

Bangladesh  
University of  
Engineering and  
Technology

**COURSE  
CURRICULUM FOR  
UNDERGRADUATE  
STUDIES**

Seventh Edition

Department of Civil Engineering  
June 2021

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**Editorial Committee:**

Dr. Md. Delwar Hossain, Head of the Department  
Dr. Sheikh Mokhlesur Rahman  
Mr. Ishfaq Aziz  
Ms. Sumaiya Afrose Suma  
Mr. Sk. Rakibul Islam

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Head of the Department:  
Dr. M. Feroze Ahmed

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Head of the Department:  
Dr. A. M. M. Safiullah

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Dr. Md. Humayun Kabir

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# PREFACE

It gives me great pleasure to publish the updated course curriculum for undergraduate studies of the Department of Civil Engineering.

I would like to express my thanks and gratitude to all my colleagues of the Department. Dr. Sheikh Mokhlesur Rahman (BUGS secretary), Mr. Ishfaq Aziz, Ms. Sumaiya Afrose Suma and Mr. Sk. Rakibul Islam also deserve special thanks for their all-out effort and help in different stages of preparation of this booklet.

This booklet presents the rules and regulations of the course system and course requirements and contents of the Department of Civil Engineering. It is an essential companion for students of this Department as well as their advisers for smoothly carrying out their academic activities. Although the current booklet retains the overall characteristics of its previous versions, efforts have been made to incorporate key modifications related to regulations and course content. Special care has been taken in Chapter 3 where, apart from reproducing articles from Rules and Regulations for the Course System (May 1999), all the amendments that were subsequently made to it (up to May 2021) have been incorporated.

As with the practice of any Course System, it is likely that some of the rules and regulations published in this booklet may be modified in future. Students are, therefore, strongly advised to be in touch with their Advisers regarding modifications, if any, that may be introduced by the university.

It is hoped that the information provided in this booklet will be useful to the Advisers and undergraduate students of the Department of Civil Engineering.

Dhaka  
June 2021

Dr. Md. Delwar Hossain  
Professor and Head  
Department of Civil Engineering,  
BUET

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# *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 Government of Bengal of British India. As the years passed, the Survey School became the Ahsan Ullah School of Engineering offering three-year diploma courses in Civil, Electrical and Mechanical Engineering. In 1948, the School was upgraded to Ahsan Ullah 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 meet the increasing demand for engineers in the country and to expand the facilities for advancement of engineering education. In order to create facilities for post graduate studies and research, Ahsan Ullah 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. Starting with two faculties, the university has now been enlarged into five faculties. The faculty of Civil Engineering opened in 1980.

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. Initially, the university had no campus or a building of their own and rather resorted to a rented building to carry out institutional works. But with initiatives and help from the Government, its first own building was constructed, some place near the present Shahidullah Hall. Even a few days back, a tall chimney located at the later bore the symbol of its first establishment. Finally, in 1920, the university was shifted to the present location.

After the Second World War, the then Government undertook major plans for industrializations of Bengal. However, difficulties arose during the implementations of such plans as inexperience of the people was a major issue. People did not have adequate training to perform the work. It was obvious that a solution to this problem became a necessity. Therefore, the Government selected a committee with the purpose of establishing an engineering college for the admission of 120 students in mechanical, electrical, chemical and agricultural engineering in 4-year degree courses and also to transfer the school to the Palashi Barrack with an aim to enroll a further 480 students in civil, mechanical and chemical engineering for 3-year diploma courses. By the year 1947, in the month of August, the Ahsan Ullah Engineering School was promoted to Ahsan Ullah Engineering College and Mr. Hakim Ali was appointed as the principal.

In February, 1947, the then East Pakistan Government approved the college and gave permission to offer degrees in civil, mechanical, electrical, chemical, agricultural and textile engineering and diplomas in civil, mechanical and electrical engineering. However, in the end, agricultural and textile departments were withdrawn and students were admitted in the Department of Metallurgical Engineering. During this period, the college was an affiliate of Dhaka University.

As time passed, the growth of Ahsan Ullah Engineering College amplified. The semester system and a new curriculum were introduced in the year 1956. The prospectus became even better when the number of available seats in degree courses was doubled from 120 to 240 in 1957. The diploma course was terminated in 1958.

Already, Mr. T. H. Mathewman in 1951 and Dr. M. A. Rashid in 1954 joined as principals in the college. Over the years, the number of teachers kept proliferating. At this time, an exchange program was established between Texas A&M College (now a university) and Ahsan Ullah Engineering College. Some teachers arrived here from Texas College and played a crucial role in improving the teaching quality, laboratory and the curriculum. To ensure the quality of teaching and further development, some of the teachers from the Ahsan Ullah Engineering College were transferred to Texas A&M College as exchange students for obtaining their postgraduate degrees. The knowledge gained could then be channelized among the students of the

country so that they can flourish. Meanwhile, the Asian foundation donated some essential books and the rental library system was launched which is operational to date. The present Dr. M. A. Rashid building (main hostel) and Nazrul Islam Hall (South Hostel) were used as residences back then. In 1958, Ahsan Ullah Hall was built. Moreover, in 1961, Dr. M. A. Rashid joined as director of technical education and Dr. Wakar Ahmed took charge as principal.

In order to create opportunities for higher education and the required infrastructure and facilities for research, the Ahsan Ullah Engineering College upgraded its status to East Pakistan University of Engineering and Technology on 1<sup>st</sup> July, 1962. Dr. M. A. Rashid was appointed as the first Vice Chancellor of the university, from his previous position as the Director of Technical Education. Not to mention, his sheer discipline, dynamic nature of leadership and near perfect code of conduct gave a solid foundation to the university right at the beginning. Professor A. M. Ahmed became the Dean of the Department of Civil Engineering. Back then, the main hostel (currently Dr. M. A. Rashid Hall) served as the university's administrative office. Furthermore, the infamous mathematician Mr. M. A. Jabbar and Mr. Momotajuddin Ahmed became the first register and comptroller respectively.

However, the institution did not have adequate space to house the students seeking rooms in halls. To accommodate them, three new residential halls viz. Kayedi Azam Hall (at present Titumir Hall), Sher-e-Bangla Hall and Liakot Hall (at present Suhrawardy Hall) were constructed. Also in the year 1962, the Department of Architecture under the Faculty of Architecture and Planning was opened and some experienced teachers flew from Texas A&M College to join the later. Thus, the university set the foot out for a glorious journey ahead comprising the Engineering and Architecture Faculty which in turn constituted of civil, mechanical, electrical, chemical, metallurgical and architecture departments.

During 1969 to 1970, the university could house 420 students. In that period, the architecture and planning faculty had an undergraduate intake of only 30 students. Later, in the 1976-77-78 session, the number of seats in Engineering Faculty and Architecture and Planning Faculty was increased to 510 and 50 respectively. In addition, a quota



of 50 seats was allowed for foreign, ethnic and security force groups. Gradually the seat number was increased and in the 1997-98 session, the Engineering Faculty could accommodate a total of 725 seats and the architecture and planning faculty, 85 seats. In the academic year 2006-07, the number of seats in the Faculty of Engineering was further increased to 800 with a total capacity of 885. Still, it was not enough to meet the needs of a developing country with rapidly growing population. As a result, the authority and hence the university was sort of compelled to see another rise in the 2009-2010 of the academic year in various departments of the Engineering Faculty.

As we all know, in 1971, the whole nation plunged into the Liberation War in Bangladesh and waged a mass resistance. Students, teachers, officers and staffs of this university joined in the revolutionary independence war to rise against the attack by the West Pakistan Army. Among those students and staffs who died as martyrs in the liberation war are listed below:

<b>Name</b>	<b>Identity</b>	<b>Hall/Workplace</b>
Iqbal Ahmed	Reg No. 68077	Suhrawardy Hall
A. K. Sharafuddin Ahmed (Dulal)	Reg No. 68052	Ahsan Ullah Hall
Mufti Mohammed Kashed	Reg No. 67147	Titumir Hall
Mohammed Ahsanul Habib	Reg No. 66234	Titumir Hall
A. K. M. Aminul Islam	Reg No. 69185	Titumir Hall
Salauddin Ahmed Chowdhury	Reg No. 66270	Nazrul Islam Hall
Abu Selim Shahiduzzaman	Reg No. 66128	Sher-e-Bangla Hall
Abul Kashem Molla	Reg No. 68386	Suhrawardy Hall
Abu Ahmed Asadullah	Reg No. 68155	Sher-e-Bangla Hall
Shamsuddin Ahmed	Reg No. 67253	Titumir Hall
Mohammed Habib Ullah	Reg No. 68150	Titumir Hall

<b>Name</b>	<b>Identity</b>	<b>Hall/Workplace</b>
Mohammed Golam Nobi	Reg No. 6828	Titumir Hall
Jalal Uddin Ahmed	Reg No. 67298	Titumir Hall
Mohammed Mahfuzul Haque	Reg No. 67298	Nazrul Islam Hall
Mohammed Bodiul Alam	Reg No. 66102	Ahsan Ullah Hall
Mohammed Anwarul Azim	Reg No. 67032	Ahsan Ullah Hall
Mohammed Rafiq Uddin Ahmed (Bulbul)	---	Ahsan Ullah Hall
Mohammed Abdus Sobhan Akhanda	Lab Attendant	Mechanical Department
Abdus Sobhan	Gardener	Suhrawardy Hall
Sri Shiddipodo Ghosh	Steno-typist	Students Directorate

All the departments opted to offer undergraduate programs keeping in mind the demand of engineers, architects, and planners within the country. In 1995-96 session, undergraduate classes commenced with an intake of 30 students in the Department of Urban and Regional Planning. A year later, for the first time, the Department of Industrial and Production Engineering enrolled students for undergraduate studies whereas the previously shut off undergraduate classes, once again began in the Department of Water Resources Engineering. The university also took into account the necessity of experts in the glass and ceramic industry within the country and launched a new department called the Department of Glass and Ceramic Engineering. All in all, the academic expansion of the university received a major thrust.

The university's first convocation in independent Bangladesh was held in 1973 and the second one took place in 1976. The then Chancellor of the university and Abu Sayeed Chowdhury, Honorable President of The People's Republic of Bangladesh and the Judge, Abu Sadat Mohammed Sayem gave away the certificates in the first and second convocation, respectively. After a long stretch of 16 years, the third and fourth convocation ceremonies were respectively held on 29<sup>th</sup> of

February, 1992 and 8<sup>th</sup> of May, 1993. In these two events, certificates were distributed among the graduates by the then Vice Chancellor and Honorable Prime Minister of Bangladesh Government, Begum Khaleda Zia. In 1997, the 5<sup>th</sup> and in 2001, the 6<sup>th</sup> convocation ceremony were held and certificates were given away by the Vice Chancellor of the Engineering University back then as well as the Honorable Prime Minister of the Government of Bangladesh, Sheikh Hasina Wazed. The 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> convocation ceremonies were subsequently held on 15<sup>th</sup> March of 2004, 30<sup>th</sup> January of 2005 and 3<sup>rd</sup> January of 2006 and certificates given by the former Vice Chancellor and the former Prime Minister of the Government of Bangladesh, Begum Khaleda Zia. Eventually the university's 10<sup>th</sup> convocation certificates were presented among the students by the then Vice Chancellor and the late Honorable President, Zillur Rahman on 3<sup>rd</sup> February, 2011.

Over time, the Engineering University flourished with new opportunities and facilities. Academic expansion followed through the construction of civil building in 1968, the current library (1975), auditorium complex (1983) and E.M.E building in 1984. By the year 1978, Shahid Smritiy Hall was completed and it opened up for the students in 1979. The university's first girls' hall was inaugurated in 1986 and was named the "Chattri Hall". Moreover, the university chose to honour Dr. M. A. Rashid and constructed a hall in his name for the students. Expansion works proceeded on a continuous basis and the university saw further extension of the Civil Building by 1992 while the construction of the Academic Council building finished in 1993. To expedite the developments further, the seventh floor of the Civil Engineering building and the sixth floor of the EME building were simultaneously completed by 1996. The first building of the department of Urban and Regional Planning was constructed in 2002 whereas an office was set up for the Controller of Examinations in 2003. In 2005, supports and initiative from the Ministry of Communication of the Government of Bangladesh helped founding an institute, equipped with modern facilities, called the "Accident Research Institute". The main objectives of the Institute are to carry out scientific research and investigation to ascertain the causes of accidents on roads, railways and waterways in Bangladesh. Moreover, the Government of Japan came forward and provided financial supports and subsequent initiatives from the Government of Bangladesh saw the establishment of BUET-Japan Institute of Disaster Prevention and Urban Safety

(BUET-JIDPUS) in Palashi. A multistoried academic building was also constructed in the same place which is already operational.

Infrastructural developments occurred rapidly, and modernization of the curriculum and research facilities also took place side by side. As of now, optical fiber cable is installed within the campus and a backbone network is established. The backbone not only tied together diverse networks within a particular department but also among the departments and the offices located within the campus area. At present, BUET is connected worldwide through the internet by means of submarine cable and its own VSAT (Very-small-aperture terminal). The government also decided and henceforth funded to upgrade the computer center into an institute. The institute was later named Institute of Information & Communication Technology (IICT).

Through years of relentless efforts from the students, teachers, officers and staffs, Bangladesh University of Engineering and Technology has reached its present state. Its fame as an ideal institution and a symbol of remarkable success has not only spread within the territory of Bangladesh but also firmly rooted well beyond. Let it be our oath to preserve the vast and prestigious tradition of this institution and to enforce our paramount effort and endeavor towards its completeness.

Some of the photographs of the key structures of BUET campus are displayed as under.



**Department  
of Civil  
Engineering**



**Dr. M. A. Rashid  
Bhaban**



**Department of  
Architecture**



**ECE  
Building**



**Department of  
Urban and  
Regional  
Planning**



**Shahid  
Minar,  
Bangladesh  
University of  
Engineering  
and  
Technology**



**EME  
Building**

## **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, Water Resources, Electrical & Electronic, Mechanical, Industrial & Production, Chemical, Material and Metallurgical, Computer Science & Engineering, Biomedical Engineering and Naval Architecture & Marine Engineering. In the

faculty of Architecture and Planning the degree of Bachelor of Architecture is usually obtained in five years and the degree of Bachelor of Urban & Regional Planning in four 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 Ph.D. courses. Postgraduate degrees in Architecture (M.Arch.) and in Urban and Regional Planning (MURP) are offered by the Faculty of Architecture and Planning. In addition to its own research programs, the University undertakes research programs sponsored by outside organizations, e.g. UN Organizations, Commonwealth Secretariat, University Grants Commission (UGC). The expertise of the University teachers and the laboratory facilities of the University are also utilized to solve problems of and to provide up-to-date engineering and technological knowledge to the various organizations of the country. The University is persistent in its effort to improve its research facilities, staff position and courses 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, except for the department of Humanities, offer degree programs; however, some of them 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**

Department of Civil Engineering:	UG and PG
Department of Water Resources Engineering:	UG and PG

#### **Faculty of Architecture and Planning**

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



## **Faculty of Electrical and Electronic Engineering**

Department of Electrical and Electronic Engineering:	UG and PG
Department of Computer Engineering:	UG and PG
Department of Biomedical Engineering (BME)	UG and PG

## **Faculty of Engineering**

Department of Chemical Engineering:	UG and PG
Department of Material and Metallurgical Engineering:	UG and PG
Department of Petroleum and Mineral Resources Engineering:	PG
Department of Chemistry:	PG
Department of Mathematics:	PG
Department of Physics:	PG
Department of Glass and Ceramic engineering	PG

## **Faculty of Mechanical Engineering**

Department of Industrial and Production Engineering:	UG and PG
Department of Mechanical Engineering:	UG and PG
Department of Naval Architecture and Marine Engineering:	UG and PG

Some of the photographs of the departments of BUET are displayed as under:

### **Faculty of Civil Engineering**



Department of Civil Engineering



Department of Water Resources Engineering

## Faculty of Engineering



Department of Chemical Engineering



Department of Material and Metallurgical



Department of Glass and  
Ceramic engineering



Department of Chemistry



Department of Mathematics



Department of Physics



Department of  
Petroleum and  
Mineral Resources  
Engineering

## Faculty of Architecture and Planning



Department of Architecture



Department of Humanities



Department of Urban and  
Regional Planning

## Faculty of Electrical and Electronic Engineering



Department of Electrical and  
Electronic Engineering



Department of Computer Science  
and Engineering



Department of Biomedical Engineering

## Faculty of Mechanical Engineering



Department of Mechanical Engineering



Department of Naval Architecture  
and Marine Engineering



Department of Industrial and  
Production Engineering

### 1.4 University Administration

Chancellor	:	Md. Abdul Hamid The Honorable President of the People's Republic of Bangladesh
Vice Chancellor	:	Prof. Dr. Satya Prasad Majumder
Pro-Vice Chancellor	:	Prof. Dr. Abdul Jabbar Khan

#### List of Administrative Officers

Registrar	:	Prof. Dr. Md. Forkan Uddin
Controller of Examinations	:	Prof. Dr. Mohammed Imamul Hassan Bhuiyan
Comptroller	:	Md. Jasim Uddin Akond

Director of Students Welfare	:	Prof. Dr. Md. Mizanur Rahman
Director, Advisory, Extension & Research Services	:	Prof. Dr. Md. Abdus Salam Akanda
Director, Bureau of Research, Testing & Consultation	:	Prof. Dr. Abu Siddique
Director of Planning & Development	:	Prof. Dr. G M Tarekul Islam
Librarian (in-charge)	:	Prof. Dr. Samia Subrina

### **Deans of Faculties**

Dean of Civil Engineering	:	Prof. Dr. Abu Siddique
Dean of Architecture & Planning	:	Prof. Dr. Khandaker Shabbir Ahmed
Dean of Electrical & Electronic Engineering	:	Prof. Dr. Pran Kanai Saha
Dean of Mechanical Engineering	:	Prof. Dr. Abu Rayhan Md. Ali
Dean of Engineering	:	Prof. Dr. Mohammad Tamim

### **Provosts of Residential Halls**

Provost, Ahsan Ullah Hall	:	Prof. Dr. Al-Nakib Chowdhury
Provost, Chattri Hall	:	Prof. Dr. Nazma Parveen
Provost, Nazrul Islam Hall	:	Prof. Dr. Md. Abdul Alim
Provost, Shahid Smrity Hall	:	Prof. Dr. Md. Mostafa Ali
Provost, Sher-e-Bangla Hall	:	Prof. Dr. A. K. M. Monjur Morshed
Provost, M.A. Rashid Hall	:	Prof. Dr. Md. Shamim Reza

Provost, Suhrawardy Hall : Prof. Dr. Mohammad Al Amin  
Siddique

Provost, Titumir Hall : Prof. Dr. Jiban Podder

## *Chapter 2*

### **The Faculty of Civil Engineering**

#### **2.1 Introduction**

The Faculty of Civil Engineering consists of two academic departments: The Department of Civil Engineering and the Department of Water Resources Engineering.

