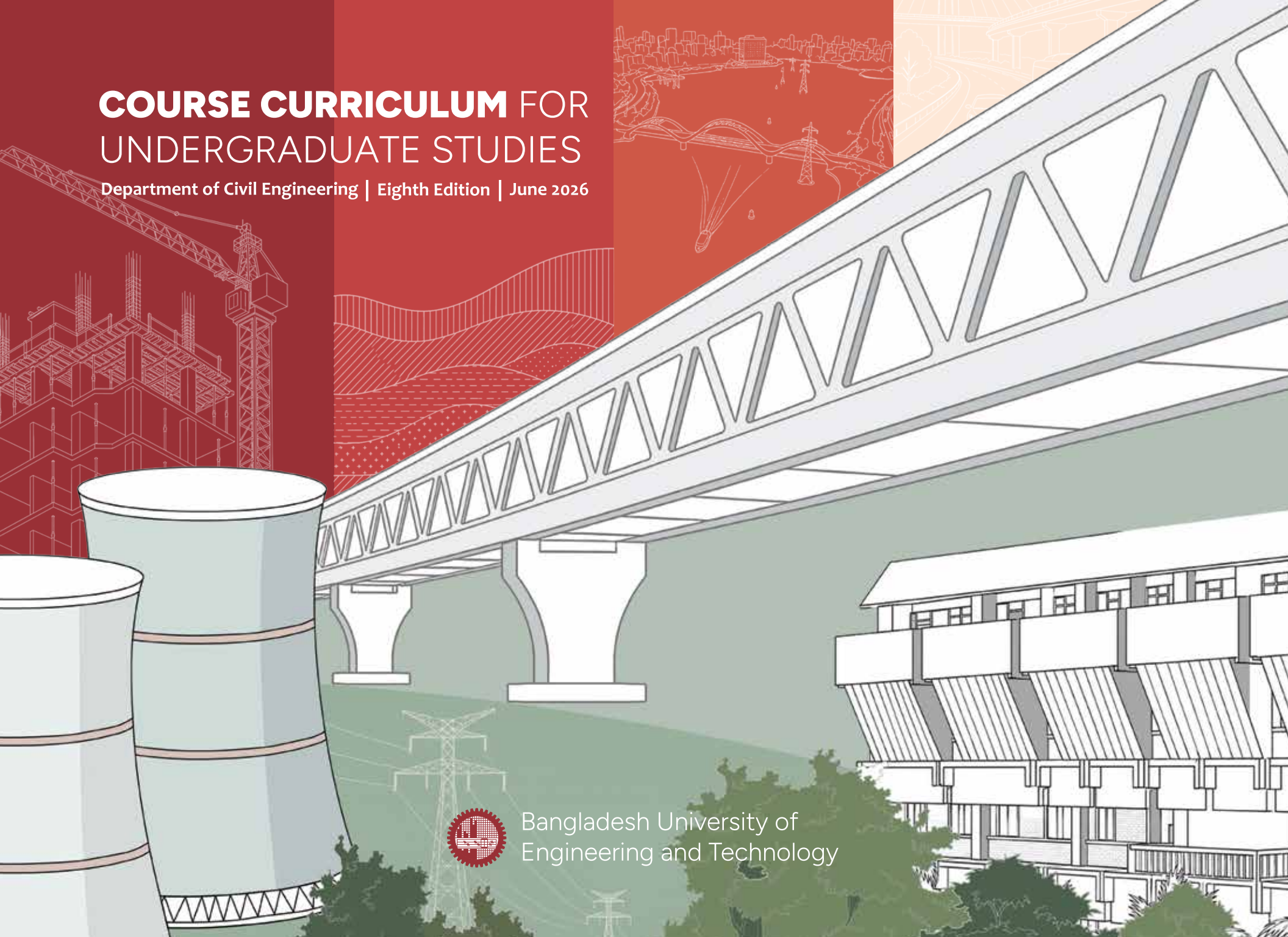
COURSE CURRICULUM FOR UNDERGRADUATE STUDIES

