equipment for undergraduate instructional course it has two large flumes, a flow visualization tank for scour studies around bridge piers, a centrifugal pump testing rig and an echo sounder.

2.8 Laboratory Protocol and General Safety Guidelines

Safety is a collective responsibility that requires the full cooperation of everyone in the laboratory. However, the ultimate responsibility for safety rests with the person actually carrying out some type of procedure. Accidents often result from an indifferent attitude, failure to use common sense, or failure to follow instructions. Each student should be aware of what the other students are doing because all can be victims of one individual's mistake. Do not hesitate to point out to other students that they are engaging in unsafe practices or operations. If necessary, report it to the instructor. In the final assessment, students have the greatest responsibility to ensure their own personal safety.

The following are general guidelines for all laboratory students:

(a) Follow all safety instructions carefully.

(b) Become thoroughly acquainted with the location and use of safety facilities in the laboratory being used such as fire extinguishers, first aid box, etc.

(c) Become familiar with the hazards associated with the machine/ instrument/ chemicals being used, and know the safety precautions and emergency procedures before undertaking any work.

(d) Do not work alone in a laboratory. Make sure that the laboratory assistant(s) is present while you are working.

(e) If you plan to work after regular office hours in a laboratory, get written permission from your supervisor and laboratory in-charge.

2.9 COMPUTING FACILITIES

BUET Computer Centre:

The members and students of the department have access to all the facilities of the BUET Computer Centre located on the fourth floor of the Civil Engineering Building. The BUET Computer Centre has two mainframe computers IBM 370/115-H02 and IBM 4331-K02 and sufficient supporting on-line and off-line peripheral units. Application packages available on the mainframe computers include SPSS, SYMAP, SHAZAM, ANSYS etc. Besides the two mainframes the Centre has a number of microcomputers with on-line plotting and digitizing facilities.

The students should contact the Director of the Computer Centre for allotting user ID. BUET computer centre is open six days a week and follows the time-table shown below:

Sunday to Thursday: 8:00 A. M. to 9:00 P. M.
Saturday : 8:00 A. M. to 5:00 P. M.

Civil Engineering Computer Laboratory:

The Civil Engineering Computer Laboratory was initiated in 1986 with only one IBM 8088 computer. Now it has flourished into a well established computer laboratory equipped with three Pentium and ten 80486 personal computers along with a number of dot matrix and desk jet printers and a laser printer. A computer network has been installed to facilitate computer usage and to achieve maximum benefit. Three Macintosh computers (including a Power PC) has also been installed, with network facilities, in another section of the laboratory to accommodate Macintosh users.

The faculty members, Doctoral and Masters students are allowed to work in the laboratory during the regular working hours. The regular working hours of the computer laboratory is between 9 a.m. to 7 p.m. weekdays with weekends remaining closed. However, the users are allowed to work beyond the regular working hours with written permission from the Head of the Department and/or Laboratory in-charge. A Duty-teacher remains present during the regular working hours to assist the users. To prevent the network system from being infected with virus, the users are required to use unformatted diskettes in this laboratory. In addition, each user is provided with a diskette locker to store his/her diskettes in the laboratory.

2.10 LIBRARY FACILITIES

Civil Engineering Library

The Department of Civil Engineering has its own library which is located on the third floor of the Civil Engineering Building. The Civil Engineering Library has a collection of specialized text, reference books, valuable documents and reports on various fields of Civil Engineering. It has a good collection of research reports, conference proceedings, design manuals and theses. The Civil Engineering Library also maintains volumes of back issues of the ASCE, ACI and other journals. The CE Library is open for reference for all postgraduate students of the department on all workdays with a recess from 1:30 pm to 3:00 pm.

Water Resources Engineering Library

The Department of Water Resources Engineering also has a specialized library. It has a collection of valuable documents and reports related to water resource related problems in Bangladesh in addition to regular journals and texts.

Central Library

The four-storied Central Library building stands close to the Civil Engineering Building. It is a compact library with built-in-facilities for acquisition and processing of books, journals and published materials; issue and receipt of books; reprographic services; reading room and rental library. The library also provides E-mail facilities for faculty members and university staff.

It is now possible to become aware of the recent publications in any field from "Current Awareness" which publishes the contents of all journals available in the library on a monthly

basis. "Current Awareness" is published by the BUET Central Library and is made available in the departmental libraries. Availability of back issues of the journals can now be checked in the "----------" published by the Central Library which is also available in all departmental libraries.

The reprography section of the library provides opportunity for photocopy at a nominal cost.

The Central Library operates according to the following time-table:

Journal Section/Lending Section/Photocopy Section/ General Office:

Sunday to Thursday: 9:00 A. M. to 1:00 P. M.
2:00 P. M. to 5:00 P. M.
Friday and Saturday : Closed

Reference Library:

Sunday to Thursday:
Friday and Saturday : Closed

2.11 DEPARTMENTAL RECORDS

It is of extreme importance that any student who changes either his/her home address, even temporarily, should inform the Departmental office, and his/her supervisor forthwith, as important communication related to student's progress may otherwise go astray.

Chapter 3
Postgraduate Study and Research

3.1 DEGREES OFFERED

The post graduate degrees offered by the Civil Engineering Department are as follows:

Master of Science in Civil Engineering abbreviated as M.Sc.Engg. (Civil);
Master of Engineering in Civil Engineering abbreviated as M.Engg. (Civil); and
Doctor of Philosophy (Ph.D.)

3.2 FIELDS OF RESEARCH

The faculty members are engaged in research in the various fields of civil engineering as listed below :

Professor Sohrabuddin Ahmad : Finite element analysis of shells, Computer analysis of water tanks : Behaviour of stair slabs, Spiral stair and free standing stair : Properties of brick aggregate concrete.

Professor Jamilur Reza Choudhury : High-rise buildings, Earthquake resistant design, Low cost housing, Computer aided design of structures.

Professor Alamgir Habib : Numerical and experimental investigation of shell behaviour under service and ultimate load conditions, Experimental study of brick vaults, Behaviour concrete deep beams.

Professor Shamim Z. Bosunia : Durability of concrete, Properties of brick aggregate concrete and its durability, Recycling of materials in concrete making, Environmental effects in concrete as material.

Professor Md. Alee Murtuza : Analytical and Experimental investigation of Skew Slab, Spine Beam and Box Girder Bridges, Analysis of Grid Structures, Cable Stayed Bridge, Computer aided design of structures.

Professor Alamgir Mojibul Hoque : Bituminous concrete with brick aggregates, Absorption properties of aggregates for road construction, Physiochemical Properties of soil, Study of road accidents.

Professor M. Feroze Ahmed : Water supply, Waste water management, Environmental pollution control and Environmental impact assessment.

Professor A. M. M. Safiullah : Seismicity, Flexible and rigid earth retaining structures, Deep foundations, Small computer application in geotechnical engineering problems.

Professor M. Azadur Rahman : Soil structure interaction; Brick and brick masonry; Computer aided analysis, design and instruction.

Professor Md. Hossain Ali : Stress deformation behaviour of clay : Dynamic behaviour of soils : Computer application in geo-technical engineering.

Professor Md. Humayun Kabir : Ground improvement techniques, Computer aided design in Geotechnical Engineering, Geotextiles, Geogrids and other Geoinclusions, Settlement analysis and reinforced earth.

Professor Md. Abdur Rouf : Structural analysis and design, Brick work structures, Behaviour of arch bridges. Reinforced and prestressed concrete.