The Department of Civil Engineering comprises four major divisions: Environmental Engineering, Geotechnical Engineering, Structural Engineering and Transportation Engineering. The divisions offer basic and advanced optional courses in the above disciplines. Research on the above fields is extremely important in the national context. These include areas like behavior of available building and road materials with emphasis on indigenous materials, engineering 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 simulation, transport system modeling, traffic safety studies, etc. The results of some of these research works have been incorporated in the Bangladesh National Building Code introduced in 1993. Some research projects of more fundamental natures viz. application of finite element techniques in tackling engineering problems, dynamic behavior of multistoried buildings, soil-structure interaction, concrete technology etc., pursued in this department have greatly contributed to the 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 stabilization, ground water, sedimentation problems and coastal engineering.

## 2.2 List of Faculty Members of Department of Civil Engineering (as of June 2021)

### Professor & Head

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

### Professors

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

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

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

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

**Hasib Mohammed Ahsan:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; D. Eng., University of Tokyo, Japan (Transportation Engineering)



- Sarwar Jahan Md. Yasin:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Tokyo, Japan (Geotechnical Engineering)
- Moazzem Hossain:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Southampton, U.K. (Transportation Engineering)
- Eqramul Hoque:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Tokyo, Japan (Geotechnical Engineering)
- Bashir Ahmed:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Nottingham, U.K. (Structural Engineering)
- Khan Mahmud Amanat:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; D. Eng., Nagoya University, Japan (Structural Engineering)
- Mehedi Ahmed Ansary:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Tokyo, Japan (Geotechnical Engineering)
- Md. Shamsul Hoque:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Southampton, U.K. (Transportation Engineering)
- Tahmeed M. Al-Hussaini:** B.Sc. Engg. (Civil), BUET; M. Engg., AIT, Thailand; Ph.D., State University of New York at Buffalo, U.S.A. (Geotechnical Engineering)
- Md. Mafizur Rahman:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Tokyo, Japan (Environmental Engineering)
- Md. Kabirul Islam:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., Johns Hopkins University; USA; Ph.D., University of Sydney, Australia (Geotechnical Engineering)

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

**Abdul Jabbar Khan:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Strathclyde, U.K. (Geotechnical Engineering)

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

**Tahsin Reza Hossain:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of London, U.K.; DIC, Imperial College London, U.K. (Structural Engineering)

**Munaz Ahmed Noor:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Tokyo, Japan (Structural Engineering) [on deputation]

**Raquib Ahsan:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Tokyo, Japan (Structural Engineering)

**A.F.M. Saiful Amin:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., Saitama University, Japan (Structural Engineering)

**Syed Ishtiaq Ahmad:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., Nagoya University, Japan (Structural Engineering)

**Md. Mizanur Rahman:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., Yokohama National University, Japan (Transportation Engineering)

**Mohammad Shariful Islam:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., Saitama University, Japan (Geotechnical Engineering)

**Mahbuba Begum:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Alberta, Canada (Structural Engineering)

**Md. Jahangir Alam:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D, University of Tokyo, Japan (Geotechnical Engineering)

**Tanvir Manzur:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Texas at Arlington, U.S.A. (Structural Engineering) [on leave]

**Md. Hadiuzzaman:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Alberta (Transportation Engineering)

**Mohammad Al Amin Siddique:** B.Sc.Engg. (Civil), BUET; M.Sc.Engg., BUET; Ph.D., The University of Western Ontario, Canada (Structural Engineering)

**Tanvir Ahmed:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., Massachusetts Institute of Technology, U.S.A. (Environmental Engineering)

### *Associate Professors*

**Shohel Rana:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Tokyo, Japan (Structural Engineering)

**Shameem Ahmed:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of New South Wales (UNSW) (Structural Engineering)

**Nazrul Islam:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., NC State University (Structural Engineering)

**Assistant Professors**

**Snigdha Afsana:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Environmental Engineering)

**Md. Ruhul Amin:** B.Sc. Engg. (Civil), BUET (Structural Engineering); M.Sc. Engg., BUET (Structural Engineering)

**Mohammad Neaz Murshed:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Texas, Austin (Transportation Engineering)

**Sheikh Mokhlesur Rahman:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., Northeastern University (Environmental Engineering)

**Annesha Enam:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Connecticut (Transportation Engineering)

**Provat Kumar Saha:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., NC State University (Environmental Engineering)

**Mohammad Faizus Salehin:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Transportation Engineering) [on leave]

**Md. Ferdous Alam:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., Monash University (Geotechnical Engineering)

**Sadia Afrin:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Environmental Engineering) [on leave]

**Sohana Iffat:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Structural Engineering) [on leave]

**Md. Abul Bashar Emon:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Structural Engineering) [on leave]

- Md. Maksimul Islam:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Environmental Engineering) [on leave]
- S. M. Faisal Mahmood:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., University of Melbourne, Australia; (Structural Engineering)
- Sanjana Hossain:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Transportation Engineering) [on leave]
- Rowshon Jadid:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Geotechnical Engineering) [on leave]
- Shamsunnahar Suchana:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Environmental Engineering) [on leave]
- Rupak Mutsuddy:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET; Ph.D., University of Alberta (Structural Engineering)
- Rubaiya Rumman:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Structural Engineering) [on leave]
- Md. Azijul Islam:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Geotechnical Engineering) [on leave]
- Sumaiya Afroz:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Structural Engineering) [on leave]
- Azmayeen Rafat Shahariar:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Geotechnical Engineering) [on leave]
- Radin Md. Mahirul Haque:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Structural Engineering) [on leave]
- Sk. Md. Mashrur:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Transportation Engineering) [on leave]
- Bayezid Baten:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Structural Engineering) [on leave]

**Anindya Samya Saha:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Structural Engineering)

**Mashiat Hossain:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Environmental Engineering) [on leave]

**Mohammad Irfan Hossain:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Structural Engineering)

**Omar Faruqe Hamim:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Transportation Engineering) [on leave]

**Ishfaq Aziz:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Structural Engineering)

**Lecturers**

**Baishakhi Bose:** B.Sc. Engg. (Civil), BUET; M.Sc. Engg., BUET (Structural Engineering) [on leave]

**Tausif-E-Elahi:** B.Sc. Engg. (Civil), BUET (Geotechnical Engineering)

**Ahmed Farhan Ahnaf Siddique:** B.Sc. Engg. (Civil), BUET (Structural Engineering)

**Sumaiya Afrose Suma:** B.Sc. Engg. (Civil), BUET (Transportation Engineering)

**Sk. Rakibul Islam:** B.Sc. Engg. (Civil), BUET (Structural Engineering)

## 2.3 Laboratory Facilities

The Department of Civil Engineering is equipped with a number of laboratories for pursuing 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 and Materials laboratory is housed on the ground floor of the Civil Engineering Building and has a floor area of 6,000 sq. ft. 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 behavior. A number of universal testing machines are available in the laboratory which includes a 400,000 lb machine. Strain measuring devices and data acquisition facilities are also available.



Structures and Materials Laboratory

**Concrete Laboratory:** This is situated on the ground floor of the Civil Engineering Building and has a floor area 6,000 sq. ft. 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 cores and testing in the laboratory.



Concrete Laboratory

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

**Environmental Research Laboratory:** This laboratory has a floor area of 1600 sq. ft 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

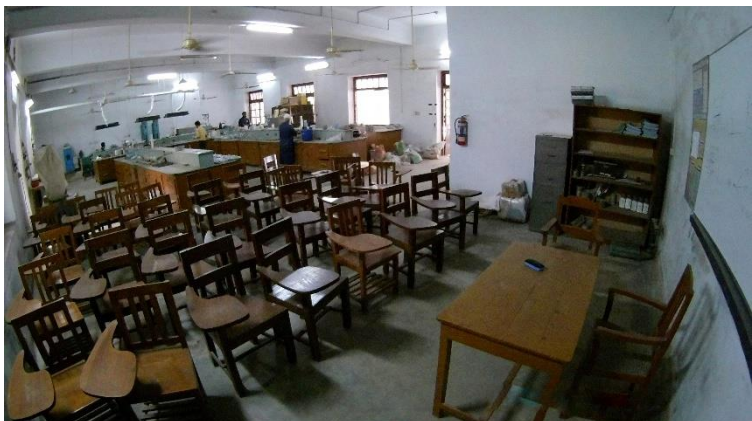


and wastewater. Instruments in this laboratory include among others, an Atomic Absorption Spectrophotometer, a TOC analyzer, and a modern Spectrophotometer.



Environmental Engineering Laboratory

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



Transportation Engineering Laboratory

**Traffic Engineering and GIS Laboratory:** Traffic Engineering and GIS (Geographic Information System) laboratory is housed on the second floor of the Civil Engineering Building and has a floor area of 1,700 sq. ft. 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 detailed 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 has been 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 on the 2nd floor of the Civil Engineering Building has a floor area of 4,250 sq. ft. 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.



Geotechnical Engineering Laboratory

## 2.4 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 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) Be familiar with the location of emergency equipment - fire alarm, fire extinguisher, emergency eye wash and safety shower. Know the appropriate emergency response procedures.
- (c) Become familiar with hazards associated with the machine/instrument/ chemicals being used and know the safety precautions and emergency procedures before undertaking any work.
- (d) Always wear proper eye protection in chemical work, handling and storage areas. Contact lenses should not be worn normally. Fitted goggles are essential.
- (e) Always wear appropriate protective clothing. Do not wear high-heeled shoes, open-toed shoes, sandals or shoes made of woven material.
- (f) Always wash hands and arms with soap and water before leaving the work area. This applies even if you have been wearing gloves.

- (g) Never perform unauthorized work, preparations, or experiment.
- (h) Use equipment and hazardous materials only for their intended purposes.
- (i) Never leave an experiment unattended while it is being heated or is rapidly reacting.
- (j) Food, beverages, cups, and other drinking and eating utensils should not be stored in areas where hazardous materials are handled or stored.
- (k) Laboratory water sources and deionized water should not be used for drinking water.
- (l) If you plan to work after regular office hours in a laboratory, get written permission from your supervisor and laboratory in-charge.
- (m) Report any accident, however minor, immediately.

## 2.5 Computing Facilities

**Civil Engineering Computer Laboratory:** The Civil Engineering Computer Laboratory was initiated in 1986 with only one IBM 8088 computer. At present, it has flourished into two separate laboratories with four different rooms along with a capacity of 150 computers. Of the 150 available computers, eighty (80) of them have been incorporated with Core i5 processor along with Dual Core processors for the remaining seventy (70). A computer network has been installed to facilitate computer usage and to achieve maximum benefit.

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 5 p.m. during weekdays while remaining closed during weekends. 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.

## **2.6 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 1:00 pm to 2:30 pm.

## **2.7 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

### Rules and Regulations for Course System

The following are the rules and regulations for administering undergraduate course curricula through the course system. The following articles have been reproduced from *Rules and Regulations for the Course System (May 1999)* after incorporating all the amendments that were subsequently made to it (up to May 2021).

#### A. Rules, Regulations, Course Offering Evaluation and Grading

##### 1. Organizational Framework of the Bachelor's Degree Programs the Course System

The undergraduate curriculum at Bangladesh University of Engineering & Technology (BUET) is based on the course system. The salient features of the course system are:

- (i) Reduction of the number of theoretical courses and examination papers to around five in each term,
- (ii) The absence of a pass or a fail on an annual basis,
- (iii) Continuous evaluation of student's performance,
- (iv) Introduction of Letter Grades and Grade Points instead of numerical grades,
- (v) Introduction of some additional optional courses and thus enable students to select courses according to his/her interest as far as possible,
- (vi) Opportunity for students to choose fewer or more courses than the normal course load depending on his/her capabilities and needs,
- (vii) The flexibility to allow the student to progress at his/her own pace depending on respective ability or convenience, subject to the regulations on credit and minimum Grade Point Average (GPA) requirements, and
- (viii) Promotion of teacher-student contact.

In the curriculum for the undergraduate programs, besides the professional courses pertaining to each discipline, there is a strong emphasis on acquiring a thorough knowledge in the basic sciences of Mathematics, Physics and Chemistry. Due importance is also given for the study of several subjects in Humanities and Social Sciences which, it is expected will help the student to interact more positively with the society. Thus the course contents of the undergraduate programs provide a harmonious blend of both basic sciences and their applications as well as their social relevance.

The first two terms of Bachelor's degree programs consist of courses in basic sciences, mathematics, humanities and social sciences, basic engineering and architecture subjects. The third and subsequent terms build directly on the knowledge of the basic subjects gained in the first two terms and go on to develop competence in specific disciplines.

## **2. Student Admission**

Students will be admitted in undergraduate curricula in the Departments of Architecture, Urban and Regional Planning, Chemical Engineering, Civil Engineering, Water Resources Engineering, Computer Science and Engineering, Electrical and Electronic Engineering, Biomedical Engineering Mechanical Engineering, Industrial & Production Engineering, Materials and Metallurgical Engineering and Naval Architecture and Marine Engineering as per existing rules of the University. The Registrar's Office will continue to serve as Admissions Office and will deal with course registration in addition to student admission.

## **3. Number of Terms in a Year**

There will be two terms (Term I and Term II) in an academic year. The duration of each Term will be 18 weeks which will be used as follows:

<i>Classes</i>	<i>14 weeks</i>
<i>Recess before Term Final Examination</i>	<i>2 weeks</i>
<i>Term Final Examination</i>	<i>2 weeks</i>
<i>Total</i>	<i>18 weeks</i>

The duration of the Short Term will be around 8 weeks of which about 7 weeks will be spent for class lectures and one week for Term Final Examination.

#### 4. Course Pattern and Credit Structure

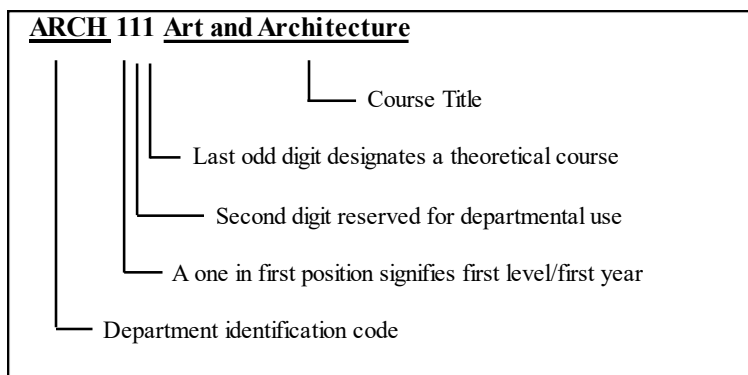
The entire undergraduate program is covered through a set of theoretical and laboratory/sessional/studio courses.

##### 4.1 Course Designation and Numbering System

Each course is designated by a two to four letter word identifying the department and a three-digit number with the following criteria:

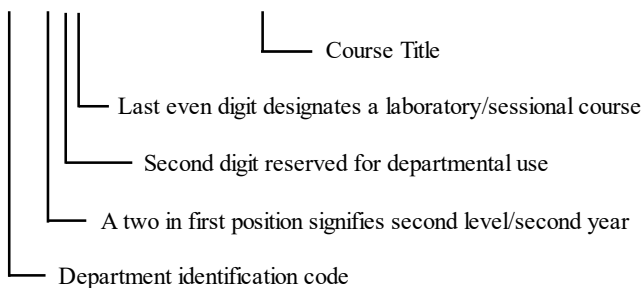
- (a) The first digit will correspond to the year/level in which the course is normally taken by the students.
- (b) The second digit will be reserved for departmental use for such things as to identify different areas within a department.
- (c) The last digit will usually be odd for theoretical and even for laboratory or sessional courses.

The course designation system is illustrated by two examples.





## **CE 212 Structural Mechanics and Materials Sessional**



### **4.2 Assignment of Credits**

- (i) Theoretical Courses  
One lecture per week per term will be equivalent to one credit.
- (ii) Laboratory/ Sessional/ Design  
Credits for laboratory/sessional or design courses will be half of the class hours per week per term.

Credits are also assigned to project and thesis work taken by students. The number of credits assigned to such work may vary from discipline to discipline.

The curriculum does not demand the same rate of academic progress from all students for obtaining the degree but only lays down the pace expected from a normal student. A student whose background or capacity for assimilation is lower will be permitted to complete the program at a slower pace by studying less number of courses during a given term (subject to a minimum course load). He may keep pace with his class by taking courses during the Short Term which he had dropped earlier during the Regular Terms, or by covering the entire degree program over an extended period without developing any feeling of inferiority complex.