Department of Civil Engineering | Eighth Edition | June 2026



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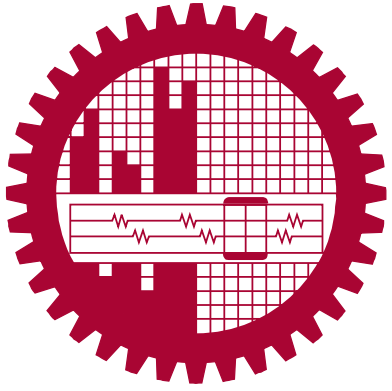

Bangladesh University of Engineering and Technology

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Department of Civil Engineering | June 2026

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Disclaimer

PREFACE

The undergraduate curriculum of the Department of Civil Engineering at BUET, in its eighth revision, reflects our continued commitment to academic excellence, research-driven innovation, and the development of skilled engineers prepared to meet both national priorities and global challenges. The curriculum has been carefully structured and is continually updated to provide a strong foundation in core civil engineering principles, while also allowing flexibility to explore emerging areas of practice and research.

As a department, we aim to develop our students' capabilities across all learning domains to remain competitive and professional; therefore, we strive to foster an environment where knowledge, creativity, and a sense of responsibility intersect. This curriculum, therefore, reflects that vision, ensuring that our graduates become proficient not only in technical skills but also in the mindset to lead, serve, and innovate for the betterment of society.

The booklet outlines essential academic regulations, course requirements, and detailed descriptions to help students and advisers navigate the undergraduate program smoothly and effectively. Although the fundamental structure remains consistent with previous versions, necessary modifications have been incorporated to reflect recent developments and policy changes.

To our students, your time here is an opportunity to shape your future and contribute to a better world. Embrace this phase with curiosity, dedication, and purpose.

I would also like to express sincere thanks to the Honorable Vice-Chancellor of BUET, Professor Dr. Eqramul Hoque, for his continued support and guidance. To the faculty members of the department for their efforts in updating the course curriculum: Prof. Dr. Abu Borhan Mohammad Badruzzaman, Prof. Dr. Md. Zakaria Ahmed and Prof. Dr. Sheikh Mokhlesur Rahman for their valuable contribution. I would also like to express my gratitude towards Prof. Dr. Munaz Ahmed Noor and Prof. Dr. Mohammad Al Amin Siddique for their valuable comments in improving the contents of this booklet.

We hope this curriculum will serve as a clear and valuable guide in your academic journey.

Dhaka
June, 2026

Dr. Ishtiaque Ahmed
Professor and Head
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Chapter 1 General Information

1.1 Historical Background

Established in 1876 as the Dhaka Survey School at Nalgola to train surveyors for the Bengal Government under British India, Bangladesh University of Engineering and Technology (BUET) has evolved significantly over nearly 150 years to become the premier institution for engineering and architecture education in Bangladesh. Initially offering diploma courses as Ahsan Ullah School of Engineering, the institution was upgraded to Ahsan Ullah Engineering College in 1948, under the affiliation of the University of Dhaka, and began offering four-year Bachelor's degrees to meet the nation's growing demand for engineers. Following continuous growth and infrastructural expansions, including relocation to its present Palashi campus in 1920, the institution further elevated its status to become East Pakistan University of Engineering and Technology in 1962, with Dr. M. A. Rashid appointed as its first Vice Chancellor. After Bangladesh's liberation in 1971, it was renamed Bangladesh University of Engineering and Technology (BUET). Over subsequent decades, BUET has steadily expanded from two faculties to the current seven, including the Faculty of Civil Engineering, established in 1980. Throughout its history, BUET has consistently addressed the evolving needs of Bangladesh's industrialization efforts and technical advancement, introducing new departments such as Petroleum and Mineral Resource Engineering, Biomedical Engineering, and Nanomaterials and Ceramic Engineering, reflecting its responsiveness to national development priorities. Notably, during the Liberation War of 1971, many BUET students and staff courageously participated, including several who sacrificed their lives.