Professor Muhammad Zakaria : Highway Engineering, Concrete Technology, Highway and Civil Engineering Materials.

Professor Md. Mazharul Hoque : Road safety; Accident investigation; Road traffic system; Traffic management; Public transportation planning & evaluation; Transport Economics, Non-motorised transport.

Professor S. K. Sekender Ali : Numerical modeling of composite behaviour of brick masonry; Nonlinear fracture analysis of reinforced concrete structures.

Mr. A. F. M. A. Rauf : Highways, Pavement and Materials.

Mr. Syed Noor-Ud-Deen Ahmed : Road geometry : Traffic flow operation and control.

Dr. A.M. M. T. Anwar : Dynamics and stability of thin walled restrained beams: Development of design criteria for stepped columns, Feasibility study of prefabricated bridge panels from locally available materials.

Dr. Ahsanul Kabir : Nonlinear analysis of reinforced concrete, constitute modeling for concrete, Transfer of shear through dowel bars and shear keys, Finite element analysis of reinforced concrete masts and raft foundation on elastic material.

Dr. Md. Zoynul Abedin : Bearing capacity of shallow foundation stress distribution beneath a shallow foundation stereo photogrametric method of deformation measurement of method of deformation measurement of soil mass.

Dr. Farooque Ahmed : Low cost water treatment, Low cost sanitation, Rural supply, management and planning.

Dr. Md. Mujibur Rahman : Waste water collection, treatment and disposal; Pollutant transport; Water pollution control, Urban storm water quality and storm drainage management; and Solid waste management.

Dr. A. Muqtadir : Computational methods, Interaction analysis, Dynamics, Constitutive modeling, Structural analysis.

Dr. Syed Fakhrul Ameen : Geotechnical Engineering, deep foundation design, design of machine foundation.

Dr. Md. Habibur Rahman : Water supply, Sanitation, Solid Waste Management, Environmental Pollution Control, Renewable Energy and Environmental Impact Assessment & Management.

Dr. Md. Safiul Bari : Nonlinear analysis of reinforced concrete structures, shearwall-floor slab connection; High-Rise buildings.

Dr. Md. Delwar Hossain : Environmental Pollution Control, Ground Water Quality.

Dr. Abu Siddique : Stress-deformation behaviour of clays, Effects and implications of sampling days, Numerical and analytical investigation of tube sampling disturbance, Geotechnical behaviour of stabilized soils.

Dr. Salek M. Seraj : New concepts of structural concrete design, Innovative structural concrete design, Numerical modeling of structural concrete, Size effect of structural concrete, Brick unit and masonry walls, Soil-structure interaction, Renovation of sewer using lining technology, Retrofitting of damaged structural members.

Dr. Md. Abdul Jalil : Environmental hydraulics, Computational fluid dynamics, Environmental sanitation, Water and sewage treatment, Environmental aspect of river improvements.

Dr. Ishtiaque Ahmed : Advances in steel structures, Semi-rigid design concept in steel frames; Durability of concrete; Retrofitting of concrete members.

Dr. Md. Shamsul Hoque : Non-lane based mixed traffic operation, Traffic signals, Behaviour of Pedestrian, Environmental Impact of Transportation Application of Simulation, Ai, Neural Network in mixed traffic operation.

Dr. A. B. M. Badruzzaman : Water quality modeling and Solid waste management.

Dr. M. S. A. Siddique : Non-linear analysis in Geomechanics Experimental design analysis, FEM application in geomechanics.

Dr. Hasib M. Ahsan : Integrated Transport Planning, Transport Infrastructure Development and Project Evaluation, Transport Survey Method, Land use and Transport Modeling, Public Transport Systems, Road Geometry and Traffic Management Techniques, Non-Motorised Transport, Application of Geotechnical Information System.

Dr. Md. Zakaria Ahmed : Non linear analysis, Stability of structures, Advances in steel structures, Risk analysis, Rehabilitation of concrete structures.

Dr. T. M. Al. Hussaini : Boundary Element Analysis in dynamics, Vibration Isolation, Seismic response of base-isolated structures, Geotechnical aspects of earthquake engineering, soil structure interaction.

Dr. Md. Ashraf Ali : Aquatic Chemistry , Surface Chemistry, Fate and transport of chemicals in surface and subsurface waters, ground water contamination, hazardous waste site remediation, water & industrial waste treatment.

Dr. Mehedi Ahmed Ansary : Soil Dynamics: Liquefaction Simulation, Ground Vibration Characteristics, Site Amplification, Nonlinear Site Response; Earthquake Engineering: Attenuation Law, Historical Data Handling, Development of Hazard Map, Microtremor Measurement, Wave Type Identification; Lifeline Engineering; Stochastic Processes; Behavior of Traditional Structures Under Earthquake Loading; Application of GIS & Neural Network in Geotechnical & Earthquake Engineering..

3.3 FINANCIAL ASSISTANCE FOR POSTGRADUSTE STUDENTS

The University provides financial assistance in the form of Teaching Assistantship (TA) and fellowship to limited number of postgraduate students each year. Limited number of full-time Master's students of the Department are awarded Teaching Assistantship while fellowships are awarded to doctoral students. Teaching Assistants should be full time students and cannot undertake any other job during the tenure of his teaching assistantship. Teaching Assistants are to work under the guidance of a teacher of the Department. Enquiries regarding TA/fellowship may be made at the office of the Director, Advisory, Extension and Research Services (DAERS) of BUET. The faculty member of Civil Engineering Department who is charge of TAl fellowship awards is Dr. Tahmeed M. AI-Hussaini.

3.4 REGISTRATION FOR THESIS, APPOINTMENT OF SUPERVISOR, PREPARATION AND FORMAT OF THESIS PROPOSAL, THESIS

A student is required to register for the required number of credit hours for thesis work on completion of the requisite course works. A student may register for thesis simultaneously with other courses only in his final semester of course work, provided that total number of 'credit hours do not exceed 15. However, the student should consult the respective Divisional Course Adviser prior to registration of thesis work. A student shall apply to the BPGS, stating his choice of supervisor or choice of field of study, for appointment of a supervisor. All students of Ph.D. and M.Sc. Engg. degrees having registered for thesis work and after having a thesis supervisor appointed, shall submit a research proposal to the CASR for approval through the BPGS. Students of M.Engg. degree are needed to submit a project proposal for approval by the Vice Chancellor through the BPGS. The research proposal must be submitted in the specified format (available at the DAERS office).

All theses should be printed, using a word processor, on A4 size (210 mm x 297 mm) 80 gram white offset paper. The left margin should be kept at 3.81 cm (1.5 inch) and all other margins (top, bottom, and right) should be fixed at 2.54 cm (1 inch). The text should be preferably typed using Times New Roman font with 12 point font size and with one and a half spacing between

lines. In writing thesis, British spelling should be followed. In all cases, SI unit should preferably be used. In case FPS system is used, it has to be supplemented by appropriate conversions in the text as well as in the figures. The thesis should be hard bound with black cover. Reference published in literature should be referred to in the text by the last name of the author(s) and the year of publication of the reference (e.g., Choi and Kim, 1989) and the list of references should be compiled in alphabetic order of the last name of the author(s) at the end of the thesis. References should be listed in the following style:

Journal: Choi, C. K. and Kim, S. H. (1989), "Coupled use of reduced integration and nonconforming modes in improving quadratic plate element", Int. J. Num. Meth. Eng., Vol. 28(4),1909-1928.