### **5. Types of Courses**

The courses included in undergraduate curricula are divided into

several groups as follows:

### **5.1 Core Courses**

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

### **5.2 Pre-requisite Courses**

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

### **5.3 Optional Courses**

Apart from the core courses, students will have to complete a number of courses which are optional in nature. They will have the option to choose the required number of courses from a specified group/number of courses.

## **6. Course Offering and Instruction**

The courses to be offered in a particular term will be announced and published in the Course Catalogue along with a tentative Term Schedule before the end of the previous term. Whether a course is to be offered in any term will be decided by the respective Board of Undergraduate Studies (BUGS). Respective departments may arrange to offer one or more pre-requisite or core courses in any term depending on the number of students who dropped or failed the course in the previous term.

Each course is conducted by a teacher. The course teacher is responsible for maintaining the expected standard of the course and for the assessment of a student's performance. Depending on the strength of registered students (i.e. the number of students) enrolled for the course, the teacher concerned might have course associates and teaching assistants (TA) to help him in teaching and assessment.

For a course strength necessitating two or more parallel classes or sections, one of the course teachers or any other member of the teaching staff of the department be designated as course coordinator. He/she has the full responsibility for coordinating the work of the other members of the department involved in that course.

## **7. Departmental Monitoring Committee**

Consistent with its resilient policy to keep pace with new developments in the field of science and technology, the university will update its course curriculum at frequent intervals (at least every three years). The updates not only aim to include the expanding frontiers of knowledge in the various fields but also to accommodate the changing social, industrial, and professional needs of the country. This can be done through deletion and modification of some of the courses and also through the introduction of new ones.

The Board of Undergraduate Studies (BUGS) of each department will constitute a Departmental Monitoring Committee with three teachers of the department. This committee will monitor and evaluate the performance of the Course System within the department. In addition to other teachers of the department, the committee may also propose from time to time to the BUGS any changes and modifications needed for upgrading the Undergraduate Curriculum and the Course System.

## **8. Teacher Student Contact**

The proposed system encourages students to come in close contact with teachers. For promotion of teacher-student contact, each student is assigned to an Adviser and the student is free to discuss with his Adviser all academic matters, especially those related to courses taken and classes being attended by him. Students are also encouraged to meet with other teachers at any time for help on academic matters.

## **9. Student Adviser**

One Adviser would normally be appointed for a batch of students by the Undergraduate Board of Studies of the concerned department(s) who will advise each student on the courses to be taken by the student.

Adviser will discuss with the student his/her academic program and then decide the number and nature of courses for which he/she can register. However, it is the student's responsibility to keep contacts with his Adviser who will review and eventually approve the student's specific plan of study and check on subsequent progress. The Adviser should be in the rank of an Assistant Professor or above from the concerned department(s).

For a student of second and subsequent terms, the number and nature of courses for which he/she can register will be decided on the basis of his/her academic performance during the previous term. The advisor will advise the students to register for the courses during the next term within the framework of the guidelines in respect of minimum/maximum credit hours limits, etc. which are elaborated at appropriate places in this report. The Advisor is also authorized to permit the student to drop one or more courses based on his/her academic performance and the corresponding categorization (see Art. 16 for details).

Special provisions exist for academically weak students with regard to make-up courses (see Art.19 for details).

## **10. Registration Requirements**

Any student who makes use of classroom or laboratory facilities or faculty time is required to register formally. Being admitted to the University, each student is assigned to a student Adviser. The student can register for courses he intends to take during a given term only on the basis of the advice and consent of his/her Adviser.

### **10.1 Registration Procedure**

Students must register for each class in which they will participate. Each student will fill up his/her Course Registration Form in consultation with and under the guidance of his/her adviser. The original copy of the Course Registration Form will be submitted to the Registrar's Office, and then the requisite number of photocopies will be made by the Registrar's Office for distribution. The date, time and venue will be announced in advance by the Registrar's Office. Alternatively, students must register for each class in which they want

to participate in consultation with his/her Advisor. This can be done online within a specified deadline at <http://biis.buet.ac.bd> where a student can select courses in the online course registration form. The student is then required to meet his/her advisor to finalize and confirm the registration. Much counseling and advising is accomplished at the registration time. It is absolutely necessary that all students register at the specified time.

## **10.2 Limits on the Credit Hours to be Taken**

A student must be enrolled in at least 15 credit hours. He may be allowed to enroll in up to a maximum of 24 credit hours if recommended by his/her Adviser. A student must enroll for the prescribed sessional/laboratory courses in the respective Term within the allowed credit-hour limits.

In special cases where a student cannot be allotted the minimum required 15 credit hours in a Term, the relevant BUGS may approve a lesser number of credit hours to suit individual requirements. Such cases shall only be applicable to students needing less than 15 credits for graduation.

## **10.3 Pre-condition for Registration**

Some courses involve pre-requisite courses. A student will be allowed to register in those courses provided he has completed all of the pre-requisite courses. If a student fails in a pre-requisite course in any Term, the concerned BUGS may allow him/her to register for a course which builds on the pre-requisite course provided his/her attendance and grades in continuous assessment in the said pre-requisite course is found to be satisfactory.

Registration will be done at the beginning of each term. The registration program with dates and venue will be announced in advance. Late registration is, however, permitted within the first week after starting of the classes through payment of a late registration fee. Students having outstanding dues to university or a hall of residence shall not be permitted to register. Therefore, all students must clear their dues and get a clearance or no dues certificate, and only then, they will be given necessary permission to complete the course registration

procedure. For the First-Year students, prior department-wise enrolment/admission is mandatory for registration.

#### **10.4 Pre-registration**

Pre-registration (currently not in practice) for courses to be offered by the students in a particular term will be done on a specified date before the end of the previous term. All students in consultation with their course Advisers are required to complete the pre-registration formalities. Failing to do so requires a fine of Tk. xx.xx (amount may be decided by the authority) to be paid before registration in the next term. Furthermore, a student who does not pre-register may not get the courses desired by him subsequently.

#### **10.5 Registration Deadline**

Student must register for the courses to be taken before the commencement of each term and no late registration will be accepted after one week of classes. Late registration after this date will not be accepted unless the student submits a written appeal to the Registrar through the concerned Head and can document extenuating circumstances such as medical problems (physically incapacitated and not able to be presented) from the Chief Medical Officer of the University or some other academic commitments which precluded enrolling prior to the last date of registration.

#### **10.6 Penalty for Late Registration**

Students who fail to register during the designated dates for registration are charged a late registration fee of Tk. xx.xx (amount may be decided by the authority). This extra fee will not be waived whatever be the reason for late registration.

#### **10.7 Course Adjustment Procedure**

A student will have some limited options to add or delete courses from his/her registration list, within the first two weeks from the beginning of the term. However, minimum credit requirements mentioned in the Art. 10.2 need to be fulfilled after the adjustments. He/she may add courses only within the first two weeks of a regular Term and only the

first week of Short Term. In case of dropping a course, a student will be allowed to do so within four weeks after the commencement of a regular Term and two weeks after commencement of a Short Term. Adjustment of initially registered courses in any term can be done by duly completing the **Course Adjustment Form**. These forms will normally be available in the Registrar's Office. For freshman students, such forms may already be included in the registration packet at the time of orientation.

Any student willing to add or drop courses will have to fill up a Course Adjustment Form in consultation with and under the guidance of his/her Adviser. The original copy of the Course Adjustment Form will be submitted to the Registrar's Office, and then the requisite number of photocopies will be made by the Registrar's Office for distribution to the concerned Adviser, Head, Dean, Controller of Examination and the student.

All changes in courses must be approved by the Adviser and the Head of the department concerned. The completed Course Adjustment Form will have to be submitted to the Registrar's Office after it has been duly filled in and signed by the concerned persons. To add/drop a course, respective teacher's consent will be required.

Late Registration Fee is not necessary in these cases.

### **10.8 Withdrawal from a Term**

If a student is unable to complete the Term Final Examination due to serious illness or serious accident, he/she may apply to the Head of the degree awarding department for total withdrawal from the Term within a week after the end of the Term Final Examination. However, he/she may choose not to withdraw any laboratory / sessional / design course if the grade obtained in such a course is 'D' or better. The application must be supported by a medical certificate from the Chief Medical Officer of the University. The Academic Council will take the final decision about such an application.

## 11. The Grading System

The total performance of a student in a given course is based on a scheme of continuous assessment. For theory courses this continuous assessment is made through a set of quizzes/in class evaluation, class participation, homework assignments, and a term final examination. The assessment in laboratory/sessional courses is made through observation of the student at work in class, viva-voce during laboratory hours, and quizzes. For architecture students, assessments in design sessionals would be done through evaluation of a number of projects assigned throughout the term. As discussed earlier, each course has a certain number of credits which describe its weightage. A letter grade with a specified number of grade points is awarded in each course for which a student is registered. A student's performance is measured by the number of credits that he/she has completed satisfactorily and the weighted average of the grade points that he/she has maintained. A minimum grade point average is required to be maintained for satisfactory progress. Also a minimum number of earned credits should be acquired in order to qualify for the degree as prescribed under Art. 22.

Letter grades and corresponding grade-points will be awarded in accordance with provisions shown below.

<b>Numerical Grade</b>	<b>Letter Grade</b>	<b>Grade Point</b>
80% or above	A+ (A plus)	4.00
75% to less than 80%	A (A regular)	3.75
70% to less than 75%	A- (A minus)	3.50
65% to less than 70%	B+ (B plus)	3.25
60% to less than 65%	B (B regular)	3.00
55% to less than 60%	B- (B minus)	2.75
50% to less than 55%	C+ (C plus )	2.50
45% to less than 50%	C (C regular)	2.25
40% to less than 45%	D	2.00
less than 40%	F	0.00
Continuation (for project & thesis/ design courses )	X	-



## 11.1 Distribution of Marks

Thirty percent (30%) of marks shall be allotted for continuous assessment i.e., quizzes and homework assignments, in class evaluation and class participation. The remainder of the marks will be allotted to Term Final examination which will be conducted centrally by the University. There will be internal and external examiners for each course in the Term Final Examination. The duration of each term final examination will be 3 hours. The distribution of marks for a given course will be as follows:

(i) Class participation	10%
(ii) Homework Assignment and Quizzes	20%
(iii) Final Examination (3 hours)	70%

-----  
Total 100%

Basis for awarding marks for class participation and attendance is generally as follows:

<b>Attendance</b>	<b>Marks</b>
90% and above	10
85% to less than 90%	9
80% to less than 85%	8
75% to less than 80%	7
70% to less than 75%	6
65% to less than 70%	5
60% to less than 65%	4
less than 60%	0

The number of quizzes of a course shall be at least  $n+1$ , where  $n$  is the number of credits of the course. Evaluation of the performance in quizzes will be on the basis of the best  $n$  quizzes. The scheme of continuous assessment that a teacher proposes to follow for a course will be announced on the first day of classes.

## **12. Earned Credits**

The courses, in which a student has obtained 'D' or a higher grade, will be counted as credits earned by him/her. Any course in which a student has obtained 'F' grade will not be counted towards his/her earned credits.

A student who obtains an 'F' grade in any Core Course in any term, will have to repeat the course. If a student obtains a 'F' grade in an Optional Course, he/she may choose to repeat the course or take a substitute course if available.

'F' grades will not be counted for GPA calculation but will stay permanently on the Grade Sheet and Transcript. When a student will repeat a course in which he/she previously obtained an 'F' grade, he/she will not be eligible to get a grade better than 'B' in such a course. If a student obtains a grade other than 'F' in a course, he/she will not be allowed to repeat the course for the purpose of grade improvement.

If a student obtains a grade lower than 'B' in a course, he/she will be allowed to repeat the course only once for the purpose of grade improvement by forgoing his/her earlier grade, but he/she will not be eligible to get a grade better than 'B' in such a course. A student will be permitted to repeat for grade improvement purposes a maximum of four courses in B.Sc. Engg. and B.URP programs and a maximum of five courses in B. Arch. program.

If a student obtains 'B' or a better grade in any course, he/she will not be allowed to repeat the course for the purpose of grade improvement.

## **13. Honors**

Candidates for Bachelor's degree in engineering and architecture will be awarded the degree with honors if their overall GPA is 3.75 or better.

### **13.1 Dean's List**

As a recognition of excellent performance, the names of students obtaining an average GPA of 3.75 or above in two regular Terms in each academic year may be published in the Dean's List in each

faculty. Students who have received ‘F’ grade in any course during any of the two regular terms will not be considered for the Dean's List in that year.

#### 14. Calculation of GPA

Grade Point Average (GPA) is the weighted average of the grade points obtained in all the courses passed/completed by a student. For example, if a student passes/completes five courses in a semester having credits of C1, C2, C3, C4, and C5 and his grade points in these courses are G1, G2, G3, G4, and G5, respectively then

$$GPA = \frac{\sum C_i G_i}{\sum C_i}$$

##### 14.1 A Numerical Example

Suppose a student has completed five courses in a Term and obtained the following grades:

Course	Credits	Grade	Grade Points
EEE 203	3	A+	4.00
EEE 205	3	B	3.00
EEE 207	3	A	3.75
Math 205	2	B+	3.25
Hum 203	1	A-	3.50

Then his/her GPA for the term will be computed as follows:

$$GPA = \frac{3(4.0) + 3(3.0) + 3(3.75) + 2(3.25) + 1(3.5)}{(3 + 3 + 3 + 2 + 1)} = 3.52$$

#### 15. Student Classification

For a number of reasons, it is necessary to have a definite system by which to classify students as First Year/Freshman, Second Year/Sophomore, Third Year/Junior, and Fourth Year/Senior. At BUET, regular students are classified according to the number of credit hours earned towards a degree. The following classification applies to

the students.

Year/Level	Earned credit Hours	
	Engineering /URP	Architecture
First Year (Freshman) / Level I	0 to 36	0 to 34
Second Year (Sophomore) / Level II	>36 to 72	>34 to 72
Third Year (Junior) / Level III	>72 to 108	>72 to 110
Fourth Year (Senior) / Level IV	> 108	> 110 to 147
Fifth Year / Level V		> 147

## 16. Registration for the Second and Subsequent Terms

A student is normally required to earn at least 15 credits in a term. At the end of each term, the students will be classified into the following three categories:

### *Category 1*

Consisting of students who have passed all the courses prescribed for the previous term and have no backlog of courses. A student belonging to Category 1 will be eligible to register for all courses prescribed for the next term.

### *Category 2*

Consisting of students who have earned at least 15 credits in the term but do not belong to Category 1. A student belonging to Category 2 is advised to take at least one course less in the next term subject to the condition that he has to register for such backlog courses as may be prescribed by the Adviser.

### *Category 3*

Consisting of students who have failed to earn 15 credits in the previous term. A student belonging to Category 3 is advised to take at least two courses less subject to registration for a minimum of 15 credits. However he/she will be required to register for such backlog courses as may be prescribed by the Adviser.

## **17. Performance Evaluation**

The performance of a student will be evaluated in terms of two indices, viz. term grade point average, and cumulative grade point average, which is the grade average for all the terms. The term grade point average is computed dividing the total grade points earned in a term by the number of term hours taken in that term. The overall or cumulative grade point average (CGPA) is computed by dividing the total grade points accumulated up to date by the total credit hours earned. Thus a student who has earned 275 grade points in attempting 100 credit hours of courses would have an overall grade point average of 2.75.

Students will be considered to be making normal progress toward a degree if their cumulative or overall GPA for all work attempted is 2.20 or more. Students who regularly maintain Term GPA of 2.20 or better are making good progress toward their degrees and are in good standing with the University. Students who fail to maintain this minimum rate of progress will not be in good standing. This can happen when one or more of the following conditions exist:

- (i) Term GPA falls below 2.20
- (ii) Cumulative GPA falls below 2.20
- (iii) Earned credits fall below 15 times the Number of Terms attended/ studied

All such students can make up deficiencies in GPA and credit requirements by completing courses in next term(s) and backlog courses, if there are any, with better grades. When GPA and credit requirements are achieved, the student is returned to good standing.

## **18. Academic Progress, Probation and Suspension**

Academic Progress: Undergraduate students will be considered to be making normal progress toward a degree if their cumulative or overall GPA for all work attempted is not less than 2.20.

Probation and Suspension: Undergraduate students who regularly maintain Term GPA of 2.20 or better are making good progress toward their degrees and are in good standing with the University. Students who fail to maintain this minimum rate of progress may be placed on

academic probation.

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

- (i) The Term GPA falls below 2.20 or
- (ii) The cumulative GPA falls below 2.20

Students on probation are subject to such restrictions with respect to courses and extracurricular activities as may be imposed by the respective Dean of faculty.

The minimum period of probation is one Term, but the usual period is for one academic year. This allows the student an opportunity to improve the GPA through the completion of additional course work during the period that the student is on probation. The probation is extended for additional terms until the student achieves an overall GPA of 2.20 or better. When that condition is achieved the student is returned to good standing.

Academic probation is not to be taken lightly - it is a profoundly serious matter. A student on academic probation who fails to maintain a GPA of at least 2.20 during two consecutive academic years may be suspended from this University. A student who has been suspended may submit a petition to the Dean of faculty, but this petition will not be considered until the student has been suspended for at least one full Term.

Petitions for reinstatement must set forth clearly the reasons for the previous unsatisfactory academic record and it must delineate the new conditions that have been created to prevent the recurrence of such work. Each of such petitions is considered individually on its own merits. After consideration of the petition, and perhaps after consultation with the student, the Dean in some cases, reinstate the student, if this is the first suspension. However, a second suspension will be regarded as final and absolute.