International academic collaborations, such as the faculty exchange program established with Texas A&M University, significantly enhanced teaching quality, curriculum development, and research capabilities. While founding this university in the 1960s, BUET's infrastructure progressively improved with the construction of halls of residence and specialized laboratory facilities, and the establishment of the semester system and the course system in 1992, which are now in operation. The university's steady growth in student enrollment, from an initial intake of about 100 students at inception to approximately 1,305 as of today, reflects its commitment to meeting national and international engineering demands. Convocation ceremonies have been held regularly since independence, notably featuring prominent figures such as Bangladesh's Prime Ministers and Presidents, further underscoring the university's prominence. Today, BUET proudly maintains its status as the foremost institution for engineering education, deeply committed to advancing technological innovation, societal development, and global excellence.

Vision and Mission of BUET

Vision

- To be a leader in education, research, and innovation in science, engineering, and technology for a sustainable future.

Mission

- To provide advanced transformative education, promote cutting-edge research, and foster innovation for producing competent graduates with ethical values.
- To create an inspiring, diverse, and inclusive learning environment for planning, design, and innovation.
- To enhance collaboration for improving knowledge and skill, ensuring lifelong learning opportunities.
- To contribute towards reshaping for well-being of the society.

1.2 Civil Engineering Program at BUET

The undergraduate Civil Engineering program at BUET provides an exceptional education that fosters innovation among graduates, equipping them with the skills to address complex challenges both locally and globally. The meticulously developed curriculum, refined over decades through continuous updates by distinguished academicians, ensures depth and breadth in the application of mathematical, scientific, and engineering fundamentals. Students gain proficiency not only in problem analysis and the design of sustainable solutions, but also in the use of modern engineering tools while considering societal needs and environmental protection.

Beyond technical skills, the curriculum emphasizes professional ethics, effective communication, teamwork, project management, and financial acumen, which are essential for a successful career. Continuous feedback from esteemed alumni, international academic partners, and industry stakeholders ensures curriculum relevance and responsiveness to emerging industry trends and global research developments. Strategic oversight from the Board of Undergraduate Studies (BUGS), Academic Council (AC), Committee for Advanced Studies and Research (CASR), and the Syndicate is instrumental in guiding this ongoing enhancement. The department also offers courses for up to five other undergraduate programs at BUET.

1.3 Vision and Mission of the Civil Engineering Program

Vision

- To be the leading Civil Engineering program through quality education and research to enable innovation and excellence for addressing national and global challenges.

Mission

- Provide high-quality education and pursue innovative research in Civil Engineering to ensure state-of-the-art solutions addressing the needs of society, profession and the nation.

The mission statement can be divided into the following three major parts:

1. Educational Excellence
2. Advanced Research
3. Serving Society Needs

The Civil Engineering Department of BUET in the Dr. Jamilur Reza Choudhury Civil Engineering Building is the first engineering department in the South Asian region to be recognized by the Institution of Civil Engineers, the Institution of Structural Engineers, and the Chartered Institution of Building Services Engineers of the United Kingdom in 1996, enabling graduates to qualify for chartered membership of British institutions. The department has grown continually, and at present, it is the only department in the university to possess accreditation, positioning its graduates as globally competitive professionals. This accreditation ensures that engineers from BUET's Civil Engineering program receive international recognition, especially within all the full signatory countries of the Washington Accord. With Bangladesh's official membership as a full signatory of the Washington Accord, BUET's Civil Engineering graduates are equipped to meet global engineering demands, supported by the full rights of participation in international frameworks.

Aligned with BUET's broader institutional vision and mission, the Civil Engineering program fosters the development of highly motivated engineers committed to societal advancement.

The program is generously funded through contributions from the Government of Bangladesh, the University Grants Commission (UGC), BUET alumni, and collaborations with both public and private organizations. This funding supports not only the core educational program but also student activities, facilitating research, the maintenance of state-of-the-art laboratory facilities, and is also home to one of the focused civil engineering departments in the world in terms of faculty strength, with intensive collaboration with the industry. The department engages in national projects through its Bureau of Research, Testing and Consultation, that serves as a well-recognized center of national reference for deriving solutions to engineering problems requiring critical thinking. The students have access to cutting-edge resources that enhance their academic and practical experiences.