Book: Salvadori, M. G. and Baron, M. L. (1961),
Numerical Methods in Engineering, Prentice Hall, Englewood Cliffs, NJ.

Proceedings: Choi, C. K. and Kim, S. H. (1989), "Coupled use of reduced integration and nonconforming modes in improving quadratic plate element", Int. J. Num. Meth. Eng., Vol. 28(4), 1909-1928.

3.5 STUDENT ACCOMMODATIONS/RESIDENTIAL FACILITIES

The University has eight halls of residence including one for the female students. One residential hall (Shahid Smrity Hall) is designated solely for postgraduate students. This facility is available for full time postgraduate students only. These halls provide residential accommodation for the majority of students of the University. All eight residential halls are on campus and are within walking distance of the main academic buildings. All residential halls have furnished rooms, dining facilities and recreational arrangements. The University has commuter bus service for students having residence within the city area.

3.6 STUDENT WELFARE/MEDICAL FACILITIES

The University has a well equipped Medical Centre staffed by six qualified doctors Including one female physician. The students get free treatment and medicines from the Medical Centre.

3.7 SPORTS/RECREATIONAL FACILITIES

Regular sport activities are part of student life at BUET. Inter-hall football, basketball, and cricket competitions are organised regularly, There are play grounds, tennis courts, basketball courts, a squash court, and a well equipped gymnasium. All the halls of residence have adequate facilities for indoor games.

The students participate in various cultural programs throughout the year. Special cultural weeks are arranged in each of the halls of residence. The University has an air conditioned auditorium complex with 1200 .seating capacity. Various educational and recreational films are shown in this auditorium with 35 and 16 nun film projector.

Chapter 4
Ordinance for Master's Degree Programme

The following are the rules and regulations for administering the Master's degree programme. The following articles have been mostly reproduced from Ordinance, Statutes, Rules and Regulation (February 1991), published by Bangladesh University of Engineering and Technology.

Degree Offered

1. The post graduate degrees to be offered under this ordinance are as follows:

1.1 Master of Science in Engineering in
Chemical Engineering abbreviated as M.Sc.Engg. (Otem) Civil Engineering abbreviated as M.Sc.Engg. (Civil) Electrical & Electronic Engineering abbreviated as M.Sc.Engg. (BE)
Industrial and Production Engineering abbreviated as M.Sc.Engg. (ll')
Mechanical Engineering abbreviated as MSc.Engg.(Mech) Metallurgical Engineering abbreviated as
M.Sc.Engg. (Met)
Water Resources Engineering abbreviated as
M.Sc.Engg. (WR)
Computer Science and Engineering abbreviated as M.Sc.Engg. (CS)
Naval Architecture and Marine Engineering abbreviated as M.Sc.Engg. (NAM)
Petroleum and Mineral Resources Engineering abbreviated as M.Sc.Engg. (PMR)

1.2 Master of Engineering in
Chemical Engineering abbreviated as M.Engg.- (Chern) Civil Engineering abbreviated as M.Engg. (Civil) Electrical & Electronic Engineering abbreviated as M.Engg. (EE)
Industrial and Production Engineering abbreviated as M.Engg. (IP)
Mechanical Engineering abbreviated as M.Engg.(Mech) Metallurgical Engineering abbreviated as M.Engg. (Met) Water Resources Engineering abbreviated as
M.Engg. (WR)
Computer Science and Engineering abbreviated as M.Engg. (CS)
Naval Architecture and Marine Engineering abbreviated as M.Engg. (NAM)
Petroleum and Mineral Resources Engineering abbreviated as M.Engg. (PMR)

1.3 Master of Architecture abbreviated as M.Arch.

1.4 Master of Urban & Regional Planning abbreviated as M.URP

Admission

2.1 For admission to the courses leading to the award of the degree of M.Sc.Engg./M.Engg. in any branch, a candidate must have obtained with good academic record a B.Sc.Engg. degree in the relevant branch or an equivalent degree from any recognised institution.

2.2 For admission to the course leading to the award of the degree of M.Arch, a candidate must have obtained with good academic record a B.Arch or its equivalent degree from any recognised institution with good academic record.

2.3 For admission to the course leading to the degree of M.URP a candidate must have either Bachelor's degree with good academic record in Planning/ Architecture/Engineering / Agricultural Economics or its equivalent.

OR

Master's degree with good academic record in Sociology /Social Welfare/Social Work/Geography / Economics or its equivalent from any recognised institution.

2.4 Applications for admission to the above courses shall be invited through regular means of advertisement and shall be received by the Registrar.

2.5 On the recommendation of the appropriate Board of Post Graduate Studies (BPGS), the rules for admission into the University for post graduate studies shall be framed from time to time by the Academic Council.

2.6 Before being finally selected for admission a candidate may be required to appear at an interview by a Selection Committee as constituted by the BPGS. He will be required to take pre-requisite courses as may be prescribed by the Committee.

2.7 Every selected candidate, unless he has already been registered, shall get himself registered with the University.

2.8 After admission each candidate (student) shall be assigned, by the appropriate BPGS, an adviser from among the teachers of the relevant department not below the rank of an Assistant professor. In advance of each enrolment and course registration for any semester, the advisor/Supervisor (as appointed by Art. 7.1 & 8.1 of this Ordinance) shall check and approve his student's schedule for subjects, prerequisites as recommended by the Selection Committee and total hours. The student is expected to consult his advisor on all academic problems but, it is the responsibility of the individual student to see that his schedule conforms to the academic regulations.

2.9 Every registered candidate shall get himself enrolled on payment of prescribed fees and other dues as per Appendix 1 before the commencement of each semester. Course registration must be completed within two weeks from the start of the semester otherwise the student shall not be allowed to continue the course in the semester.

Academic Regulations

3.1 The minimum duration of the M.Sc.Engg./M.Engg. and M.Arch course shall normally be three semesters and that for M.URP shall be four semesters. A candidate for the Master's degree must complete all requirements for the degree within five calendar years form the date of his first admission.

3.2 Academic progress shall be measured in terms of credit hours earned by a student. One credit hour subject shall normally require one hour of class attendance per week for one semester; while one credit hour for thesis/project /laboratory should normally require three hours of work per week for one semester. The number of credit hours for each subject shall be specified in the syllabus of the respective department.

3.3.1 For the degree of M.Sc.Engg. a student must earn a minimum of 36 credit hours including a thesis for which 18 credit hours shall be assigned.

3.3.2 For the degree of M.Engg. a student must earn a minimum of 36 credit hours including a project for which 6 credit hours shall be assigned.

3.3.3 For the degree of M.Arch. a student must earn a minimum of 36 credit hours including a thesis for which 18 credit hours shall be assigned.

3.3.4 For the degree of M.URP a student must earn a minimum of 48 credit hours including a thesis for which 18 credit hours shall be assigned.

3.4 There shall be two categories of students, namely, full time students and part time students.

3.4.1 Students, serving in different organisations may be admitted as part-time students with a written consent of the employer. A part-time student may be assigned a maximum of 9 credit hours of course work in any semester.

3.4.2 Full time students must register for a minimum of 12 credit hours and a maximum of 15 credit hours per semester. A full time student shall not be allowed to be in the employment of any organization (even as part time employee). However, they may be employed as teaching/research assistant at the University.