## **19. Measures for Helping Academically Weak Students**

The following provisions will be made as far as possible to help academically weak students to enable them to complete their studies within the maximum period of seven years in engineering and eight years in architecture students, respectively:

- a) All such students whose cumulative grade point average (CGPA) is less than 2.20 at the end of a term may be given a load of not exceeding four courses, in the next term.
- b) For other academic deficiencies, some basic and core courses may be offered during the Short Term in order to enable the student to partially make-up for the reduced load during Regular Terms.

Following criteria will be followed for determining academically weak students:

- a) CGPA falling below 2.20.
- b) Term grade point average (TGPA) falling below 2.20 points below that of the previous term.
- c) Earned credit falling below 15 times the number of terms attended.

## **20. Special Courses**

- a) These courses, which include self-study courses, will be from amongst the regular theory courses listed in the course catalog, a special course can be run only in exceptional cases.
- b) Whether a course is to be floated as a special course will be decided by the Head of the concerned department in consultation with the teacher/course co-coordinator concerned. Decisions to float a course as a special course shall be reported to the Academic Council.
- c) The special course may be offered to any student in his/her last term if it helps him/her to graduate in that term. It will be offered only if the course is not running in that term as a regular course.

- d) Normally no lecture will be delivered for the special course but laboratory/design classes may be held if they form a part of the course. The course coordinator/course teacher will also assign homeworks, administer quizzes and final examinations for giving his or her assessments at the end of the term.
- e) A student will be allowed to register for a maximum of two courses on self-study basis.
- f) A Special Course shall not be utilized for grade improvement purposes.

## **21. Rules for Courses offered in a Short Term**

- a) The courses to be run during the Short Term shall be decided on the recommendations of Departments on the basis of essential deficiencies to be made up by a group of students. Once floated, other students could be allowed to register in those courses subject to the capacity constraints and satisfaction of prerequisites.
- b) Students will be allowed to register in a maximum of two courses during the Short Term.
- c) A course may be given a weightage up to 6 credits in any Short Term following a graduating/final Term if he/she is short by a maximum of 6 earned credits only, on a self-study basis with no formal instruction. In a self-study course, there will be a Final Examination, beside the continuous assessment.
- d) A fee of Tk. xx.xx (amount may be decided by the authority) for each credit hour to be registered to be borne by the students who enroll during Short Term.

## **22. Minimum Earned Credit and GPA Requirements for Obtaining Graduation**

Minimum credit hour requirements for the award of Bachelor's degree in engineering and architecture will be decided by the respective BUGS. However, at least 157 credit hours for engineering and 190



credit hours for architecture must be earned to be eligible for graduation, and this must include the specified core courses. The minimum GPA requirement for obtaining a bachelor's degree in engineering, URP or architecture is 2.20.

Completion of full time Studentship:

Students who have completed the minimum credit requirement for graduation for a Bachelor's degree shall not be considered and registered as full time students.

A student may take additional courses with the consent of his/her Adviser in order to raise GPA, but he/she may take a maximum of 15 such additional credits in engineering and URP and 18 such additional credits in architecture beyond respective credit-hour requirements for bachelor's degree during his/her entire period of study.

### **22.1 Application for Graduation and Award of Degree**

A student who has fulfilled all the academic requirements for the Bachelor's degree will have to apply to the Controller of Examinations through his/her Adviser for graduation. Provisional degree will be awarded on completion of credit and GPA requirements. Such provisional degrees will be confirmed by the Academic Council.

### **23. Industrial/Professional Training Requirements**

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

### **24. Time Limits for Completion of Bachelor's Degree**

A student must complete his studies within a maximum period of seven years for engineering and URP and eight years for architecture.

### **25. Inclusion of Repeaters from Annual System in Course System**

Repeater students including Private students of the Annual system will be included in the Course System of curricula as and when such a situation will arise.

## **25.1 Equivalence of Courses and Grades**

Equivalence of courses passed previously by any repeater student including Private students shall be determined by the respective BUGS for the purpose of:

- a) Allowing course exemption, and
- b) Conversion of numerical grades into letter grades in exempted courses.

## **25.2 Exemption of Courses**

Repeater students including private students may be granted exemption in theoretical course(s) in which he/she secured 45% or more marks and in sessional/laboratory course(s) in which he/she secured 41% or more marks.

## **25.3 Time Limit for Completion of Bachelor's Degree**

Time allowed for a student included in the Course System from Annual System to complete studies leading to a Bachelor's degree will be proportional to the remaining credits to be completed by him/her.

A student in engineering, for example, having earned 40 credit hours through equivalence and exemption (of previously completed courses) out of a total requirement of 160 credits for Bachelor's degree will get  $(7 \text{ yrs} \times 120/160 = 5.25) = 5.5$  years (rounded to next higher half-a year) or 11 (eleven) Regular Terms to fulfill all requirements for Bachelor's degree. For a student in architecture, time allowed will be calculated in a similar way.

## **25.4 Relaxation of Course Registration for Students Transferred to Course System from Annual System**

The requirement of registration of a minimum 15 credit hours in a term shall be waived for only the terms of the level where he/she has been transferred in the course system provided that he/she has been granted exemption in some of the courses offered in those terms.

## **26. Supplementary Examination**

### **26.1 Students of Graduating Term**

Students of graduating term, having One (01) or Two (02) Theory Courses left for graduation, can register for supplementary examination if they meet the following criteria:

- a) Only one (01) or two (02) theory courses that are left for graduation which were previously incomplete due to “Term withdrawal” or completed by obtaining an “F” grade.
- b) Students have to register these courses in the graduating term for attending supplementary examinations.
- c) All Sessional/ Industrial Training/ Practical Survey courses have already been completed by the previous terms.
- d) Supplementary examination cannot be used for grade improvement of any theory courses and the highest grade any student can obtain from this examination is “B”.

### **26.2 Students of Non-Graduating Term**

Students of non-graduating term can register for supplementary examination as per the following criteria:

- a) Students of Engineering and URP departments who have completed 108 credits and students of Department of Architecture who have completed 147 credits can register for a maximum of two (02) theory courses (extra from the courses and credits of the regular term) from the previous terms which was completed by obtaining an “F” grade. All other students can register for only one (01) theory course (extra from the courses and credits of the regular term) from the previous terms which was completed by obtaining an “F” grade.
- b) The Departments will decide the courses that will be offered for supplementary examination.

- c) Students have to pay a registration fee (to be decided by the University) for attending the supplementary examination.
- d) Supplementary examination cannot be used for grade improvement of any theory courses and the highest grade any student can obtain from this examination is “B”.

## **27. Attendance, Conduct, Discipline etc.**

### **27.1 Attendance**

All students are expected to attend classes regularly. The university believes that attendance is necessary for effective learning. The first responsibility of a student is to attend classes regularly, and one is required to attend at least 60% of all classes held in every course.

### **27.2 Conduct and Discipline**

A student shall conform to a high standard of discipline, and shall conduct himself, within and outside the precincts of the university in a manner befitting the students at a university of national importance. He shall show due courtesy and consideration to the employees of the university and Halls of Residence, good neighborliness to his fellow students and the teachers at the university and pay due attention and courtesy to visitors.

To safeguard its ideals of scholarship, character and personal behavior, the university reserves the right to require the withdrawal of any student at any time for any reason deemed sufficient.

## **28. Absence during Term**

A student should not be absent from quizzes, tests, etc. during the term. Such absence will naturally lead to reduction in points/marks which count towards the final grade. Absence in Term Final Examination will result in ‘F’ grades.

A student who has been absent for short periods, up to a maximum of three weeks due to illness should approach the course teacher(s) or the

course -coordinator(s) for make-up quizzes or assignments immediately on returning to the classes. Such request should be supported by a medical certificate from a university Medical Officer. The medical certificate issued by a registered medical practitioner (with the Registration Number shown explicitly on the certificates) will also be acceptable only in those cases where the student has valid reasons for his absence from the university.

# Chapter 4

## Course Requirements for Undergraduate Civil Engineering Students

### 4.1 Introduction

The undergraduate students of the Department of Civil Engineering have to follow the course schedule given below. The letter prefix in any course number indicates the department offering the course viz. CE for Civil Engineering, WRE for Water Resources Engineering, EEE for Electrical Engineering, ME for Mechanical Engineering, Chem for Chemistry, Phy for Physics, Math for Mathematics, Hum for Humanities and Shop for Workshops. The first digit in the number indicates the year/level for which the course is intended. Odd number courses are theory courses and even numbered courses are sessional courses.

### 4.2 Course Requirements

#### A. BASIC SCIENCES

##### Requirement 12 credits (9+3)

##### Theoretical

* Phy 101	Physical Optics, Waves and Oscillation, Heat and Thermodynamics	3 credits	
Phy 105	Structure of Matter, Electricity and Magnetism and Modern Physics	3 credits	<i>Prereq.</i> Phy 101
* Chem 103	Chemistry I	3 credits	
Chem 105	Chemistry II	3 credits	<i>Prereq.</i> Chem 103

##### Sessional

* Phy 102	Physics Laboratory	1.5 credits	
* Chem 114	Inorganic Quantitative Analysis	1.5 credits	

\* Subjects marked with asterisk (\*) indicate compulsory courses

**B. MATHEMATICS**

**Requirement 9 Credits (9+0)**

**Theoretical**

- \* Math 137 Differential and Integral Calculus, Matrices 3 credits
- \* Math 139 Differential Equations and Statistics 3 credits
- \* Math 237 Laplace Transform and Vector Analysis 3 credits

**C. HUMANITIES, SOCIAL SCIENCES AND BUSINESS**

**Requirement 9.5 Credits (8+1.5)**

**Theoretical**

- \* Hum 185 English 2 credits
- \* Hum 217 Engineering Economics 2 credits
- \* Hum 353 Accounting 2 credits
- Hum 355 Sociology 2 credits
- Hum 375 Government 2 credits

**Sessional**

- \* Hum 274 Developing English Language Skills 1.5 credits

**D. BASIC ENGINEERING**

**Requirement 48 Credits (30+18)**

**Theoretical**

- \* CE 101 Analytic Mechanics 3 credits
- \* CE 103 Surveying 4 credits
- \* EEE 165 Basic Electrical Technology 3 credits
- \* CE 201 Engineering Materials 3 credits
- \* CE 203 Engineering Geology and Geomorphology 3 credits
- \* CE 205 Numerical Methods 2 credits

* CE 207	Applied Mathematics for Engineers	3 credits
* WRE 211	Fluid Mechanics	3 credits
* CE 211	Mechanics of Solids I	3 credits <i>Prereq.</i> CE 101
* CE 213	Mechanics of Solids II	3 credits <i>Prereq.</i> CE 211

### **Sessional**

* CE 100	Civil Engineering Drawing	1.5 credits
* CE 102	Computer Aided Drafting	1.5 credits
* CE 104	Practical Surveying	1.5 credits
* Shop 132	Workshop Sessional	1.5 credits
* CE 200	Details of Construction	1.5 credits
* CE 202	Materials Sessional	1.5 credits
* WRE 212	Fluid Mechanics Sessional	1.5 credits
* CE 204	Computer Programming Sessional	1.5 credits
* CE 206	Engineering Computation Sessional	1.5 credits <i>Prereq.</i> CE 204
* CE 208	Quantity Surveying	1.5 credits
* CE 210	Architectural, Engineering and Planning Appreciation	1.5 credits
* CE 212	Structural Mechanics and Materials Sessional	1.5 credits

## **E. CIVIL ENGINEERING PRACTICE**

### **Requirement 11.5 Credits (10+1.5)**

#### **Theoretical**

* CE 301	Professional Practices and Communication	3 credits
* CE 401	Project planning and Construction Management	4 credits
CE 403	Sustainability of Development Projects	3 credits
CE 405	Business and Career Development	3 credits



CE 407 Principles of Project Finance 3 credits

**Sessional**

\* CE 302 Professional Practices and Communication Sessional 1.5 credits

**F. STRUCTURAL ENGINEERING**

**Minimum Requirement 20.5 Credits (16+4.5)**

**Theoretical**

\* CE 311 Structural Analysis 4 credits *Prereq.* CE 213

\* CE 315 Design of Concrete Structures I 3 credits

\* CE 317 Design of Concrete Structures II 3 credits *Prereq.* CE 315

\* CE 319 Design of Steel Structures 3 credits

\* CE 411 Analysis of Indeterminate Structures 3 credits *Prereq.* CE 311

CE 413 Introduction to Steel-Concrete Composite Structures 2 credits

CE 415 Prestressed Concrete 2 credits

CE 417 Design of Concrete Structures III 2 credits

CE 419 Introduction to Finite Element Method 2 credits

CE 421 Dynamics of Structures 2 credits

**Sessional**

\* CE 316 Bridge Design Sessional 1.5 credits

\* CE 320 Steel Structures Design Sessional 1.5 credits

\* CE 410 Building Design Sessional 1.5 credits

CE 400 Undergraduate Thesis 3.0 credits

CE 404 Capstone Project 4.5 credits

## **G. ENVIRONMENTAL ENGINEERING**

### **Minimum Requirement 8.5 Credits (7+1.5)**

#### **Theoretical I**

* CE 331	Environmental Engineering I	3 credits
* CE 333	Environmental Engineering II	4 credits
CE 433	Solid and Hazardous Waste Management	2 credits
CE 435	Environmental Pollution Management	2 credits
CE 437	Basic Environmental Management	2 credits

#### **Sessional**

* CE 332	Environmental Engineering Laboratory	1.5 credits
CE 400	Undergraduate Thesis	3.0 credits
CE 404	Capstone Project	4.5 credits

## **H. GEOTECHNICAL ENGINEERING**

### **Minimum Requirement 8.5 Credits (7+1.5)**

#### **Theoretical**

* CE 341	Principles of Soil Mechanics	4 credits <i>Prereq.</i> CE 203
* CE 441	Foundation Engineering	3 credits
CE 443	Earth Retaining Structures	2 credits
CE 445	Elementary Soil Dynamics	2 credits
CE 447	Soil-water Interaction	2 credits

**Sessional**

* CE 342	Geotechnical Engineering Laboratory	1.5 credits
CE 400	Undergraduate Thesis	3.0 credits
CE 404	Capstone Project	4.5 credits

**I. TRANSPORTATION ENGINEERING****Minimum Requirement 8.5 Credits (7+1.5)****Theoretical**

* CE 351	Transportation Engineering I: Transportation Planning & Traffic Engineering	3 credits
* CE 451	Transportation Engineering II: Pavement Design and Railway Engineering	4 credits
CE 453	Transportation Engineering III: Traffic Engineering Design and Management	2 credits
CE 455	Transportation Engineering IV: Pavement Management, Drainage and Airport	2 credits
CE 457	Transportation Engineering V: Urban Transportation Planning and Management	2 credits

**Sessional**

CE 400	Undergraduate Thesis	3.0 credits
CE 404	Capstone Project	4.5 credits
* CE 452	Transportation Engineering Sessional I: Highway Materials and Traffic Engineering Design	1.5 credits

**J. WATER RESOURCES ENGINEERING****Minimum Requirement 8.5 Credits (7+1.5)****Theoretical**

* WRE 311	Open Channel Flow	4 credits
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\* WRE 451 Hydrology, Irrigation and Flood Management 3 credits

**Sessional**

\* WRE 312 Open Channel Flow Sessional 1.5 credits

**4.3 Summary of Course Requirements for B.Sc. Engg. (Civil) Degree**

<b>Courses</b>		<b>Requirements (total credits to be offered)</b>	
A.	Basic Science	12	(15)
B.	Mathematics	9	(9)
C.	Humanities	9.5	(11.5)
D.	Basic Engineering	48	(48)
E.	Civil Engineering Practice	11.5	(17.5)
F.	Structural Engineering	20.5	(38)
G.	Environmental Engineering	8.5	(22)
H.	Geotechnical Engineering	8.5	(22)
I.	Transportation Engineering	8.5	(22)
J.	Water Resources Engineering	8.5	(18.5)
<b>Total</b>		<b>144.5</b>	
Undergraduate Thesis		3.0	
Capstone Project		4.5	
<b>Optional Courses**:</b>			
Theory		8.0 (38 in F to J, Max. 4 from each division)	
<b>Grand Total</b>		<b>160</b>	

\*\* Students specializing in an optional group, such as Structural, Geotechnical, Environmental and Transportation, shall take thesis, capstone project, and at least two optional theory courses from that group and two more optional theory courses from any other group.