Faculty members in the Department of Civil Engineering are highly qualified, with a significant proportion holding doctoral and postdoctoral degrees from renowned universities across the globe. These dedicated faculty members bring a wealth of experience from national and international megaprojects, research, and consultancy work, sharing

real-world knowledge with students and encouraging critical thinking. The best engineering graduates are inducted as young faculty members every year while they complete world-class postgraduate research work in the department.

Personalized academic advising ensures student success, complemented by modern, safety-compliant educational environments, including multimedia-equipped classrooms, state of the art laboratories, dedicated seminar and conference rooms, and realistic capstone project rooms. Specialized computer labs equipped with advanced computational and simulation software further enhance learning experiences.

Students of the Department of Civil Engineering are eligible for numerous scholarships, awards, and certificates offered at the government, university, and faculty levels to recognize academic distinction, including the prestigious Prime Minister's Award and various gold medals, fostering a competitive academic environment. Additionally, BUET's Civil Engineering program facilitates students' pursuit of postgraduate studies at top ranked institutions worldwide. The extensive BUET alumni network supports graduates in becoming impactful entrepreneurs, prominent leaders within the civil engineering field, and influential contributors to national development through robust national and international collaborations.

BUET has held convocations since Bangladesh's independence, recognizing graduates' achievements in ceremonies attended by prominent national leaders, including presidents and prime ministers. Continuously evolving to address national and global engineering challenges through BRTC projects, BUET remains committed to fostering innovation, advancing research, and producing skilled professionals essential for the nation's continued growth and development.

1.4 Academic Activities

Undergraduate courses in the faculties of Chemical and Materials Engineering, Science, 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 and Electronic, Mechanical, Industrial and Production, Chemical, Materials and Metallurgical, Nanomaterials and Ceramic, Computer Science and Engineering, Biomedical Engineering, and Naval Architecture and Marine Engineering. At the faculty of Architecture and Planning, the Bachelor of Architecture is usually completed in five years, and the Bachelor of Urban & Regional Planning in four years.

Postgraduate studies and research are now among the University's primary functions. Most departments across 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 external organizations, e.g., UN Organizations, Commonwealth Secretariat, University Grants Commission (UGC). The University's teachers and laboratory facilities are also utilized to solve problems and provide up-to-date engineering and technological knowledge to various organizations across the country. The University is persistent in its effort to improve its research facilities, staff positions, and courses and curricula to meet the growing technological challenges confronting the nation.

1.5 Faculties and Teaching Departments

The University has eighteen teaching departments under seven faculties. All departments, except Humanities, offer degree programs; however, some offer only postgraduate (PG) degrees.

Faculty of Civil Engineering

CE	Department of Civil Engineering	UG and PG
WRE	Department of Water Resources Engineering	UG and PG

Faculty of Architecture and Planning

ARCH	Department of Architecture	UG and PG
URP	Department of Urban and Regional Planning	UG and PG
HUM	Department of Humanities	No degree offered

Faculty of Electrical and Electronic Engineering

EEE	Department of Electrical and Electronic Engineering	UG and PG
CSE	Department of Computer Science and Engineering	UG and PG
BME	Department of Biomedical Engineering	UG and PG

Faculty of Chemical and Materials Engineering

CHE	Department of Chemical Engineering	UG and PG
MME	Department of Materials and Metallurgical Engineering	UG and PG
NCE	Department of Nanomaterials and Ceramic Engineering	UG and PG
PMRE	Department of Petroleum and Mineral Resources Engineering	PG

Faculty of Mechanical Engineering

IPE	Department of Industrial and Production Engineering	UG and PG
ME	Department of Mechanical Engineering	UG and PG
NAME	Department of Naval Architecture and Marine Engineering	UG and PG