3.5 The subjects of study in the different department shall be as recommended by the respective BPGS and approved by the Committee of Advanced Studies and Research (CASR) and the Academic Council. The BPGS may review the curriculum from time to time and recommend any changes as may be considered necessary.

3.6 The subjects that shall be offered in any semester shall be as determined by the relevant department.

Grading system

4. Final grades for courses shall be recorded as follows:

Grade	Merit description	Grade points
A+	Excellent	4.0
A	Very good	3.5
B+	Good	3.0
B	Average	2.5
C	Pass	2.0
*F	Failure	
**I	Incomplete	

*Subjects in which the students gets F grades shall not be counted towards credit hour requirements and for the calculation of Grade Point Average (GP A).

** Given only when a student is unable to complete the course because of circumstances beyond his control. It must be made up by the close of next two semesters or the incomplete grade becomes a failure. He may, however, be allowed to register without further payment of tuition fees for that course.

S- or U
Satisfactory or Unsatisfactory. Used only as final grades for thesis/projects "in Progress" shall be so recorded. If, however, thesis is discontinued, "Incomplete" grade shall be recorded.

W- Officially Withdrawn from a Course. A student must withdraw officially from a course within two working weeks of the commencement of the semester or else his grade in that course shall be recorded as failure unless he is eligible to get a grade of 1 (incomplete). A student may be permitted to withdraw and change his course within the specified period with the approval of his adviser, Head of the Department and the respective teacher(s) concerned.

Numerical marking may be made in answer scripts, tests, etc. but all final gradings to be reported to the Controller of Examinations shall be in the letter grade system as detailed below:

90% and above	A+
80% to below 90%	A
70% to below 80%	B+
60% to below 70%	B
50% to below 60%	C
below 50%	F

Conduct of Examination

5.1 In addition to tests, assignments and/or examinations during the semester as may be given by the teacher(s) concerned, there shall be a written examination and/ or other tests for each of the subjects offered in a semester at the end of that semester, the dates of which shall be announced by the Dean of the respective Faculties at least two weeks before the commencement of the examination. The final grade in a subject shall be based on the performance in all tests, assignments and/or examinations.

5.2 The Controller of Examinations shall keep up-to-date record of all the grades obtained by a student in individual Academic Record Card. Grades shall be announced by the Controller

of Examinations at the end of each semester. In addition each student is entitled to one official transcript of the University record without any fee at the completion of his academic programme from the office of the Controller of Examinations on production of statement of clearance from all departments/ offices.

5.3 The BPGS of the department shall recommend the names of the paper setters and examiners for the semester examinations at least two weeks before the date of commencement of the examination to the Vice Chancellor for approval.

Qualifying Requirements

6.1 The qualifying requirement for graduation is that a student must earn a minimum grade point of 2.65 based on the weighted average in his course works.

6.2 The C grades up to a maximum of two subjects may be ignored for calculation of grade point average (GP A) at the written request of the student, provided the student has completed the total course credit hour requirement with a minimum weighted GP A of 2.55 in the remaining subjects. No subject shall be repeated unless it is a compulsory requirement for the degree as determined by the BPGS. Performance in all the subjects shall be reflected in the transcript.

6.3 If the cumulative number of F grade obtained by the student is three or more he/she shall not be allowed to continue in the programme.

6.4 If at the end of the second or any subsequent semester, the cumulative GP A of the student falls below 2.5 (including C grades) he shall not be allowed to continue in the programme.

6.5 In addition to successful completion of course work every student shall submit a thesis on his research work or report on his project work, fulfilling the requirements as detailed below.

Thesis

7.1 Research work for a thesis shall be carried out under the supervision of a full-time member of the staff belonging to the relevant department. A Cosupervisor from within or outside the department may be appointed, if necessary. The title of thesis and the supervisor and Cosupervisor (if any) shall be approved by the CASR before the end of the second semester of studies of the student concerned on the recommendation of the Head of the Department.

7.2 The Research work must be carried out in the University or at a place(s) approved by the supervisor in consultation with the BPGS.

7.3 Every student shall submit to the Head of the Department, through his supervisor required number of type written copies of his thesis in the approved format on or before a date to be fixed by the Head of the Department in consultation with the supervisor concerned.

7.4 The student shall carry that the research work was done by him and that work has not been submitted elsewhere for any other purpose (except for publication).

7.5 The thesis should demonstrate an evidence of satisfactory knowledge in the field of research undertaken by the student.

7.6 The Head of the Department, in consultation with the supervisor shall suggest to the Vice Chancellor through CA$R a panel of examiners for examining the thesis and conducting an oral examination. The examination Committee shall be constituted as follows:

i. Supervisor	Chairman
ii. Cosupervisor (if any)	Member
iii. Head of the Department	Member
iv. One external member outside the student's relevant department	Member
v. One or two members from	Member

within the department.

7.7 If any examiner is unable to accept the appointment or has to relinquish his appointment before/during the examinations, the Vice-Chancellor shall appoint another examiner in his place, without further reference to the BPGS or the CASR.

7.8 Every student submitting a thesis in partial fulfilment of the requirements of a degree, shall be required to appear at an oral examination, on a date or dates fixed by the Head of the department and must satisfy the examiners that he is capable of intelligently applying the results of this research to the solution of problems, of undertaking independent work, and also afford evidence of satisfactory knowledge related to the theory and technique used in his research work.

Project

8.1 Project work shall be carried out under the supervision of a full-time member of the staff belonging to the relevant department. The title of the project and the supervisor shall be recommended by the BPGS for approval of the Vice-Chancellor. This approval will be reported to the CASR.

8.2 The project work must be carried out in this University or at a place approved by the supervisor in consultation with the Head of the department.

8.3 Every student shall submit to the Head of the department, through his supervisor required number of type written copies of his report in the approved format on or before a date to be fixed by the Head of the Department in consultation with the supervisor concerned.

8.4 The student shall certify that the project work was done by him and that this work has not been submitted elsewhere for any other purpose (except for publication).

8.5 The BPGS shall approve the names of examiners for the project work. The Examination Committee shall be constituted as follows:

i. Supervisor	Chairman
ii. One or two members from within or outside the department	Member

8.6 Every student submitting a project report in partial fulfilment of the requirement of a degree shall be required to appear at an oral examination, on a date or dates fixed by the Head of the department and must satisfy the examiners that he has gained satisfactory knowledge related to the project work.

Striking off and removal of names from the rolls

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

9.1 Non-payment of dues within prescribed period, post graduate students residing in the halls of residence shall be subject to the same condition as followed in the Ordinance regarding Board of residence and Discipline.

9.2 Failing to proceed with the programme by the exercise of Articles 3.1 and/or 6.3 or 6.4 of this Ordinance.

9.3 Failing to make satisfactory progress as reported by the adviser / supervisor through the BPGS and approved by CASR.

9.4 Forced to discontinue his studies under disciplinary rules.

9.5 Withdrawn officially from all the course including thesis/project.

Academic Fees

10. Academic fees shall be as per Appendix - I

Refund of Fees

11. A student withdrawing officially from all courses including project/ thesis is entitled to get a refund of 50% of the course registration fees provided he withdraws in writing through the respective Head of the department before the expiry of two working weeks form the commencement of the classes; and in that case his grade in the courses registered shall be recorded as "W". If withdrawal is made after the expiry of two weeks from the commencement of classes no refund shall be allowed and the grade should be recorded as failure unless he is eligible to get a grade of "Incomplete" as per Art. 4. Thesis/project registration fees in any case are not refundable.