#### 4.4 Courses Offered in Different Terms for B.Sc.Engg. (Civil) Degree

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks		
1	I	CE 101	Analytic Mechanics	3.00	C			
		Chem 103	Chemistry I	3.00	C			
		Math 137	Differential and Integral Calculus, Matrices	3.00	C			
		Phy 101	Physical Optics, Waves and Oscillation, Heat and Thermodynamics	3.00	C			
		Hum 355	Sociology	2.00	O	Select one		
		Hum 375	Government	2.00	O			
		CE 100	Civil Engineering Drawing	1.50	C			
		Chem 114	Inorganic Quantitative Analysis	1.50	C			
		Phy 102	Physics Laboratory	1.50	C			
		Total				<b>18.50</b>		

C: Compulsory  
O: Optional

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
1	II	CE 103	Surveying	4.00	C	
		EEE 165	Basic Electrical Technology	3.00	C	
		Hum 185	English	2.00	C	
		Math 139	Differential Equations and Statistics	3.00	C	
		Chem 105 *	Chemistry II	3.00	O	Select one
		Phy 105 *	Structure of Matter, Electricity and Magnetism and Modern Physics	3.00	O	
		CE 102	Computer Aided Drafting	1.50	C	
		CE 104	Practical Surveying	1.50	C	
		HUM 274	Developing English Language Skills	1.50	C	
		Shop 132	Workshop Sessional	1.50	C	
		Total				<b>21.00</b>

C: Compulsory

O: Optional

\*: Registration of this course requires obtaining minimum F grade in its pre-requisite course

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
2	I	CE 201	Engineering Materials	3.00	C	
		CE 203	Engineering Geology and Geomorphology	3.00	C	
		CE 211 *	Mechanics of Solids I	3.00	C	
		Hum 353	Accounting	2.00	C	
		Math 237	Laplace Transform and Vector Analysis	3.00	C	
		CE 200	Details of Construction	1.50	C	
		CE 202	Materials Sessional	1.50	C	
		CE 204	Computer Programming Sessional	1.50	C	
		CE 210	Architectural, Engineering and Planning Appreciation	1.50	C	
		Total			<b>20.00</b>	

C: Compulsory

\*: Registration of this course requires obtaining minimum F grade in its pre-requisite course

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
2	II	CE 205	Numerical Methods	2.00	C	
		CE 213 *	Mechanics of Solids II	3.00	C	
		Hum 217	Engineering Economics	2.00	C	
		CE 207	Applied Mathematics for Engineers	3.00	C	
		WRE 211	Fluid Mechanics	3.00	C	
		CE 206 *	Engineering Computation Sesssional	1.50	C	
		CE 208	Quantity Surveying	1.50	C	
		CE 212	Structural Mechanics and Materials Sesssional	1.50	C	
		WRE 212	Fluid Mechanics Sesssional	1.50	C	
		Total			<b>19.00</b>	

C: Compulsory

\*: Registration of this course requires obtaining minimum F grade in its pre-requisite course



Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
3	I	CE 301	Professional Practices and Communication	3.00	C	
		CE 311 *	Structural Analysis	4.00	C	
		CE 315	Design of Concrete Structures I	3.00	C	
		CE 331	Environmental Engineering I	3.00	C	
		CE 341 *	Principles of Soil Mechanics	4.00	C	
		CE 302	Professional Practices and Communication Sessional	1.50	C	
		CE 332	Environmental Engineering Laboratory	1.50	C	
		CE 342	Geotechnical Engineering Laboratory	1.50	C	
		Total			<b>21.50</b>	

C: Compulsory

\*: Registration of this course requires obtaining minimum F grade in its pre-requisite course

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
3	II	CE 317 *	Design of Concrete Structures II	3.00	C	
		CE 319	Design of Steel Structures	3.00	C	
		CE 333	Environmental Engineering II	4.00	C	
		CE 351	Transportation Engineering I: Transportation Planning & Traffic Engineering	3.00	C	
		WRE 311	Open Channel Flow	4.00	C	
		CE 316	Bridge Design Sessional	1.50	C	
		CE 320	Steel Structures Design Sessional	1.50	C	
		WRE 312	Open Channel Flow Sessional	1.50	C	
		Total			<b>21.50</b>	

C: Compulsory

\*: Registration of this course requires obtaining minimum F grade in its pre-requisite course

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
4	I	CE 401	Project planning and Construction Management	4.00	C	
		CE 411 *	Analysis of Indeterminate Structures	3.00	C	
		CE 441	Foundation Engineering	3.00	C	
		CE 451	Transportation Engineering II: Pavement Design and Railway Engineering	4.00	C	
		WRE 451	Hydrology, Irrigation and Flood Management	3.00	C	
		CE 452	Transportation Engineering Sessional I: Highway Materials and Traffic Engineering Design	1.50	C	
		CE 400 **	Undergraduate Thesis	1.50	C	
		CE 404 **	Capstone Project	1.50	C	
		CE 410	Building Design Sessional	1.50	C	
		<b>Total</b>			<b>23.00</b>	

C: Compulsory

\*: Registration of this course requires passing of its pre-requisite course

\*\*: To register in a division of specialization from Structural, Environmental, Geotechnical, and Transportation Engineering.

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
4	II	CE 403	Sustainability of Development Projects	3.00	O	Select one
		CE 405	Business and Career Development	3.00	O	
		CE 407	Principles of Project Finance	3.00	O	
		CE 400 **	Undergraduate Thesis	1.50	C	
		CE 404 **	Capstone Project	3.00	C	
		CE 413	Introduction to Steel-Concrete Structures Composite	2.00	O	Select two (Structure)
		CE 415	Prestressed Concrete	2.00	O	
		CE 417	Design of Concrete Structures III	2.00	O	
		CE 419	Introduction to Finite Element Method	2.00	O	
		CE 421	Dynamics of Structures	2.00	O	
		CE 433	Solid and Hazardous Waste Management	2.00	O	
		CE 435	Environmental Pollution Management	2.00	O	
		CE 437	Basic Environmental Management	2.00	O	Select two (Environment)

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks		
4	II	CE 443	Earth Retaining Structures	2.00	0	Select two (Geotechnical)		
		CE 445	Elementary Soil Dynamics	2.00	0			
		CE 447	Soil-water Interaction	2.00	0			
		CE 453	Transportation Engineering III: Traffic Engineering Design and Management	2.00	0	Select two (Transport)		
		CE 455	Transportation Engineering IV: Pavement Management, Drainage and Airport	2.00	0			
		CE 457	Transportation Engineering V: Urban Transportation Planning and Management	2.00	0			
		<b>Total</b>				<b>15.50</b>		

C: Compulsory

O: Optional

\*: Registration of this course requires passing of its pre-requisite course

\*\*\*: To register in division of specialization from Structural, Environmental, Geotechnical, and Transportation Engineering.

#### 4.5 Course Equivalence Table for B.Sc. Engg. (Civil) Degree

Equivalence rules as per AC resolution No. 200222 date 19.02.2020 will be applicable.

Old Syllabus			New Syllabus		
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
CE 100	Civil Engineering Drawing	1.50	CE 100	Civil Engineering Drawing	1.50
CE 101	Analytic Mechanics	3.00	CE 101	Analytic Mechanics	3.00
CE 102	Computer Aided Drafting	1.50	CE 102	Computer Aided Drafting	1.50
CE 103	Surveying	4.00	CE 103	Surveying	4.00
CE 104	Practical Surveying	1.50	CE 104	Practical Surveying	1.50
CE 200	Details of Construction	1.50	CE 200	Details of Construction	1.50
CE 201	Engineering Materials	3.00	CE 201	Engineering Materials	3.00
CE 202	Materials Sessional	1.50	CE 202	Materials Sessional	1.50
CE 203	Engineering Geology and Geomorphology	3.00	CE 203	Engineering Geology and Geomorphology	3.00
CE 204	Computer Programming Sessional	1.50	CE 204	Computer Programming Sessional	1.50
CE 205	Numerical Methods	2.00	CE 205	Numerical Methods	2.00
CE 206	Engineering Computation sessional	1.50	CE 206	Engineering Computation sessional	1.50

Old Syllabus			New Syllabus		
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
CE 207	Applied Mathematics for Engineers	3.00	CE 207	Applied Mathematics for Engineers	3.00
CE 208	Quantity Surveying	1.50	CE 208	Quantity Surveying	1.50
CE 210	Architectural, Engineering and Planning Appreciation	1.50	CE 210	Architectural, Engineering and Planning Appreciation	1.50
CE 211	Mechanics of Solids I	3.00	CE 211	Mechanics of Solids I	3.00
CE 212	Structural Mechanics and Materials Sessional	1.50	CE 212	Structural Mechanics and Materials Sessional	1.50
CE 213	Mechanics of Solids II	3.00	CE 213	Mechanics of Solids II	3.00
CE 301	Professional Practices and Communication	3.00	CE 301	Professional Practices and Communication	3.00
CE 302	Professional Practices and Communication Sessional	1.50	CE 302	Professional Practices and Communication Sessional	1.50
CE 311	Structural Analysis and Design I	4.00	CE 311	Structural Analysis	4.00
CE 315	Design of Concrete Structures I	3.00	CE 315	Design of Concrete Structures I	3.00
CE 316	Concrete Structures Design Sessional I	1.50	CE 316	Bridge Design Sessional	1.50
CE 317	Design of Concrete Structures II	3.00	CE 317	Design of Concrete Structures II	3.00
CE 319	Design of Steel Structures	3.00	CE 319	Design of Steel Structures	3.00
CE 320	Steel Structures Design Sessional	1.50	CE 320	Steel Structures Design Sessional	1.50

Old Syllabus		New Syllabus			
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
CE 331	Environmental Engineering I	3.00	CE 331	Environmental Engineering I	3.00
CE 332	Environmental Engineering Laboratory	1.50	CE 332	Environmental Engineering Laboratory	1.50
CE 333	Environmental Engineering II	4.00	CE 333	Environmental Engineering II	4.00
CE 341	Principles of Soil Mechanics	4.00	CE 341	Principles of Soil Mechanics	4.00
CE 342	Geotechnical Engineering Laboratory	1.50	CE 342	Geotechnical Engineering Laboratory	1.50
CE 351	Transportation Engineering I: Transportation Planning & Traffic Engineering	3.00	CE 351	Transportation Engineering I: Transportation Planning & Traffic Engineering	3.00
CE 400	Project and Thesis	4.50	CE 400	Undergraduate Thesis	3.00
CE 401	Project planning and Construction Management	4.00	CE 401	Project planning and Construction Management	4.00
CE 403	Socio-economic Aspects of Development Projects	3.00	CE 403	Sustainability of Development Projects	3.00
CE 405	Business and Career Development	3.00	CE 405	Business and Career Development	3.00
CE 410	Concrete Structures Design Sessional II	1.50	CE 410	Building Design Sessional	1.50
CE 411	Structural Analysis and Design II	3.00	CE 411	Analysis of Indeterminate Structures	3.00



Old Syllabus		New Syllabus			
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
CE 412	Computer Aided Analysis and Design of Structures Sessional	1.50		Nil	
CE 413	Introduction to Steel-Concrete Composite Structures	2.00	CE 413	Introduction to Steel-Concrete Composite Structures	2.00
CE 415	Prestressed Concrete	2.00	CE 415	Prestressed Concrete	2.00
CE 417	Design of Concrete Structures III	2.00	CE 417	Design of Concrete Structures III	2.00
CE 419	Introduction to Finite Element Method	2.00	CE 419	Introduction to Finite Element Method	2.00
CE 421	Dynamics of Structures	2.00	CE 421	Dynamics of Structures	2.00
CE 432	Design of Water Supply, Sanitation and Sewerage Systems	1.50		NIL	
CE 433	Solid and Hazardous Waste Management	2.00	CE 433	Solid and Hazardous Waste Management	2.00
CE 435	Environmental Pollution Management	2.00	CE 435	Environmental Pollution Management	2.00
CE 437	Environmental and Sustainable Management	2.00	CE 437	Basic Environmental Management	2.00
CE 441	Foundation Engineering	3.00	CE 441	Foundation Engineering	3.00

Old Syllabus		New Syllabus			
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
CE 442	Geotechnical Engineering Design Sessional	1.50		NIL	
CE 443	Earth Retaining Structures	2.00	CE 443	Earth Retaining Structures	2.00
CE 445	Elementary Soil Dynamics	2.00	CE 445	Elementary Soil Dynamics	2.00
CE 447	Soil-water Interaction	2.00	CE 447	Soil-water Interaction	2.00
CE 451	Transportation Engineering II: Pavement Design and Railway Engineering	4.00	CE 451	Transportation Engineering II: Pavement Design and Railway Engineering	4.00
CE 452	Transportation Engineering Sessional I: Highway Materials and Traffic Engineering Design	1.50	CE 452	Transportation Engineering Sessional I: Highway Materials and Traffic Engineering Design	1.50
CE 453	Transportation Engineering III: Traffic Engineering Design and Management	2.00	CE 453	Transportation Engineering III: Traffic Engineering Design and Management	2.00
CE 454	Transportation Engineering Sessional II: Pavement Design and Traffic Studies	1.50		NIL	

Old Syllabus		New Syllabus			
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
CE 455	Transportation Engineering IV: Pavement Management, Drainage and Airport	2.00	CE 455	Transportation Engineering IV: Pavement Management, Drainage and Airport	2.00
CE 457	Transportation Engineering V: Urban Transportation Planning and Management	2.00	CE 457	Transportation Engineering V: Urban Transportation Planning and Management	2.00
Chem 103	Chemistry I	3.00	Chem 103	Chemistry I	3.00
Chem 105	Chemistry II	3.00	Chem 105	Chemistry II	3.00
Chem 114	Inorganic Quantitative Analysis	1.50	Chem 114	Inorganic Quantitative Analysis	1.50
EEE 165	Basic Electrical Technology	3.00	EEE 165	Basic Electrical Technology	3.00
Hum 185	English	2.00	Hum 185	English	2.00
Hum 217	Engineering Economics	2.00	Hum 217	Engineering Economics	2.00
HUM 274	Developing English Language Skills	1.50	Hum 274	Developing English Language Skills	1.50
Hum 353	Accounting	2.00	Hum 353	Accounting	2.00

Old Syllabus		New Syllabus			
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
Hum 355	Sociology	2.00	Hum 355	Sociology	2.00
Hum 375	Government	2.00	Hum 375	Government	2.00
Math 137	Differential and Integral Calculus, Matrices	3.00	Math 137	Differential and Integral Calculus, Matrices	3.00
Math 139	Differential Equations and Statistics	3.00	Math 139	Differential Equations and Statistics	3.00
Math 237	Laplace Transform and Vector Analysis	3.00	Math 237	Laplace Transform and Vector Analysis	3.00
Phy 101	Physical Optics, Waves and Oscillation, Heat and Thermodynamics	3.00	Phy 101	Physical Optics, Waves and Oscillation, Heat and Thermodynamics	3.00
Phy 102	Physics Laboratory	1.50	Phy 102	Physics Laboratory	1.50
Phy 105	Structure of Matter, Electricity and Magnetism and Modern Physics	3.00	Phy 105	Structure of Matter, Electricity and Magnetism and Modern Physics	3.00
Shop 132	Workshop Sessional	1.50	Shop 132	Workshop Sessional	1.50
WRE 211	Fluid Mechanics	3.00	WRE 211	Fluid Mechanics	3.00

Old Syllabus		New Syllabus			
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
WRE 212	Fluid Mechanics Sessional	1.50	WRE 212	Fluid Mechanics Sessional	1.50
WRE 311	Open Channel Flow	4.00	WRE 311	Open Channel Flow	4.00
WRE 312	Open Channel Flow Sessional	1.50	WRE 312	Open Channel Flow Sessional	1.50
WRE 405	Flood Mitigation and Management	2.00		NIL	
WRE 407	Ground Water Engineering	2.00		NIL	
WRE 409	River Engineering	2.00		NIL	
WRE 411	Hydraulic Structures	2.00		NIL	
WRE 412	Water Resources Engineering Sessional	1.50		NIL	
WRE 413	Coastal Engineering	2.00		NIL	
WRE 451	Hydrology, Irrigation and Flood Management	3.00	WRE 451	Hydrology, Irrigation and Flood Management	3.00

## *Chapter 5*

### **Detail Outline of Undergraduate Courses**

#### **5.1 Courses Offered by the Department of Civil Engineering (For Civil Engineering students)**

##### **CE 100: Civil Engineering Drawing**

**1.50 credits, 3 hrs/week**

Lines and lettering; plane geometry: drawing of linear and curved geometric figures, e.g. pentagon, hexagon, octagon, ellipse, parabola, hyperbola; solid geometry: concept of isometric view and oblique view, theory of projections; drawing of isometric view of 3d objects such as cube, prism, pyramid, cone and cylinder; projections of cube, prism, cone, cylinder; developments of cube, pyramid, cone, cylinder; plan, elevations and sections of one storied and duplex building.

##### **CE 101: Analytic Mechanics**

**3.00 credits, 3 hrs/week**

Coplanar and non-coplanar force systems; moments; analyses of two-dimensional frames and trusses; friction; flexible chords; centroids of lines, areas and volumes; moments of inertia of areas and masses; plane motion; principles of work and energy; impulse and momentum; virtual work principle for rigid bodies.

##### **CE 102: Computer Aided Drafting**

**1.50 Credits, 3 hrs/week**

Introduction to computer usage; introduction to CAD packages and computer aided drafting: drawing editing and dimensioning of simple objects; plan, elevations and sections of multi-storied buildings; reinforcement details of beams, slabs, stairs etc; plan and section of septic tank; detailed drawings of roof trusses; plans, elevations and sections of culverts, bridges and other hydraulic structures; drawings of building services.

**CE 103: Surveying**  
**4.00 credits, 4 hrs/week**

Reconnaissance survey; linear measurements; traverse survey; triangulation, leveling and contouring; calculation of areas and volumes; problems on heights and distances; curves and curve ranging, transition curve, vertical curves; tacheometry: introduction, principles and problems on tacheometry; astronomical surveying: definition, instruments, astronomical corrections, systems of time; photogrammetry: introduction of terrestrial photography, aerial photography, reading of photo mosaic, scale; project surveying; errors in surveying; remote sensing; introduction to geographic information system (GIS) and global positioning system (GPS).

**CE 104: Practical Surveying**  
**1.50 credits, 3 hrs/week**

Linear and angular measurement techniques; traverse surveying; leveling and contouring; curve setting; tacheometry; project surveying; modern surveying equipment and their applications.

**CE 200: Details of Constructions**  
**1.50 credits, 3 hrs/week**

Types of building, components of a building, design loads, framed structure and load bearing wall structure; foundations: shallow foundation and deep foundation, site exploration, bearing capacity of soil, standard penetration test; brick masonry: types of brick, bonds in brickwork, supervision of brickwork, brick laying tools, defects and strength on brick masonry, typical structures in brickwork, load bearing and non-load bearing walls, cavity walls, partition walls; lintels and arches: different types of lintels and arches, loading on lintels, construction of arches; stairs: different types of stairs, floors: ground floors and upper floors; roofs and roof coverings; shoring; underpinning; scaffolding and formwork; plastering, pointing, painting; distempering and white washing; cement concrete construction; sound insulation: acoustics; thermal insulation; house plumbing: water supply and wastewater drainage.

### **CE 201: Engineering Materials**

**3.00 credits, 3 hrs/week**

Properties and uses of aggregates, brick, cement; sand, lime, mortars; concrete; concrete mix design; wood structures and properties; shrinkage and seasoning; treatment and durability; mechanical properties; wood products; advanced fiber reinforced polymer (FRP) composites and its application to civil engineering; reinforcement types, basic property of FRP composites and available FRP composite products; definition of stress and strain; plane stress and strain condition; identification of strain components of elastic, elasto-plastic and elasto-visco-plastic materials; time dependent strain response of these materials due to different types of loadings; mathematical and simple rheological modeling for prediction of creep behavior; ferrocement: advantages and uses; corrosion and prevention of steel in RC structures, offshore structures and ground applications.

### **CE 202: Materials Sessional**

**1.50 credits, 3 hrs/week**

General discussion on preparation and properties of concrete, test for specific gravity, unit weight, voids and bulking of aggregates; moisture content and absorption of coarse and fine aggregates; normal consistency, initial setting time, soundness and fineness test of cement; direct tensile and compressive strengths of cement mortar; gradation of coarse and fine aggregates; design and testing of a concrete mix, sampling and testing of bricks for absorption, unit weight, efflorescence and compressive strength.

### **CE 203: Engineering Geology and Geomorphology**

**3.00 credits, 3 hrs/week**

Minerals; identification of minerals, common rock forming minerals; physical properties of minerals; mineraloids rocks; types of rocks, cycle of rock change; earthquake and seismic map of Bangladesh.

Structural geology; faults; types of faults; fold and fold type; domes; basins; erosional process; quantitative analysis of erosional land forms. Channel development; channel widening; valley shape; stream terraces; alluvial flood plains; deltas and alluvial fans; channel morphology;



channel patterns and the river basin; geology and geomorphology of Bangladesh.

**CE 204: Computer Programming Sessional**  
**1.50 credits, 3 hrs/week**

Programming concepts and algorithms; internal representation of data; elements of structured programming language: data types, operators, expressions, control structures, functions, pointers and arrays, input and output; concept of Object Oriented Programming (OOP): encapsulation, inheritance, polymorphism and abstraction.

**CE 205: Numerical Methods**  
**2.00 credits, 2 hrs/week**

Systems of linear algebraic equations; interpolation and curve fitting; roots of equations; numerical differentiation; numerical integration; initial value problems; two-point boundary value problems; finite differences.

**CE 206: Engineering Computation Sessional**  
**1.50 credits, 3 hrs/week**  
**Prereq. CE 204**

Introduction to hi-level computational programming tools; application to numerical analysis: basic matrix computation, solving systems of linear equations, non-linear equations, differential equations, interpolation and curve fitting, numerical differentiation, numerical integration; application to engineering problems: solving problems related to mechanics, numerical solution of equation of motion etc.

**CE 207: Applied Mathematics for Engineers**  
**3.00 credits, 3 hrs/week**

Review of differential equations; power series solution of differential equations and their applications: Frobenius method, Legendre's polynomials, gamma function, Bessel's function; integral form of differential equation and its application to engineering problem solving.

Fourier series and its properties, application to engineering problem solving; Fourier integral; Fourier transforms and their uses in solving boundary value problems.

Application of statistical methods to engineering problems: Random variables; discrete and continuous probability distributions; functions of random variables and derived distributions; expectation and moments of random variables; point estimation of distribution parameters: methods of moments and maximum likelihood, Bayesian analysis; confidence intervals; hypothesis tests; nonparametric statistical tests; simple and multiple linear regression and model selection; uncertainty and reliability analysis; project level decision making and quality control.

**CE 208: Quantity Surveying**  
**1.50 credits, 3 hrs/week**

Earthwork excavation for roadway, earthwork computation from spot levels; estimation for residential building: estimation of slab, beam, column, footing; analysis of rates, specifications, costing of residential building; estimation and costing of septic tank; estimation and costing of underground water reservoir; estimation and costing of retaining wall; estimation and costing of slab culvert; estimation and costing of bridges; highways construction; estimation of steel truss; computer aided quantity estimation; construction site survey and estimation.

**CE 210: Architectural, Engineering and Planning Appreciation**  
**1.50 credits, 3 hrs/week**

Appreciation of architecture, mechanical engineering, urban and regional planning; environmental issues.

**CE 211: Mechanics of Solids I**  
**3.00 credits, 3 hrs/week**  
**Prereq. CE 101**

Concepts of stress and strain, generalized Hooke's law; deformations due to tension, compression and temperature change; frame statics: reactions, axial force, shear force and bending moments; axial force, shear force and bending moment diagrams of beams using method of

section and summation approach; elastic analysis of circular shafts in torsion, solid noncircular and thin walled tubular members subjected to torsion, flexural and shear stresses in beams; shear center; closely coiled helical springs.

**CE 212: Structural Mechanics and Materials Sessional**  
**1.50 credits, 3 hrs/week**

Tension, direct shear and impact tests of mild steel specimen; slender column test; static bending test; hardness test of metals; helical spring test; determination of shear centre; study of structural models: truss, beam frame.

**CE 213: Mechanics of Solids II**  
**3.00 credits, 3 hrs/week**  
**Prereq. CE 211**

Symmetric and unsymmetrical bending of beams; stresses due to axial load and bending; stress transformation, Mohr's circle of stresses; beam deflection by direct integration and moment area method; elastic buckling of columns; elastic strain energy; cable theorem and cable supported structures, thin walled pressure vessels.

**CE 301: Professional Practices and Communication**  
**3.00 credits, 3 hrs/week**

Project, its characteristic feature, project life cycle; type of contracts; procurement regulations and law; documents for procurement of works, goods and services and their application; contract risk and contract responsibility; insurances; tender procedure; claims, disputes and arbitration procedure; measures for reducing fiduciary risks. Introduction to communication concepts, modes of communication, methods of effective communication; writing reports; oral presentation of reports; writing proposals; preparing effective business messages; conducting meetings; strategies for effective speaking and successful inter personal communication; job application process, interviews and follow-ups; an introduction to the code of ethics for engineers.

**CE 302: Professional Practices and Communication Sessional**  
**1.50 credits, 3 hrs/week**

Application of communication theory and professional practice approaches in a controlled class room environment; this may include case study analysis, role playing, preparing small reports and proposals, class room presentations and individual reports etc.

**CE 311: Structural Analysis**  
**4.00 credits, 4 hrs/week**  
**Prereq. CE 213**

Stability and determinacy of structures; Analysis of statically determinate frames, trusses and arches; Influence lines; Moving loads on beams, frames and trusses; Wind and earthquake loads, code provisions.

Approximate analysis of statically indeterminate structures: Mill bents, braced trusses; Portal method, cantilever method and vertical load analysis of multi storied building frames; building drift.

Deflection of beams, trusses and frames by virtual work method; Approximate analysis of suspension bridges.

**CE 315: Design of Concrete Structures I**  
**3.00 credits, 3 hrs/week**

Fundamental behavior of reinforced concrete and loads on structure; introduction to strength design and alternate design methods; flexural design of beams (singly reinforced, doubly reinforced, T-beam) using strength design method; shear, diagonal tension and torsion of beams; bond and anchorage of reinforcement and its detailing; design of one-way slabs; design of two-way edge supported slabs.

**CE 316: Bridge Design Sessional**  
**1.50 credits, 3 hrs/week**

Design and detailing of a slab bridge; design and detailing of a balanced cantilever bridge; design and detailing of a PC Girder Bridge.

## **CE 317: Design of Concrete Structures II**

**3.00 credits, 3 hrs/week**

**Prereq. CE 315**

Design of column supported slabs; introduction to floor systems; structural forms; design of columns under uniaxial and biaxial loading, introduction to slender column; structural design of footings, pile caps; seismic detailing; shear wall subjected to axial load and flexure; introduction to prestressed concrete; analysis and preliminary design of prestressed beam.

## **CE 319: Design of Steel Structures**

**3.00 credits, 3 hrs/week**

Behavioral principles and design of structural steel; design of tension members, residual stress; bolted and welded connections; compression members; local buckling, effective length; flexural members; lateral torsional buckling, flexure and shear strength, point loads on beam, design for deflection.

Introduction to beam-columns; non-sway frames.

Connection design: simple connection, moment connection, column bases; introduction to floor systems for steel buildings.

## **CE 320: Steel Structures Design Sessional**

**1.50 credits, 3 hrs/week**

Analysis and design of low rise moment frame building for gravity and wind loads; design of members, connections and columns bases.

## **CE 331: Environmental Engineering I**

**3.00 credits, 3 hrs/week**

Introduction to Environmental Engineering: ecology and environment; climate change; biodiversity; energy and environment.

Water Supply Engineering: introduction; water supply scenario in Bangladesh and SDG targets; water demands; water supply sources; ground water exploration: aquifer properties and ground water flow, well hydraulics, water well design, drilling, construction and

maintenance; water demand for rural communities; shallow hand tubewells, deep tubewells, deep set pumps, rainwater harvesting, and alternative water supplies for problem areas.

Surface water collection and transportation; head works; pumps and pumping machineries; water distribution systems; analysis and design of distribution network; fire hydrants; water meters; leak detection; unaccounted for water.

Water quality requirements; water treatment: plain sedimentation, coagulation, flocculation, filtration, disinfection; miscellaneous treatment methods; low cost treatment methods for rural communities; water safety plans.

**CE 332: Environmental Engineering Laboratory**  
**1.50 credits, 3 hrs/week**

Water and wastewater sampling techniques, sample preservation, physical, chemical and biological tests of water and wastewater; breakpoint chlorination, alum coagulation, sampling and laboratory analysis of air, sampling and laboratory analysis of soil and solid waste.

**CE 333: Environmental Engineering II**  
**4.00 credits, 4 hrs/week**

Introduction to waste management: liquid waste, solid waste, air and noise pollution.

Wastewater Engineering: introduction; estimation of wastewater; wastewater collection systems; hydraulics of sewer; design, construction and maintenance of sanitary sewer and storm drainage system; sewer appurtenances.

Wastewater characteristics; microbiology of wastewater; wastewater treatment and disposal; sludge treatment and disposal.

Sanitation and health; sanitation coverage in Bangladesh and SDG targets; onsite sanitation system including fecal sludge management (FSM), pour-flush toilets, septic tank system, Anaerobic Baffled Reactor (ABR); decentralized wastewater treatment systems

(DEWATS).

Plumbing system.

Sustainability of water and sanitation services, introduction to EIA.

**CE 341: Principles of Soil Mechanics**

**4.00 credits, 4 hrs/week**

**Prereq. CE203**

Introduction to geotechnical engineering; formation, type and identification of soils; soil composition; soil structure and fabric; index properties of soils; engineering classification of soils; soil compaction; principles of total and effective stresses; permeability and seepage; stress-strain-strength characteristics of soils; compressibility and settlement behavior of soils; lateral earth pressure; stress distribution.

**CE 342: Geotechnical Engineering Laboratory**

**1.50 credits, 3 hrs/week**

Field identification tests of soils; grain size analysis by sieve and hydrometer; specific gravity test; Atterberg limits test; permeability tests; unconfined compression test; compaction test; relative density test; direct shear tests; consolidation tests; test of geotextiles.

**CE 351: Transportation Engineering I: Transportation Planning and Traffic Engineering**

**3.00 credits, 3 hrs/week**

Transportation engineering, transportation functions; transportation systems, functional components, factors in transportation development, transportation modes, public transportation, emerging modes; intelligent transportation system: components and applications; transport planning: concepts, scope and hierarchy, process, goals and objectives, inventories, socio-economic activities, land use-transport interaction, travel demand forecasting; road safety and accident analysis.

Geometric design of highways: design controls and criteria, cross sectional elements, alignment, sight distance, intersection and

interchange layouts, planning and design of bicycle and pedestrian facilities; traffic engineering: fundamentals of traffic engineering, vehicle and traffic characteristics, traffic control devices and systems, traffic studies, planning and design of parking facilities, roadway lighting; transportation in Bangladesh: transportation modes and networks, constraints and challenges, transport demand and modal share, road classification and design standards.

**CE 400: Undergraduate Thesis**  
**3.00 credits, 6 hrs/week**

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

**CE 401: Project Planning and Construction Management**  
**4.00 credits, 4 hrs/week**

Project evaluation: cash flow and net present value, perpetuities and annuities, internal rate of return, payback period, benefit-cost ratio, real and nominal interest rate, capital budgeting, risk versus return, capital asset pricing model and project cost of capital, financial and economic feasibility, sensitivity analysis.

Leading and managing teams: human resource management, dysfunctions in teams, team development, conflict management, leading teams, self-managing teams, decision making in teams, case study.

Project operation management: project as a process, inventory management, economic order quantity, demand forecasting – newsvendor model, labour and plant management – line balancing, legal and ethical issues in project – case study, environmental regulations, procurement – value for money (VfM).

Project planning and control: planning and scheduling, PERT, CPM, resource scheduling, linear programming and application.



Construction management: principles, project organization, methods and practices, technology, management of materials and equipment, site management, contracts and specifications, inspection and quality control, quality assurance, safety, economy.

**CE 403: Sustainability of Development Projects**  
**3.00 credits, 3 hrs/week**

Environment and sustainable development; sustainable development goals (SDGs); economics and social structure; development and economic growth; socio-economic indicators; concept of human development, human development index; gender related human development index; human poverty and human poverty index; poverty reduction strategies in Bangladesh.

Socio-economic aspects of development projects; human interest related aspects; land loss, land use and land ownership patterns; population displacement; resettlement and rehabilitation strategy; inequalities in distribution of benefits and losses.

Socio-economic impact assessment approach; socio-economic survey; case studies.

**CE 404: Capstone Project**  
**4.50 credits, 9 hrs/week**

Planning, analysis and design of an integrated civil engineering project with emphasis on structural engineering/ environmental engineering/ transportation engineering/ geotechnical engineering specialization. Students shall work in teams to apply civil engineering theories, methodologies, and skills to assess the technical, environmental, and social feasibility of the project including design and cost estimation. Student shall engage their diverse civil engineering and cross-disciplinary knowledge to prepare plans and specifications of the project including Bill of Quantity (BoQ) and tender documents.

Students shall present their projects and submit project reports at the end of the work.

**CE 405: Business and Career Development**  
**3.00 credits, 3 hrs/week**

Understanding and managing organizations: structural, human resource, political, symbolic frames.

Developing strategy and competitive advantage: industry analysis, complementor, understanding value, strategy development.

Managing disruptive innovations - understanding innovation, organizing for innovation.

Marketing management: capturing market insight, connecting with customers, communicating value, building strong brands.

Career development: definition of career, value of career development, external and internal dimensions of career, career stages, preparing for job search, networking, interview, career fairs, internship, building online brand, preparing resume, civil engineering careers of the future and vision for civil engineering.

Becoming an entrepreneur: identify opportunity, developing business model, designing value Proposition, Lean Startups, Hypothesis Testing, Sales & Marketing.

**CE 407: Principles of Project Finance**  
**3.00 credits, 3 hrs/week**

Fundamental aspects of project finance, project development and management, working with lenders, project agreement, commercial risks, regulatory and political risks, financial structuring, financial model, financial support, documentation.

**CE 410: Building Design Sessional**  
**1.50 credits, 3 hrs/week**

Analysis and design of low rise RC moment frame buildings for wind and low seismic application; multi-storied RC buildings with shear wall and mat foundation for wind and high seismic application; reinforcement design and detailing at joints.

### **CE 411: Analysis of Indeterminate Structures**

**3.00 credits, 3 hrs/week**

**Prereq. 311**

Stiffness properties of beam elements; Moment distribution and flexibility/consistent deformation approaches in solving statically indeterminate structures e.g. beams, frames and trusses; matrix stiffness method in analyzing statically indeterminate beams, plane frames, grids and trusses subject to loads, temperature changes, support settlements etc.; computer application oriented direct stiffness method; influence lines of statically indeterminate structures.

### **CE 413: Introduction to Steel-Concrete Composite Structures**

**2.00 credits, 2 hrs/week**

Introduction to composite structures, advantages of composite construction; behaviour of different types of composite columns, axial load capacity and interaction diagram for composite columns.

Composite floor system: details of composite deck and shear connectors.

Elastic and plastic analysis of composite beams; design of composite beams for serviceability and strength limit states.

### **CE 415: Prestressed Concrete**

**2.00 credits, 2 hrs/week**

Prestressed Concrete: concepts of prestressing; materials; anchorage systems; loss of prestress; analysis of sections for flexure, shear, bond and bearing; analysis of end block and composite sections; beam deflections; cable layout; partial prestress.

Design of prestressed concrete beams for simple and continuous spans; ideas about use of AASHTO – PCI sections for standard spans; design considerations for prestressed concrete pipes, piles, poles and railway sleepers.

**CE 417: Design of Concrete Structures III**  
**2.00 credits, 2 hrs/week**

Analysis and design for torsion; design of one way and two way joist slabs with or without beam on the column line; design and detailing of lateral load resisting components: shear wall, lift cores, diaphragm etc.; design of reinforcement at joints.

**CE 419: Introduction to Finite Element Method**  
**2.00 credits, 2 hrs/week**

Introduction to finite element method as applied to stress analysis problems; basic equations in elasticity, matrix displacement formulation, element shapes, nodes, nodal unknowns and coordinate system, shape functions, strain displacement matrix, methods for assembling stiffness equations e.g. direct approach, Galerkin's method, virtual work method, principle of minimum potential energy; introduction to isoparametric formulation; discretization of a structure and mesh refinement, one dimensional stress-deformation and two dimensional plane stress and plane strain analysis of stress-deformation problems; numerical integration and computer application.