APPENDIX I

Academic Fees

University Registration fee	Tk. 20.00
Admission/Enrolment fee	Tk. 50.00
Course Registration fee	Tk. 20.00 per credit hour with a maximum of Taka 200.00 per Semester, Payable in 2 instalments
Thesis/Project Registration fees	Tk. 100.00 (one lst thesis / Project registration)
Fees for each additional copy of Transcript	Tk. 25.00
Medical fees	Tk. 15.00 per semester
Seat Rent	Tk. 30.00
Caution Money at first enrolment	Tk. 200.00*
Library Caution Money	Tk. 500.00*
Union Fee	Tk. 12.00
Athletic Fee	Tk. 10.00

* Caution Money may be refunded if the student withdraws officially from all the courses including thesis/project or at the end of his academic programme and the amount will be determined from the statement of clearance from all Departments / Offices.

Chapter 5
Ordinance for the Degree of Doctor of Philosophy

The following are the rules and regulations for administering the Doctoral degree programme. The following articles have been reproduced from Ordinance, Statutes, Rules and Regulation (February 1991), published by Bangladesh University of Engineering and Technology.

Degree Offered

1. The degree of Doctor of Philosophy shall be offered by the University in the following Departments:

Department of Chemical Engineering
Department of Civil Engineering
Department of Electrical & Electronic Engineering
Department of Industrial and Production Engineering
Department of Mechanical Engineering
Department of Metallurgical Engineering
Department of Water Resources Engineering
Department of Physics

and

such other departments as may be approved by the Syndicate of the University.

The degree of Doctor of Philosophy shall be abbreviated as Ph.D.

Admission

2.1.1 For engineering the minimum qualification for admission shall normally be an M.Sc.Engg./M.Engg. degree with good academic record in the appropriate branch of Engineering or its equivalent from any recognised institution.

2.1.2 For Physics the minimum qualification for admission shall normally be an M.Phil. degree in Physics or its equivalent .with good academic record from any recognized institution.

2.1.3 A student already working for an M.Sc.Engg., M.Phil. degree at this University and showing excellent progress and promise in thesis work may be provisionally transferred to the Ph.D. degree programme after completion of M.Sc.Engg./M.Phil course work on approval of the Committee of Advanced Studies and Research (CASR) on the recommendation of the relevant Board of Post Graduate Studies (BPGS).

2.2 Applications for provisional admission to the Ph.D. programme shall be received by the Registrar.

2.3 There shall be a Selected Committee in each department as constituted by the relevant BPGS on recommendation of the Head of the department.

2.4 Candidates shall be provisionally selected by the Committee and may be required to pass the prerequisite non-credit courses as prescribed by the Committee.

Registration

3.1 Every selected candidate, unless he has already been registered, shall get himself registered with the University.

3.2 Every registered candidate (student) shall get himself enrolled on payment of prescribed fees and other dues as per Appendix I of Masters Degree Ordinance of the University before the commencement of each semester. Course registration must be completed within two weeks form

the start of the semester otherwise the student shall not be allowed to continue the course in that semester.

Appointment of a Supervisor

4. On provisional admission, the department selection committee shall submit a name of a Supervisor who shall be a full-time member of t he staff belonging to the relevant department and a Cosupervisor form within or outside the department, if necessary. These selections have to be approved by the CASR. The supervisor shall prescribe a plan of study to be undertaken by the student and supervise the progress of the candidate's work.

Final Selection

5. A provisionally selected candidate shall be deemed to be eligible for final registration as a Ph.D. student with effect from the date of his provisional admission if and when he qualifies the comprehensive examination (Art. 11.2 of this Ordinance).

Academic Regulations

6.1 The minimum duration of the Ph.D. course shall be four semesters from the date of provisional admission. A student must complete all requirements for the Ph.D. degree within six calendar years from the date of his provisional admission.

6.2 Academic progress shall be measured in terms of credit hours earned by a student. One credit hour subjects shall normally require one hour of class attendance per week for one semester while one credit hour for thesis work should normally require three hours of research work per week for one semester. The number of credit hours for each subject shall be as specified in the syllabus of the department.

6.3 A student must complete a minimum of 54 credit hours of which a maximum of 45 credit hours shall be assigned for a thesis.

6.4 There shall be two categories of students namely, full time students and part-time students.

6.4.1 Students, serving in different organisations, may be admitted as part-time students with a written consent of the employer. A part time student may be assigned a maximum of 9 credit hours of course work in any semester.

6.4.2 Full-time students must register for a minimum of 12 credit hours and maximum of 15 credit hours per semester. A full-time student shall not be allowed to be in the employment of any organization (even as a part time employee). However, they may be employed as teaching/research assistant at the University.

6.5 The subjects of study in the different departments shall be as recommended by the respective BPGS and approved by CASR. The BPGS may review the curriculum from time to time and recommend any changes as may be considered necessary.

6.6 The subjects that may be offered in any semester shall be as decided by the relevant department.

Grading System

7. Final grades for courses shall be recorded as follows:

Grade	Merit description	Grade points
A+	Excellent	4.0
A	Very good	3.5
B+	Good	3.0
B	Average	2.5
C	Pass	2.0
*F	Failure	
**I	Incomplete	

** Given only when a student is unable to complete the course because of circumstances beyond his control. It must be made up by the close of next two semesters or the incomplete grade becomes a failure. He may, however, be allowed to register without further payment of tuition fees for that course.

S- or U
Satisfactory or Unsatisfactory. Used only as final grades for thesis and non-credit courses. Grade for thesis "In Progress" shall be so recorded. If, however, thesis is discontinued, "Incomplete" grade shall be recorded.

W- Officially withdrawn from a course. A student must withdraw officially from a course within two working weeks of the commencement of the semester or else his grade in that course shall be recorded as failure unless he is eligible to get a grade of I (incomplete). A student may be permitted to withdraw and change his course within the specified period with the approval of his supervisor, Head of the department and the respective teacher(s) concerned.

Numerical marking may be made in answer scripts, tests, etc. but all final gradings to be reported to the Controller of Examinations shall be in the letter grade system as detailed below:

90% and above	A+
80% to below 90%	A
70% to below 80%	B+
60% to below 80%	B
50% to below 60%	C
below 50%	F

Doctoral Committee

8. Doctoral Committee for every student shall be set up by the Head of the Department in consultation with the supervisor and approved by the CASR. The committee shall be formed within six month from the date of the student's provisional admission. The committee shall consist of at least four members including the Head of the Department and the supervisor. The Doctoral Committee should meet from time to time at the request of the supervisor to review the progress of the student. In special circumstances CASR may approve any addition and/ or alteration in the Doctoral Committee on the recommendation of the supervisor through the Head of the Department. The supervisor shall be the Exofficio Chairman of the Doctoral Committee.

Research Topic

9. The student shall submit a research proposal to the Doctoral Committee which shall examine the proposal and recommend it for the approval of the CASR through the liead of the department. In special circumstances the Doctoral Committee may recommend through the Head of the department to CASR for approval for any change of research topic.

Conduct of Examination for Course Work

10.1 In addition to tests, assignments and/or examinations during the semester as may be given by the teacher(s) concerned, there, shall be a written examination and/ or other tests for each of the subjects offered in a semester at the end of that semester, the dates of which shall be announced by the Dean of the respective Faculties at least two weeks before the commencement of the examination. The final grade in a subject shall be based on the performance in all tests, assignments and/ or examinations.