**CE 421: Dynamics of Structures**  
**2.00 credits, 2 hrs/week**

Single degree of freedom system, free vibration response; response to harmonic, impulse and general dynamic loading; numerical evaluation of dynamic response; earthquake response of linear system; two degrees of freedom system; response spectrum analysis.

**CE 433: Solid and Hazardous Waste Management**  
**2.00 credits, 2 hrs/week**

Solid Waste Management: sources and types of solid wastes; physical and chemical properties of solid wastes; solid waste generation; on-site handling, storage and processing; collection of solid wastes; transfer stations and transport; ultimate disposal methods; resources and energy recovery options; 3R strategy; Solid waste management policy in Bangladesh.

Hazardous Waste Management: identification, sources and characteristics of hazardous wastes; hospital waste management practices; legal aspects; auditing and prevention; methods of treatment and disposal – physical, chemical, biological and thermal treatment; stabilization and solidification, engineering storage, incineration, landfill and deep burial.

**CE 435 Environmental Pollution Management**  
**2.00 credits, 2 hrs/week**

Water pollution: sources and types of pollutants, emerging contaminants; waste assimilation capacity of streams; dissolved oxygen modeling; ecological balance of streams; industrial pollution; lake pollution and eutrophication; heavy metal contamination; groundwater pollution; marine pollution; water quality problems in Bangladesh; pollution control measures: water quality monitoring and management.

Air pollution: sources and types of pollutants; effects of various pollutants on human health, materials and plants; air pollution meteorology; introduction to air quality models; air pollution monitoring and control measures; global warming, climate change and ozone layer depletion; acid rain.

Noise pollution and control measures.

**CE 437: Basic Environmental Management**  
**2.00 credits, 2 hrs/week**

Introduction to environmental management; environmental policies, legislative and institutional framework; environmental implication of sectoral development; environmental quality standards; environmental impact assessment of development projects; strategic environmental assessment; environmental auditing; economics of environmental management; case studies.

**CE 441: Foundation Engineering**  
**3.00 credits, 3 hrs/week**

Soil investigation techniques; types of foundations; bearing capacity of shallow and deep foundations; settlement and distortion of

foundations; design and construction of footings, rafts and piles; slope stability analyses.

**CE 443: Earth Retaining Structures**  
**2.00 credits, 2 hrs/week**

Foundation of structures subjected to lateral loads; rigid and flexible earth retaining structures; methods of construction: dewatering and slurry-wall construction, braced excavation, sheet piles, cofferdams, caissons.

**CE 445: Elementary Soil Dynamics**  
**2.00 credits, 2 hrs/week**

Elementary vibrations; dynamic properties of soil; seismic response of soils: site effects, site amplification, liquefaction problems, remedial measures and earthquake hazards.

**CE 447: Soil-water Interaction**  
**2.00 credits, 2 hrs/week**

Introduction to soil-water interaction problems: permeability, capillarity and soil suction; slopes subjected to water current, wave action etc; theories of filters and revetment design; geotechnical design of landfills.

**CE 451: Transportation Engineering II: Pavement Design and Railway Engineering**  
**4.00 credits, 4 hrs/week**

Pavement materials: bituminous binders, cement, aggregates, embankment material, soil stabilization; mix design methods; low cost roads; flexible and rigid pavement: pavement components and functions, pavement design and construction, road maintenance; railway engineering: general requirements, rolling stock and tracks, stations and yards, points and crossings, signaling, maintenance operations.

**CE 452: Transportation Engineering Sessional I: Highway Materials and Traffic Engineering Design**  
**1.50 credits, 3 hrs/week**

Testing and quality control of highway materials; bituminous mix design; roadway traffic and capacity analysis; computer models and application packages.

**CE 453: Transportation Engineering III: Traffic Engineering Design and Management**  
**2.00 credits, 2 hrs/week**

Advanced concepts of traffic management, management strategies; analysis of traffic flow characteristics; traffic control devices; intersection control and design; grade separation and interchanges; computer application in traffic system analysis; introduction to micro simulation and ITS; NMT issues and road safety.

**CE 455: Transportation Engineering IV: Pavement Management, Drainage and Airport**  
**2.00 credits, 2 hrs/week**

Pavement management systems; evaluation and strengthening of pavements; drainage: highway drainage and drainage structures; airports: importance, advantages and trends in air transportation, planning and design of airports, aircraft characteristics related to airport design, types and elements of airport planning studies, airport configuration, geometric design of the landing area, terminal area, heliports, design of airport pavements, lighting, marking and signing, airport drainage.

**CE 457: Transportation Engineering V: Urban Transportation Planning and Management**  
**2.00 credit, 2 hrs/week**

The urban transport problems and trends; road network planning; characteristics and operation of different transit and paratransit modes, planning transit network; estimating system costs and benefits, pricing and financing, evaluation, transit users' attitude, policies and strategies for transit development in metropolitan cities; freight traffic planning

and management; selected transport case studies, congestion management; safety management; environmental issues and sustainable transport.

## **5.2 Courses Offered by the Department of Water Resources Engineering**

### **WRE 211: Fluid Mechanics 3.00 credit, 3 hrs/week**

Fluid properties; fluid statics; kinematics of fluid flows; fluid flow concepts and basic equations- continuity equation, Bernoulli's equation, energy equation, momentum equation and forces in fluid flow; steady incompressible flow in pressure conduits, laminar and turbulent flow, general equation for fluid friction; empirical equations for pipe flow; minor losses in pipe flow; pipe flow problems-pipes in series and parallel, branching pipes, pipe networks.

### **WRE 212: Fluid Mechanics Sessional 1.5 Credit, 3 hrs/week**

Centre of pressure; proof of Bernoulli's theorem; flow through venturimeter; flow through orifice; coefficient of velocity by coordinate method; flow through mouthpiece; flow over v-notch; flow over sharp-crested weir; fluid friction in pipe.

### **WRE 311: Open Channel Flow 4.00 Credit, 4 hrs/week**

Open channel flow and its classification; velocity and pressure distributions; energy equation, specific energy and transition problems; critical flow and control; principles of flow measurement and devices; concept of uniform flow, Chezy and Manning equations, estimation of resistance coefficients and computation of uniform flow; momentum equation and specific momentum; hydraulic jump theory and analysis of gradually varied flow; computation of flow profiles; design of channels.



**WRE 312: Open Channel Flow Sessional**  
**1.5 Credit, 3 hrs/week**

Broad-crested weir; sluice gate; venturi flume; parshall flume; cutthroat flume; hydraulic jump; velocity distribution profile; Manning's roughness coefficient; specific force and specific energy.

**WRE 451: Hydrology, Irrigation and Flood Management**  
**3.00 Credit, 3 hrs/week**

Hydrologic cycle; hydrologic measurement: precipitation, evaporation and stream flow; hydrographs; plant-soil-water relationship; consumptive use and estimation of irrigation water requirements; methods of irrigation; quality of irrigation water; problems of irrigated land; flood and its management.

**WRE 405: Flood Mitigation and Management**  
**2.00 Credit, 2 hrs/week**

Flood and its causes; methods of flood management: structural and non structural measures such as reservoirs, levees and flood walls, channel improvement, interior drainage, floodways, land management, flood proofing, flood zoning, flood hazard mapping, flood forecasting and warning.

Economic aspects of flood management: flood risk and vulnerability analysis, direct and indirect losses of flood, flood damage assessment, flood damage in urban and rural areas.

**WRE 407: Groundwater Engineering**  
**2.00 Credit, 2 hrs/week**

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

**WRE 409: River Engineering****2.00 Credit, 2 hrs/week**

Behavior of alluvial rivers; river channel pattern and fluvial processes; aggradation and degradation, local scours, river training and bank protection works; navigation and dredging sediment movement in river channels, bed form and flow regimes.

**WRE 411: Hydraulic Structures****2.00 Credit, 2 hrs/week**

Principles of design hydraulic structures, types of hydraulic structures; design of dams, barrages, weirs, spillways, energy dissipators and spillway gates; cross drainage works.

**WRE 413: Coastal Engineering****2.00 Credit, 2 hrs/week**

Coast and coastal features; tides and currents; tidal flow measurement; waves and storm surges; docks and harbors; forces of waves and tides in the design of coastal and harbor structures; coastal sedimentation processes; deltas and estuaries; shore protection works; dredging and dredgers.

**5.3 Courses Offered by the Department of Electrical and Electronic Engineering****EEE 165: Basic Electrical Technology****3.00 Credit, 3 hrs/week**

Electrical units and standards; electrical network and circuit solution: series, parallel, node and mesh analysis; instantaneous current, voltage and power, effective current and voltage, average power; sinusoidal single phase RLC circuits: phasor algebra, balanced three phase circuits; electrical wiring for residential and commercial loads; introduction to transformers and induction motors.

## 5.4 Courses Offered by the Department of Physics

### **Phy 101: Physical Optics, Waves and Oscillation, Heat and Thermodynamics**

**3.00 Credit, 3 hrs/week**

**Physical Optics:** theories of light; Young's double slit experiment, displacement of fringes and its uses, Fresnel bi-prism, interference at wedge shaped films, Newton's rings, interferometers; diffraction of light; Fresnel and Fraunhofer diffraction, diffraction by single slit, diffraction from a circular aperture, resolving power of optical instruments, diffraction at double slit and n-slits-diffraction grating; polarization; production and analysis of polarized light, Brewster's law, Malus law, polarization by double refraction, retardation plates, Nicol prism, optical activity, polarimeters, polaroid.

**Waves and Oscillations:** differential equation of a simple harmonic oscillator, total energy and average energy, combination of simple harmonic oscillations, Lissajous figures, spring-mass system, calculation of time period of torsional pendulum, damped oscillation, determination of damping co-efficient; forced oscillation, resonance, two-body oscillations, reduced mass, differential equation of a progressive wave, power and intensity of wave motion, stationary wave, group velocity and phase velocity, architectural acoustics, reverberation and Sabine's formula.

**Heat and Thermodynamics:** principle of temperature measurements: platinum resistance thermometer, thermo-electric thermometer, pyrometer; kinetic theory of gases: Maxwell's distribution of molecular speeds, mean free path, equipartition of energy, Brownian motion, Vander Waal's equation of state, review of the first law of thermodynamics and its application, reversible and irreversible processes, second law of thermodynamics, Carnot cycle; efficiency of heat engines, Carnot's theorem, entropy and disorder, thermodynamic functions, Maxwell relations, Clausius-Clapeyron equation, Gibbs phase rule, third law of thermodynamics.

**Phy 102: Physics Laboratory**  
**1.50 Credit, 3 hrs/week**

Determination of line frequency by Lissajous figures using an oscilloscope and a function generator and verification of the calibration of time/div knob at a particular position for different frequencies; determination of frequency of a tuning fork by Melde's apparatus; determination of the spring constant and the effective mass of a loaded spring; to draw magnetic induction versus current curve for a circular coil using Biot-Savart law and hence to verify tangent law; determination of the moment of inertia of a fly-wheel about its axis of rotation; determination of rigidity modulus of the material of a wire by static method; determination of the pressure-coefficient of air by constant volume air thermometer; determination of the thermal conductivity of a bad conductor by lee's method; to plot the thermo-electromotive force vs temperature (calibration) curve for a given thermocouple (e5); determination of the melting point of a solid using the calibration curve obtained in experiment-e5; determination of the mechanical equivalent of heat by electrical method; determination of the focal length of (i) a convex lens by displacement method and (ii) a concave lens by an auxiliary lens method; determination of the radius of curvature of a plano-convex lens by Newton's ring method; determination of specific rotation of sugar solution by a polarimeter; to verify Malus' law of polarization; determination of the threshold frequency for the material of a photocathode and hence find the value of the Planck's constant; determination of lattice constant by x-ray.

**Phy 105: Structure of Matter, Electricity and Magnetism and  
Modern Physics**  
**3.00 Credit, 3 hrs/week**

**Structure of Matter** : crystalline and non-crystalline solids, single crystal and polycrystal solids, unit cell, crystal systems, co-ordinations number, crystal planes and directions, NaCl and CsCl structure, packing factor, miller indices, relation between interplanar spacing and Miller indices, Bragg's law, methods of determination of interplanar spacing from diffraction patterns; defects in solids: point defects, line defects, bonds in solids, interatomic distances, calculation of cohesive and bonding energy; introduction to band theory: distinction between metal, semiconductor and insulator.

**Electricity and Magnetism:** coulomb's law, electric field (E), gauss's law and its application, electric potential (V), capacitors and capacitance, capacitors with dielectric, dielectric and atomic view, charging and discharging of a capacitor, Ohm's law, Kirchoff's law; magnetic field: magnetic induction, magnetic force on a current carrying conductor, torque on a current carrying loop, hall effect, faradays law of electromagnetic induction, Lenz's law, self-induction, mutual induction; magnetic properties of matter; hysteresis curve; electromagnetic oscillation: l-c oscillations and its analogy to simple harmonic motion.

**Modern Physics:** Michelson-Morley's experiment, Galilean transformation, special theory of relativity and its consequences; quantum theory of radiation; photo-electric effect, Compton effect, wave particle duality, interpretation of Bohr's postulates, radioactive disintegration, properties of nucleus, nuclear reactions, fission, fusion, chain reaction, nuclear reactor.

## **5.5 Courses Offered by the Department of Chemistry**

### **Chem 103: Chemistry I**

#### **3.00 Credit, 3 hrs/week**

Atomic structure and quantum theory: Bohr's theory, Heisenberg's uncertainty principle, Schrödinger's wave equation, electronic configurations and properties of atoms;

Electronic configurations and properties of molecules: chemical bond, valence bond theory molecular orbital theory, shape of molecules, bond length, bond energy;

Chemistry of halogen, alkali metals, alkaline earth metals, non-metals and heavy metals;

Modern concepts of acids and bases;

Different types of solutions; properties of dilute solution; Thermochemistry; Electrochemistry: voltaic cells, electrolytic cells; Colloids and colloidal solution; Chemical and ionic equilibria; Chemistry of water; Chemistry of water pollution; Chemistry of cements, silicates and limes.

**Chem 105: Chemistry II**  
**3.00 Credit Hours, 3 hrs/week**

Reaction Kinetics: Rate of Chemical Reactions; Order and Molecularity of Reactions, Different Types of Rate Expressions, Methods of Determining Rate and Order, Effect of Temperature on Reaction Rate and Energy of Activation.

Chemical Corrosion: Introduction to Chemical Corrosion, Corrosion of Metals and Alloys in Dry and Wet Environments, Mechanism of Corrosion, Atmospheric and Soil Corrosion and Their Preventive Measures.

Chemistry of Environmental Pollution: Environment and Its Characteristics, Chemistry of Metal and Non-Metal Pollutants, Analytical Techniques used in Determination of Pollutants, Concepts of DO, BOD, COD and Threshold Odor Number, Chemistry Involved in Water Treatment Plants, Quality of Industrial Waste Water.

Polymers: Chemistry of Polymerization, Different Types of Polymers and Their Properties, Polymer Degradation, Elastomers and Composite Materials.

Paints and Varnishes: Introduction to Paints and Varnishes,

Pretreatment of the Surface, Metallic and Non-Metallic and Organic Protective Coating and Their Uses.

**Chem 114: Inorganic Quantitative Analysis**  
**1.5 Credit, 3 hrs/week**

Volumetric Analysis: Acidimetry-Alkalimetry; Titrations involving redox reactions, Determination of Cu, Fe and Ca volumetrically; Determination of Ca and Mg in water.

## 5.6 Courses Offered by the Department of Mathematics

### **Math 137 : Differential and Integral Calculus, Matrices**

**3.00 Credit, 3 hrs/week**

**Differential Calculus:** Limit, Continuity and differentiability; Successive differentiation and Leibnitz's theorem; Expansion of functions; Indeterminate forms; Partial differentiation; Euler's theorem; Tangent and Normal; Maxima and minima of functions of single variables.

**Integral Calculus:** Integration by parts; Standard integrals; Integration by the method of successive reduction; Definite integrals; Beta function; Gamma function; Multiple integrals.

**Matrices:** Definition of different kinds of matrices; Algebra of matrices; Inverse of matrix; Rank and elementary transformation of matrices; Solution of system of linear equations; Eigen values and eigen vectors; Cayley-Hamilton theorem.

### **Math 139 : Differential Equations and Statistics**

**3.00 Credit, 3 hrs/week**

**Ordinary Differential Equation:** Formation of differential equations; Solution of first order differential equations by various methods; Solution of differential equation of first order but higher degrees; Solution of general linear equations of second and higher orders with constant co-efficient; Solution of Euler's homogeneous linear differential equations.

**Partial Differential Equation:** Introduction, Linear and non-linear first order differential equations; Standard forms; Linear equations of higher order; Equations of the second order with variable co-efficients.

**Statistics:** Measures of central tendency and standard deviation; Moments, Skewness and Kurtosis; Elementary probability theory and discontinuous probability distribution; Continuous probability distributions, e.g. normal and exponential.

**Math 237: Laplace Transform and Vector Analysis**  
**3.00 Credit, 3 hrs/week**

**Laplace Transforms:** Definition of Laplace transforms, Sufficient conditions for existence of Laplace transforms; Inverse Laplace transforms; Laplace transforms of derivatives; The unit step function; Periodic function; Some special theorems on Laplace transforms; Partial fraction; Solutions of differential equations by Laplace transforms.

**Vector Analysis:** Scalars and vectors, equality of vectors; Addition and subtraction of vectors; Multiplication of vectors by scalars; Position vector of a point; Scalar and vector product of two vectors and their geometrical interpretation; Triple products and multiple products of vectors; Linear dependence and independence of vectors; Definition of line, surface and volume integral; Gradient, divergence and curl of point functions; Gauss's theorem, Stoke's theorem, Green's theorem and their applications.