10.2 The Controller of Examinations shall keep upto date record of all the grades obtained by a student in individual Academic Record Card. Grades shall be announced by the Controller of Examinations at the end of each semester. In addition each student is entitled to one official transcript of the University record without any fee at the completion of his academic programme from, the office of the Controller of Examinations on production of statement of clearance from all departments / offices.

10.3 The BPGS of department shall recommend the names of the paper setters and examiners for the semester examination at least two weeks before the date of commencement of the examination to the Vice Chancellor for approval.

Qualifying Requirements

11. The following are the qualifying requirements for the degree of Ph.D.

Course Work

11.1 To qualify for the degree a student must earn a minimum grade point of 2.65 based on the weighted average in his course work.

Comprehensive

11.2 The date and time of the comprehensive examination shall be fixed by the Doctoral Committee on the request of the supervisor. Comprehensive Examination shall ordinarily be held after the completion of the course work by the student.

The comprehensive examination shall comprise a written examination and/ or an oral examination to test the knowledge the student in his field of study. The Doctoral Committee shall conduct 'the comprehensive examination. If a student fails to qualify a comprehensive examination he shall be given one more change to appear in the examination as scheduled by the Doctoral Committee.

Thesis

12.1 Research work for a thesis shall be carried out in this University or at a place (s) approved by the Doctoral committee in consultation with the supervisor.

12.2 At the end of the student's research work the student shall submit a thesis which must be an original contribution to engineering sciences and worthy of publication. At least five type written copies of the thesis in the final form must be submitted to the Head of the department through the supervisor in the approved format.

12.3 The student shall certify that the research work was done by him and that this work has not been submitted elsewhere for any other purpose (except for publication).

12.4 On completion of the research work and submission of the thesis an oral examination shall be arranged on a date or dated fixed by the Head of the department in which the student shall defend his thesis. The student must satisfy the examiners (as constituted in Art. 12.5) that he is capable of intelligently applying the results of this research to the solution of problems, of undertaking independent work, and afford evidence of satisfactory knowledge related to the theory and technique used in his research work. be subject to the same conditions as allowed in the ordinance regarding Board of Residence and Discipline.

12.5 The Board of examiners shall consist of the Doctoral Committee and one or more external examiner(s) to be appointed by the CASR on recommendation of the Head of the department in consultation with the thesis supervisor. The supervisor shall act as Chairman of the Board of Examiners. At least one external examiner shall be appointed from outside the University. If the external examiner is appointed form outside the country a copy of the thesis may be sent to him for his evaluation and his written opinion.

12.6 If any examiner is unable to accept the appointment or has to relinquish his appointment before/during the examinations, the Vice-Chancellor shall appoint another examiner in his place, without further reference to the Doctoral Committee or the CASR.

12.7 In case a student fails to satisfy the Board of Examiners in thesis and/ or Oral examination, the student shall be given one more chance to resubmit the thesis and/ or appear in Oral examination as recommended by the Board.

A student who has been transferred to the Ph.D. programme from the M.Sc.Engg. programme my be awarded an M.Sc.Engg. degree on recommendation of the supervisor if the student fails to qualify for the award of the Ph.D. degree.

Striking off and removal of name from the rolls

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

13.1 Non payment of dues within prescribed period. Post graduate students residing in the halls of residence shall be subject to the same conditions as allowed in the ordinance regarding Board of Residence and Discipline.

13.2 Failing to proceed with the programme by the exercise of Art. 6.1 or 11.2 of this Ordinance.

13.3 Failing to make satisfactory progress in his programme as reported by the supervisor through the BPGS and approved by CASR.

13.4 Forced to discontinue his studies under disciplinary rules.

13.5 Withdraw officially from all the courses including thesis.

Refund of Fees

14. A student withdrawing officially from all courses including thesis as per Art. 13.5 is entitled to get refund to 50% of the course registration fees provided he withdraws in writing through the Head of the Department before the expiry of two working weeks from the commencement of the classes; and in that case his grade in the courses registered shall be recorded as 'W'. If withdrawal is made after the expiry of two weeks from the commencement of classes no refund shall be allowed and the grade should be recorded as failure unless he is eligible to get a grade of 'Incomplete' as per Art. 7. Thesis registration fees in any case are not refundable.

Academic Fees

15. Academic fees shall be as per Appendix I of the Master degree Ordinance of the University.

CE 6011 Boundary Element Method
3 Credits

Introduction; One-dimensional problems: potential flow, beam bending; Two-dimensional problems of potential flow; Two-dimensional problems of elastostatics; Axisymmetric analysis; Three-dimensional formulations; Parametric representations of functions and geometry; Time-dependent analysis: elastodynamics, transient groundwater flow; Non-linear analysis: problems of elastoplasticity; Combination of Boundary Element Method with other numerical methods.

CE 6101 Theory of Elasticity
3 Credits

Stress-strain relationship; Plane-stress and plane-strain; 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 problem.

CE 6103 Theory of Plates
3 Credits

Rectangular plates with various edge conditions; Circular plates; Energy methods; Approximate methods; Orthotropic plates; Numerical methods in the solution of plate problems Non-liner analyses of plates.

CE 6105 Plastic Design of Structures
3 Credits

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 analyses 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 multistory frames.

CE 6106 Elastic Stability of Structures
3 Credits

Stability of struts and beam-columns; Initial imperfections; Inelastic bucking; Stability functions; Stiffness matrix; Fixed and 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 6108 Analysis and Design of Shells
3 Credits

Review of membrane theory of shells; Bending theory of cylindrical shells and shells of revolution; Synclastic and anticlastic shells; Design of shell roof of various shapes. Finite difference and finite element methods; Model analysis.

CE 6109 Finite Element Methods
3 Credits

Introduction to finite element concepts, basic techniques, shape functions. Finite element formulation of various elastic problems-plane stress, plane strain, axisymmetric and three dimensional cases. Isoparametric elements, the elastic membrane, thick shell and plate elements, body of revolution with pressure and sinusoidal loading. Local loads from shape function routines. Bending of plates axisymmetric shells, 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, roudoft errors. Variational principles in finite element analysis.

CE 6110 Computer Methods in Civil Engineering
3 Credits

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

CE 6111 Advanced Design of Concrete Structures
3 Credits

Review of principles; beams, slabs and columns, Design of columns; long columns, two way slab systems, grids, waffle slabs, ribbed slab, deep meams, 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. An individual or group project to design a complete structural system. Prestressd concrete structures.

CE 6114 Analysis and Design of Tall Building
3 Credits

Structural forms of tall buildings-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 building.

CE 6115 Bridge Engineering
3 Credits

Planning concepts, various types of bridges and their suitability for different span ranges. Bridge loadings, Orthotropic plate decks, Grillage, space frame, finite element and finite strip methods of bridge deck analysis. Long span bridges cable stayed bridge, suspension bridge. Substructures; Design and construction.

CE 6116 Finite Element Methods II
3 Credits

General sources of nonlinearity in structures. Solution of nonlinear equations, incremental, Iterative. Newton-Raphson and Modified Newton Raphson solution procedures. Geometric Nonlinearity- Large displacement and structural instability, Lagrangian approach-both total and updated, Eulerian approach, Material Nonlinearity- Material modelling. Yield criteria, plasticity, creep,

elasto-plastycity, viscoplasticity, elastio viscoplasticity, modelling of reinforced concrete. Combined geometric and material nonlinearity. Modelling of dynamic problems and solution procedure. Finite element analysis of non-structural problems fluid flow, heat conduction, electo-magnetic field analysis etc.

CE 6117 Structural Dynamics and Seismic Design of Structures
3 Credits

Fundamentals of structural dynamics. SDOF, Free vibration response, response to haremonic, periodic, impulsive and general dynamic loading. MDOF, undamped free vibrations. Analysis of dynamic response. Beam: vibrations, random vibrations. Probability theory. Deterministic and nondeterministic analysis of earthquake response. Earthquake resistant design of buildings, bridges and dams.

CE 6118 Structural Brickwork
3 Credits

Properties of bricks and mortar: Strength compression element; Analysis and 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 6119 Advanced Theory and Design of Steel Structure
3 Credits

Tension members - Design criteria; Compression members - Buckling of Column; Residual Stress; Column Strength curves; AISC design formulas for working stress design; Buckling of plates; Design of column as affected by local buckling. Design of laterally supported beam; Shear on beams; Biaxial bending; Stresses due to torsions; Analogy between torsion and plane bending; Design for combined procedures for laterally unsupported beams. Beam column; AISC working stress design criteria for combined bending and axial load; Connections.

CE 6201 Advanced Concrete Technology
3 Credits

Properties of plain concrete, physico-chemical aspects of behaviour; Constituent materials; Cements, aggregates and admixtures; Influence of material properties on stress distribution in structural members. Durability, permeability and porosity; physical and chemical deterioration. Mixdesign, manufacture, transportation and placing. From works. Field control and acceptance. Testing destructive and nondestructive. Concrete for special purposes.

CE 6203 Theory and Design of Structural Concrete
3 Credits

Introduction to the limit state design concept. Ultimate limit state design of sections in bending, shear, torsion and combination of axial load and bending. Comparison of design recommendations of different codes (viz. American, British, Canadian etc). Evaluation of the impact of traditional concepts describing structural concrete behaviour on its analysis and design. Introduction to compressive field theory, strut-and - tie model and compressive-force path concept. Design in compliance with these concepts. Prospects and problems of applying finite element method in the analysis and design of structural concrete.

CE 6301 Theory of Water Treatment
3 Credits

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 odour.

CE 6304 Theory of Sewage Treatment
3 Credits

Composition, properties and analysis of sewage. Biology and bio-chemistry of sewage treatment. Principles of physical, themical and biological treatment processes. Tertiary treatment of effluents. Sludge digestion. Sludge dewatering and disposal.

CE 6305 Biology of Sewage and Polluted Waters
3 Credits

Important microgranisms related to water and waste water engineering; Cell physiology; Introductory Biochemistry; Bacterial growth and disinfection kinetics; Enumerisation of bacterial population; Indicator organisms and water borne pathogens: Sampling and bacteriogical examination of water and waste water.

CE 6309 Environmental Sanitation
3 Credits

Application of engineering principles to the control of communicable diseases; Vector control; Insecticides and bacteriocides; Collection and disposal of municipal refuse; Housing; Milk an food sanitation; Industrial and personal hygienes; Air pollution; Plumbing; Ventilation, air-conditioning; Hospital sanitation; Camp sanitation.

CE 6310 Industrial Water and Waste Treatment
3 Credits

Requirements of water and various industries; Quality and treatment of industrial water; Characteristics and volume of industrial waste; Problems associated with industrial wastes; Physical, chemical and biological methods of treatment; Industrial waste problems of major industries and their methods of treatment and disposal.

CE 6311 Municipal and Rural Sanitation
3 Credits

Transmission and control of communicable diseases; Importance of safe water supply and safe disposal of waste on sanitation; Principles of excreta disposal with and without water carriage; Individual water supply facilities and their sanitary protection; Solid waste management; Municipal and rural sanitation facilities in Bangladesh; Public health organizations.

6312 Water Pollution and its Control
3 Credits

Sources of pollution; Effects on water; Basic theory of control devices; Pollution surveys and control programs; Water pollution problems in Bangladesh.

CE 6315 Water Supply Engineering and Design
3 Credits

development of design criteria for municipal and rural water sources; Intakes, pipe lines, distribution systems, storage facilities and water treatment systems; Ground water resources and well design.

CE 6316 Sewerage and Drainage Engineering Design

3 Credits

Design of collection system, pump house; Functional hydraulic and structural design and complete sewage treatment plant and drainage systems.

CE 6319 Environmental Management
3 Credits

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, alan 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 6321 Environmental Impact Assessment (EIA)
3 Credits

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, prediction analysis and evaluation; EIA methodologies: Adhoc, Checklists, Matrices, Network, Simulation Modelling 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 6323 Surface Water Quality Modeling
3 Credits

Principal components of dissolved oxygen (DO) analysis, sources and sinks of DO kinetics, DO analysis for waterbodies, engineering control of DO; Basic mechanisms of eutrophication, significance of N/P ratio, sources and sinks of N and P, phytoplankton and nutrient interactions, phytoplankton-DO relationships, simplified river-stream eutrophication analysis for phytoplankton and rooted aquatic plants; Objectives of modeling, applications; Mass loading rage estimations: point source, tributary and intermittent sources; Low flow estimates, travel time and velocity estimates; Steady state sream equations; Estuarine hydrology; Distribution of water quality in rivers and estuaries, dispersion coefficients, hydraulic transport processes, mathematical formulations, water quality parameters, solution techniques, multi-dimensional models; Physical and hydrologic characteristics of lakes, lakeside response to inputs, finite segment steady state lake models, model calibration and verification, sensitivity analysis parameter estimation; Case studies.

CE 6325 Environmental Fluid Dynamics
3 Credits

Governing laws of motion for a viscous fluid: Review of laminar and turbulent flows; Fickian diffusion; Turbulent diffusion, Mass transport equation; Shear flow dispersion; Mixing in rivers and estuaries; Jets and buoyant jets; Reservoir dynamics; Pollutant movement in porous media; Computation of environmental flows.

CE 6327 Aquatic Chemistry for Environmental Engineers
3 Credits

Review of some fundamentals of Chemistry; Approaches to equilibrium problem solving: numerical solution, graphical solution, the 'tableau method'; Natural weak acids and bases, alkalinity and pH in natural waters, buffer capacity; Dissolved carbonate equilibria (closed system), dissolution of CO_2 (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, inorganic and organic complexation of trace elements; Redox equilibria and electron activity, pe-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 of organic compounds in natural environment: volatilization, sorption/partitioning, transformation reactions, structure-activity and property-activity relationships.

CE 6339 Fecal Sludge Management
3 Credits

Global and national status of fecal sludge management (FSM); On-site sanitation facilities – concepts and designs; Fecal sludge quantification, characterization and treatment objectives; Collection and transport; Treatment: treatment mechanisms, overview of treatment technologies, settling-thickening tanks, drying beds, co-treatment in municipal wastewater treatment plant, end use of treatment products; Operation, maintenance and monitoring of treatment plant; Institutional fragment for FSM; Planning of integrated FSM system, sustainability of FSM services.

CE 6401 Soil Mechanics I
3 Credits
(2 hours per week theory and 3 hours per week practical).

Identifying characteristics of soils, clay minerals, clay-water relation, fabric, Compression. One and three dimensional consolidation, swelling, collapse and rheological properties. Soil shear strength, concept of cohesion and internal friction. Failure theories Bearing capacity equations and factors. Subsoil exploration programme, interpretation of topographic, geological and agricultural soil maps. Laboratory testing of soils and their interpretation for engineering purposes.