**5.7 Courses Offered by the Department of Humanities**

**Hum 185: English**  
**2 Credit, 2 hrs/week**

Introduction: current approaches to learning english, communication today.

Phonetics: phonetics and correct english pronunciation.

Syntax: vocabulary, diction and english sentence; sentence variety and style; grammatical problems.

Reading skill: readability, reading strategies, generating ideas through purposive reading, reading of selected stories, comprehension.

Writing skill: principles of effective writing; generating ideas, planning, organization and development of writing; composition, précis.



Written communication: business communication, tenders and quotations, journal articles, report.

Oral communication: dialogue, technical and scientific presentation.

### **Hum 217: Engineering Economics**

**2.00 Credit, 2 hrs/week**

Economics and engineering; microeconomics and macroeconomics; theory of demand and supply and their elasticities; demand estimation; price determination; indifference curve technique; theory of production; theory of cost and cost estimation; market structure; national income accounting, depreciation; circular flow of income and expenditure; cost-benefit analysis; payback period, NPV, IRR, inflation; economic feasibility of engineering undertakings.

### **Hum 274: Developing English Language Skills**

**1.50 credit, 3 hrs/week**

Reading skill: skimming, scanning, predicting, inferring; analysis and interpretation of texts; comprehension from literary and non-literary texts.

Writing skill: product approach, process approach: brain storming, self-evaluation, peer evaluation, revision/rewriting, teacher's evaluation; techniques of writing: comparison and contrast, problem and solution, cause and effect, classification, illustration; writing paragraph, essay and report.

Listening skill: listening to recorded texts; learning to take useful notes and answering questions.

Speaking skill: dialogue in peer work; participation in discussion and debate; extempore speech; narrating events; story telling; presentation.

### **Hum 353: Accounting**

**2.00 Credit, 2 hrs/week**

Financial accounting: objectives and importance of accounting; accounting as an information system; basic accounting principles; accounting equation; recording system; accounting cycle; journal,

ledger, trial balance; preparation of financial statements considering adjusting entries; financial statement analysis and interpretation.

Cost accounting: cost concepts and classification; cost-volume-profit analysis; contribution margin approach and its application, break-even analysis, target profit analysis, operating leverage; absorption costing vs variable costing; job order costing; capital budgeting; long run planning and control.

### **Hum 355: Sociology**

**2.00 credit, 2 hrs/week**

Nature, scope and perspectives of sociology; stages of social research and research methods; culture and civilization; socialization and personality development; globalization; media and individual; social organization and social problem; social stratification; industrial revolution, capitalism and socialism; work and economic life; environment and human activities; climate change and global risk; population and human society; urbanization and city development; social change and technology.

### **Hum 375: Government**

**2.00 Credit, 2 hrs/week**

Basic concepts of government and politics: forms of government; organs of government- legislature, executive, judiciary; functions of government; democracy; socialism; welfare state; bureaucracy; good governance; e-government.

Government and politics of Bangladesh: major administrative reforms; major amendments to the constitution- non-party caretaker government; local government; public policies; non-government organizations (NGOs); managing development project- planning, implementation, monitoring and evaluation; constitutional bodies- election commission, comptroller and auditor general, public service commission; foreign policy of Bangladesh.

Regional and international organizations: SAARC, ASIAN, UNO.

## **5.8 Courses Offered by the Shops**

### **Shop 132: Workshop Sessional**

**1.50 Credit, 3 hrs/week**

#### **Carpentry shop (3/2 hrs/week)**

Wood working tools; wood working machine: band saw, scroll saw, circular saw, jointer, thickness planer, disc sander, wood lathe; types of sawing; common cuts in wood works; types of joint; defects of timber: natural defects and artificial defects; seasoning; preservation; substitute of timber; commercial forms of timber; characteristics of good timber; use of fastening; shop practice: practical job, planning and estimating of a given job.

#### **Machine shop (3/4 hrs/week)**

Kinds of tools; common bench and hand tools; marking and layout tools, measuring tools, cutting tools, machine tools, bench work with job; drilling, shaper, lathe and milling machines: introduction, type, size and capacity, uses and applications.

#### **Welding shop (3/4 hrs/week)**

Methods of metal joints: Riveting, grooving soldering, welding; Types of welding joints and welding practice; Position of arc welding and polarity: Flat, vertical, horizontal, overhead; Electric Arc welding and its machineries; Welding of different types of materials: Low carbon steel, cast iron, brass, copper, stainless steel, aluminium; Types of electrode, fluxes and their composition; Arc welding defects; Test of Arc welding: Visual, destructive and non-destructive tests.

Types of gas welding system and gas welding equipment; Gases and types of flame; welding of different types of materials; Gas welding defects; test of gas welding.

## **5.9 Courses Offered by the Department of Civil Engineering (For students of other Departments)**

### **CE 106: Engineering Drawing 1.50 credits, 3 hrs/week. (For EEE Dept.)**

Lettering, numbering and heading; instrument and their use; sectional and isometric views of solid geometrical figures; plan, elevation and section of multistoried buildings; drawings of building services; detailed drawing of lattice towers.

### **CE 209: Construction Materials 2.00 credits, 2 hrs/week. (For URP Dept.)**

Engineering properties and uses of different construction materials - aggregates, brick, cement, sand, lime, mortars, concrete and steel; wood structures and properties; shrinkage and seasoning; treatment and durability; mechanical properties of wood products; fiber reinforced polymer (FRP) composites and its application to civil engineering; basic properties of FRP composites and available FRP composite products; ferrocement: advantages and uses; corrosion of steel in RC structures and its prevention.

### **CE 221: Mechanics of Solids I 3.00 credits, 3 hrs/week. (For WRE Dept.) Prereq. WRE 101**

Concepts of stress and strain, generalized Hooke's law; deformations due to tension, compression and temperature change; frame statics: reactions, axial force, shear force and bending moments; axial force, shear force and bending moment diagrams of beams using method of section and summation approach; elastic analysis of circular shafts in torsion, solid noncircular and thin walled tubular members subjected to torsion, flexural and shear stresses in beams; shear center; closely coiled helical springs.

### **CE 222: Structural Mechanics and Materials Sessional 1.50 credits, 3 hrs/week. (For WRE Dept.)**

Tension, direct shear and impact tests of mild steel specimen; slender column test; static bending test; hardness test of metals; helical spring

test; determination of shear centre; study of structural models: truss, beam frame.

**CE 223: Mechanics of Solids II**  
**3.00 credits, 3 hrs/week. (For WRE Dept.)**  
**Prereq. CE 221**

Symmetric and unsymmetrical bending of beams; stresses due to axial load and bending; stress transformation, Mohr's circle of stresses; beam deflection by direct integration and moment area method; elastic buckling of columns; elastic strain energy; cable theorem and cable supported structures, thin walled pressure vessels.

**CE 265: Structure I: Mechanics**  
**2.00 credits, 2 hrs/week. (For Arch Dept.)**

Force; equilibrium; free body diagrams; resultants and components; coplanar concurrent forces; moments and parallel coplanar forces; centroids; moment of inertia of areas; fundamental concepts of stress and strain; mechanical properties of materials.

**CE 267: Structure II: Basic Mechanics of Solids**  
**2.00 credits, 2 hrs/week. (For Arch Dept.)**

Stresses and strains in members subjected to tension, compression, shear and temperature changes; shear force and bending moment diagrams for statically determinate beams and frames; flexural and shearing stresses in beams by area-moment method.

**CE 271: Building Services I: Plumbing**  
**2.00 credits, 2 hrs/week. (For Arch Dept.)**

Introduction to plumbing, water requirements, water sources; water supply and distribution in buildings; sewage and sewer system, building sewer and drainage system, sewage disposal; plumbing of multistoried buildings; rural sanitation programs in Bangladesh.

**CE 290: Details of Construction****1.50 credits, 3 hrs/week. (For WRE Dept.)**

Types of building, components of a building, design loads, framed structure and load bearing wall structure; foundations: shallow foundation and deep foundation, site exploration, bearing capacity of soil, standard penetration test; brick masonry: types of brick, bonds in brickwork, supervision of brickwork, brick laying tools, defects and strength on brick masonry, typical structures in brickwork, load bearing and non-load bearing walls, cavity walls, partition walls; lintels and arches: different types of lintels and arches, loading on lintels, construction of arches; stairs: different types of stairs; floors: ground floors and upper floors; roofs and roof coverings; shoring; underpinning; scaffolding and formwork; plastering, pointing, painting; distempering and white washing; cement concrete construction; sound insulation: acoustics; thermal insulation; house plumbing: water supply and wastewater drainage.

**CE 291: Engineering Materials****3.00 credits, 3 hrs/week. (For WRE Dept.)**

Properties and uses of aggregates, brick, cement; sand, lime, mortars; concrete; concrete mix design; wood structures and properties; shrinkage and seasoning; treatment and durability; mechanical properties; wood products; advanced fiber reinforced polymer (FRP) composites and its application to civil engineering; reinforcement types, basic property of FRP composites and available FRP composite products; definition of stress and strain; plane stress and strain condition; identification of strain components of elastic, elasto-plastic and elasto-visco-plastic materials; time dependent strain response of these materials due to different types of loadings; mathematical and simple rheological modeling for prediction of creep behavior; ferrocement: advantages and uses; corrosion and prevention of steel in RC structures, offshore structures and ground applications.

**CE 292: Materials Sessional****1.50 credits, 3 hrs/week. (For WRE Dept.)**

General discussion on preparation and properties of concrete, test for specific gravity, unit weight, voids and bulking of aggregates; moisture

content and absorption of coarse and fine aggregates; normal consistency, initial setting time, soundness and fineness test of cement; direct tensile and compressive strengths of cement mortar; gradation of coarse and fine aggregates; design and testing of a concrete mix, sampling and testing of bricks for absorption, unit weight, efflorescence and compressive strength.

**CE 321: Structural Analysis and Design I**  
**4.00 credits, 4 hrs/week. (For WRE Dept.)**  
**Prereq. CE 223**

Stability and determinacy of structures; analysis of statically determinate frames, trusses and arches; influence lines; moving loads on beams, frames and trusses; wind and earthquake loads, code provisions; approximate analysis of statically indeterminate structures: mill bents, braced trusses; portal method, cantilever method and vertical load analysis of multi storied building frames; building drift, deflection of beams, trusses and frames by virtual work method; approximate analysis of suspension bridges.

**CE 322: Structural Analysis and Design Sessional**  
**1.50 credits, 3 hrs/week. (For WRE Dept.)**

Analysis and design of low rise moment frame building for gravity and wind loads; design of members, connections and columns bases; roof truss.

**CE 323: Design of Concrete Structures I**  
**3.00 credits, 3 hrs/week. (For WRE Dept.)**

Fundamental behavior of reinforced concrete and loads on structure; introduction to strength design and alternate design methods; flexural design of beams (singly reinforced, doubly reinforced, t-beam) using strength design method; shear, diagonal tension and torsion of beams; bond and anchorage of reinforcement and its detailing; design of one way slabs; design of two-way edge supported slabs: using strip and alternate methods.

**CE 324: Concrete Structures Design Sessional I**  
**1.50 credits, 3 hrs/week. (For WRE Dept.)**

Design and detailing of a low-rise masonry building; design and detailing of a slab bridge; design and detailing of a balanced cantilever bridge.

**CE 325: Design of Concrete Structures II**  
**3.00 credits, 3 hrs/week. (For WRE Dept.)**  
**Prereq. CE 323**

Design of column supported slabs; introduction to floor systems; structural forms; design of columns under uniaxial and biaxial loading, introduction to slender column; structural design of footings, pile caps; seismic detailing; shear wall subjected to axial load and flexure; introduction to prestressed concrete; analysis and preliminary design of prestressed beam.

**CE 361: Elements of Solid Mechanics**  
**3 credits, 3 hrs/week. (For URP Dept.)**

Force, resultants and components, moments and parallel coplanar forces, centroids, moment of inertia; fundamental concepts of stress and strain; mechanical properties of materials: stress and strain in members subjected to tensile, compressive and shear forces; bending moment and shear force diagrams for statically determinate structures.

**CE 363: Elements of Civil Engineering Structures**  
**3 credits, 3 hrs/week. (For URP Dept.)**

Structural forms and systems for buildings, bridges, communication and transmission structures, flyovers and intersections, road embankments, irrigation, flood control and drainage structures; loads on buildings and structures; uses of steel, concrete and other materials in buildings and structures; types of foundations and their applications; concept of bearing capacity and settlement; evaluation of approximate costs.



**CE 365: Structure III: Reinforced Concrete Design**  
**2.00 credits, 2 hrs/week. (For Arch Dept.)**

Fundamentals of reinforced concrete design; concept of WSD and USD methods; analysis and design of reinforced beams by USD; design of slabs, one-way and two-ways; reinforced concrete columns and buckling; introduction to shear walls, earthquake resistant structural systems.

**CE 371: Environmental Engineering**  
**4.00 credits, 4 hrs/week (For WRE Dept.)**

Introduction to environmental engineering; water supply: water requirement, water sources, water quality; treatment and distribution systems, design concepts of water treatment plants; wastewater engineering: wastewater characteristics, treatment and disposal, on site sanitation systems; solid waste management.

Introduction to environmental pollution; water, air, soil and noise pollution; effects of pollution.

Introduction to environmental management: environmental policy, legislation and environmental quality standards; introduction to environmental impact assessment.

**CE 372: Environmental Engineering Sessional**  
**1.5 credits, 3 hrs/week. (For WRE Dept.)**

Sample collection, preservation and storage; physical, chemical and bacteriological tests of water and wastewater; alum coagulation and break point chlorination, preliminary design of water supply and sewerage system.

**CE 381: Principles of Soil Mechanics**  
**4.00 credits, 4 hrs/week. (For WRE Dept.)**

Introduction to geotechnical engineering; formation, type and identification of soils; soil composition; soil structure and fabric; index properties of soils; engineering classification of soils; soil compaction; principles of total and effective stresses; permeability and seepage;

stress-strain-strength characteristics of soils; compressibility and settlement behavior of soils; lateral earth pressure; stress distribution.

**CE 382: Geotechnical Engineering Laboratory**  
**1.50 credits, 3 hrs/week. (For WRE Dept.)**

Field identification tests of soils; grain size analysis by sieve and hydrometer; specific gravity test; Atterberg limits test; permeability tests; unconfined compression test; compaction test; relative density test; direct shear tests; consolidation tests; test of geotextiles.

**CE 391: Transportation Engineering**  
**4.00 credits, 4 hrs/week. (For WRE Dept.)**

Introduction to transportation engineering; elements and modes of transportation system; considerations in the planning, financing and development of transportation system; traffic safety issues; highways: highway types, geometric design of highways; traffic characteristics, traffic studies and traffic control devices; highway materials; design, construction and maintenance of low cost pavements, rigid pavements and bituminous pavements; railways: introduction, characteristics, alignment, permanent way, stations and yards, points and crossings; airports: introduction, airport site selection, airport configurations, geometric design of landing area; introduction to waterways and terminals.

**CE 392: Transportation Engineering Sessional**  
**1.5 credits, 3 hrs/week. (For WRE Dept.)**

Tests on bituminous materials; tests on sub grade and base materials; roadway capacity studies; problems on the design of roadway geometry and pavements, application of analytical, simulation and statistical packages.

**CE 424: Concrete Structures Design Sessional II**  
**1.50 credits, 3 hrs/week. (For WRE Dept.)**

Analysis and design of low rise RC moment frame buildings for wind and low seismic application; multistoried RC buildings with shear wall and mat foundation for wind and high seismic application; reinforcement design and detailing at joints.

### **CE 425: Analysis of Indeterminate Structures**

**3.00 credits, 3 hrs/week. (For WRE Dept.)**

**Prereq. 321**

Stiffness properties of beam elements; Moment distribution and flexibility/consistent deformation approaches in solving statically indeterminate structures e.g. beams, frames and trusses; matrix stiffness method in analyzing statically indeterminate beams, plane frames, grids and trusses subject to loads, temperature changes, support settlements etc.; computer application oriented direct stiffness method; influence lines of statically indeterminate structures.

### **CE 467: Structure IV: Elements of Building Structure**

**2.00 credits, 2 hrs/week. (For Arch Dept.)**

Approximate analysis of multistoried buildings for gravity and lateral loads; simple analysis of truss sections; analysis and preliminary design of steel beams and columns; introduction to pre-stressed concrete; introduction to various structural forms and system; types of foundations; concept of bearing capacity and settlement.

### **CE 471: Basic Environmental Engineering**

**3 credits, 3 hrs/week. (For URP Dept.)**

Introduction to environmental engineering; human and environment interaction.

Water Supply: objectives and basic elements of water supply system; water requirements; population prediction and water demand assessment; fire demand; planning of water supply systems - sources, abstraction, transmission, treatment and distribution.

Sanitation: urban and rural sanitation; low-cost sanitation technologies; elements of a conventional waterborne sewerage system-collection, transportation, treatment, and disposal; planning of sanitation systems.

Solid waste management: sources and classification; on-site storage and handling; collection, transportation, and disposal; sanitary land filling method; waste recycling and reuse.

Environmental pollution - air, water and soil, noise pollution.

**CE 481: Foundation Engineering**  
**3.00 credit, 3 hrs/week. (For WRE Dept.)**

Soil investigation techniques; types of foundations; bearing capacity of shallow and deep foundations; settlement and distortion of foundations; design and construction of footings, rafts and piles; slope stability analyses.

**CE 500: Preliminary Structural Design Sessional**  
**1.50 credits, 3 hrs/week. (For Arch Dept.)**

Preliminary analysis of multistoried building for gravity and lateral loads incorporating basic seismic resistant structural elements; preliminary proportioning of the structural elements of the building based on structural concepts developed in theory courses; laboratory testing; compression test of concrete cylinders, tension test of mild steel specimen, slender column test.