CE 6402 Soil Mechanics II
3 Credits

Soil porosity and moisture effects relative to effective stress principles, capillarity, permeability and frost action. Hydraulic fracturing. Principles governing flow of water through soils. Soil seepage analysis for isotropic and anisotropic conditions. Numerical techniques for vertical and radial drainage. Description, design procedure and usage of current site improvement techniques, preloading, earth reinforcement, dynamic consolidation, vibrocompaction, blasting densification, lime treatment, drains and geotechnical fabrics.

CE 6403 Foundation Analysis Methods
3 Credits

Elastic foundations, loads on infinite slabs, subgrade coefficient, settlement on non-homogeneous half space, linearly-elastic pile and soil, laterally loaded pile, soil foundation interaction for footing and mat designs. Analysis of simple pile and pile group foundations. Exact and numerical solutions to above problems.

CE 6404 Earth pressure and Retaining Structures
3 Credits

Fundamentals of lateral earth pressure and classical methods of analysis. Analysis of braced excavations, retaining walls and design of sheet piling system. Principles of cofferdam design.
Bearing capacity theories related to shallow and deep foundations.

CE 6405 Earth dams and Stability of Slopes
3 Credits

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

CE 6406 Rock Mechanics
3 Credits

Classification and engineering properties of intact rocks, brittle fracture theory. Characterization and properties of rock discontinuities criteria of rock failure. Engineering problems associated with construction in rocks; Stabilization, anchoring and rock botting; 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 6407 Soil Dynamics
3 Credits

Sources and types of dynamic loading. Vibration of elementary systems, Wave propagation in soils. Dynamic solid properties and methods of their determination, liquefaction, shear modulus and damping effects. Vibrations of foundations on elastic media, machine foundations, earthquake response, blast effects including nuclear weapon effects.

CE 6408 Advanced Engineering Geology
3 Credits

Advanced physical geology concerning transported and residual soils. Erosion and deposition. Geomorphology. Study of the formation of delta. Engineering geology of soft clays. Engineering properties of rocks. Geologic structures. Historical geology. Geology of Bengal Basin. Earthquake zones of Bangladesh. Geological considerations for engineering designs.

CE 6409 Reinforced Earth
3 Credits

Materials used in reinforced earth; constitutive laws; Design parameters and testing techniques; Conceptual performance of reinforced soil; Analysis, design and construction of reinforced earth retaining structures; Reinforced sloped; Design and construction of reinforced paved and unpaved road; Analysis, design and construction of granular insitu stabilized columns; Soil nailing, root or micropiles. Random (non-oriented) fibre reinforced soil.

CE 6410 Constitutive Modeling in Soil Mechanics
3 Credits

Elasto-plastic modeling of soils; Model development process; Models for different types of soils; Monotonic, cyclic and repetitive loading models; Modern approach of constitutive modeling in soil mechanics; Thermodynamic approach of modeling; Application of soil models with small and large strain theories; Application of soil models in Finite Element Method, Distinct Element Method and Finite Difference Method.

CE 6411 Earthquake Engineering

3 Credits

Historical background; Plate tectonics; Various types of earthquakes and faulting; Wave types and their characteristics; Characteristics of seismometers and microtremor instruments; Characteristics of magnitude and intensity scales; Earthquake time histories; Fourier and response spectra; Historical seismicity and earthquake catalogues: data acquisition, sources, magnitude rescaling, application to hazard analysis; Site characterization: amplification and responses; Experimental simulation and shaking tables; Introduction to lifeline engineering: electricity, water, natural gas, telecommunication and transportation systems; Post earthquake damage survey; Mitigation strategies; Case studies of major earthquakes.

CE 6501 Transportation Engineering
3 Credits

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

CE 6502 Geometric Design of Highways
3 Credits

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 6503 Highway Materials
3 Credits

Origin, production, specifications properties and uses of bituminous materials; binder mixtures; design and analysis of bituminous paving mixes; field operations, surface treatments, stabilization methods; aggregates, base, subbase and subgrade; cement concrete in pavement constructions.

CE 6504 Advanced Surveying
3 Credits

Triangulation; Classification and schemes, instruments, linear and angular measurements, field works errors and corrections, computations; Geometric levelling; Field astronomy; Motions of earth, and other stars, time, coordinate systems, errors and corrections; Hydrographic surveying; determination of depth under water, measurement of discharge and stream current; Terrestrial and aerial photogrammetry; Instruments, field works, plotting of maps, analysis and interpretation of photographs, stereophotogrammetry, remote sensing and its application in civil engineering.

CE 6505 Structural Design of Pavements
3 Credits

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

CE 6507 Traffic Engineering
3 Credits

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

CE 6508 Railway Engineering
3 Credits

General requirements, permanent way, alignments, gradient and curves, points and crossings, signalling and interlocking, tunelling, construction and maintenance.

CE 6509 Waterways
3 Credits

Historical development of navigation, navigational channels, survey of waterways, classification of waterways, traffic, vessels, ports and harbours, navigational aids, maintenance of waterways.

CE 6510 Planning and Design of Airports
3 Credits

Growth and demand of air transport, airport site selection and configuration, geometric design of runways and taxiways, terminal areas, capacity analysis, lighting and marking, air traffic control systems, structural design, construction and maintenance of airport pavements, airport drainage.

CE 6511 Transportation Planning
3 Credits

Techniques and processes used in solving transportation problems, relationship between trip generation and land use, collection and characteristics of base year data, formulation of mathematical models to simulate existing travel patterns, forecasting procedures and evaluation of transportation systems.

CE 6512 Transportation Engineering Economics
3 Credits

Introduction to basic economic theories; principles and methodologies appropriate to transportation engineering; identification and measurement of transportation costs and benefits; Road user charges and principles of road pricing; Evaluation of transportation proposals in terms of their economic, social and environmental consequences; Techniques of cost benefit analysis; Selected case studies - application of economic principles to one or more current issues in transportation polity and planning.

CE 6513 Traffic Simulation
3 Credits

Introduction to simulation techniques; Review of Monte Carlo simulation, macroscopic and microscopic simulation, deterministic and stochastic simulation; Simulation in traffic engineering, review of traffic simulation models, lane-based and non-lane-based mixed traffic simulation; Simulation system components, introduction to statistical distributions, sampling from distributions, random number generation techniques, vehicle representation and processing techniques, simulation warm up and update procedures; Development of traffic simulation model, logical aspects of modeling traffic flow components, elements of systems analysis and synthesis; Model verification, refinements and parameter estimation, calibration and validation; Application of simulation models.

CE 6514 GIS and Remote Sensing in Transportation
3 Credits

Concepts of Geographic Information Systems (GIS): definition, data structure, data processing and management, spatial analysis; GIS software; Basic principles of remote sensing (RS) and global positioning systems (GPS): definition, data acquisition, spectral characteristics of land cover, multi-spectral analysis, image interpretation, geometric corrections, classification techniques; Integration of RS and GPS with GIS; GIS applications in the field of transportation planning and traffic engineering: digitized mapping of land use and transport network, transport infrastructure development and management, analysis and prediction of impacts, strategy planning, monitoring and evaluation of transport systems and environment, route selection, traffic management and accident analysis, public transport information systems; Integration of GIS packages with transport modeling software.