Faculty of Science

CHEM	Department of Chemistry	PG
MATH	Department of Mathematics	PG
PHY	Department of Physics	PG

1.6 University Administration

Chancellor	:	Mohammed Shahabuddin The Honorable President of the People's Republic of Bangladesh
Vice Chancellor	:	Prof. Dr. Eqramul Hoque
Pro-Vice Chancellor	:	Prof. Dr. Abdul Hasib Chowdhury

List of Administrative Officers

Registrar	:	Prof. Dr. Nayeb Md. Golam Zakaria
Controller of Examinations	:	Prof. Dr. Md. Ataur Rahman
Comptroller	:	Prof. Dr. Md. Abdus Salam Akanda
Director, Directorate of Student's Welfare	:	Prof. Dr. A.K.M Masud
Chief Engineer	:	Engr. Dr. A.K.M. Jahangir Alam
Chief Medical Officer	:	Dr. Abu Hena Abid Zafr
Librarian	:	Prof. Dr. A. B. M. Alim Al Islam

Deans of Faculties

Dean of Civil Engineering	:	Prof. Dr. Md. Abdul Jalil
Dean of Architecture & Planning	:	Prof. Dr. Shayer Ghafur
Dean of Electrical & Electronic Engineering	:	Prof. Dr. Md. Kamrul Hasan
Dean of Mechanical Engineering	:	Prof. Dr. Md. Zahurul Haq
Dean of Chemical and Materials Engineering	:	Prof. Dr. A. K. M. Bazlur Rashid
Dean of Science	:	Prof. Dr. Md. Abdul Hakim Khan
Dean of Postgraduate Studies	:	Prof. Dr. Muhammad Masroor Ali

Provosts of Residential Halls

Provost, Ahsan Ullah Hall	:	Prof. Dr. Mohammad Faisal
Provost, Sabekun Nahar Sony Hall	:	Prof. Dr. Lutfa Akter
Provost, Kazi Nazrul Islam Hall	:	Prof. Dr. Md. Rubaiyat Hossain Mondal
Provost, Shahid Smrity Hall	:	Prof. Dr. Mir Tareque Ali
Provost, Sher-e-Bangla Hall	:	Prof. Dr. Md. Ashiqur Rahman
Provost, Dr. M.A. Rashid Hall	:	Prof. Dr. Shameem Ahmed
Provost, Suhrawardy Hall	:	Prof. Dr. A. B. M. Toufique Hasan
Provost, Titumir Hall	:	Prof. Dr. Md. Iqbal Hossain
Provost, Swadhinata Hall	:	Prof. Dr. Sara Nowreen

Chapter 2 The Faculty of Civil Engineering


Dr. Jamilur Reza Choudhury Civil Engineering Building

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 the 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, and updated in 2020. Some research projects of a more fundamental nature, viz., the application of finite element techniques to tackle engineering problems, the dynamic behavior of multistoried buildings, soil-structure interaction, concrete technology, etc., pursued in this department have greatly contributed to the advancement of knowledge in this field. 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, groundwater, sedimentation problems, and coastal engineering. The department's publications receive extensive citations in reputable journals worldwide due to their depth of originality and broad applicability.

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Rabeya Akter Sukhi
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(Structural Engineering)

Anas Bin Faruque
B.Sc. Engg. (Civil), BUET
(Environmental Engineering)

2.3 Laboratory Facilities

The Department of Civil Engineering is equipped with several distinct laboratories for conducting tests and experiments for the undergraduate academic program and postgraduate research. Presently, there are six experimental laboratory facilities under the Department of Civil Engineering for undergraduate students. Civil Engineering students also have access to the Department of Water Resources Engineering, Physics, and Chemistry's laboratory facilities. Facilities of the various workshops under the university are also available to the students.

2.3.1 Strength of Materials Laboratory

The Strength of Materials Laboratory is housed on the ground floor of the Dr. Jamilur Reza Choudhury Civil Engineering Building and occupies approximately 560 sq. m. The laboratory supports undergraduate teaching and research activities in mechanics of materials, structural behavior, and material characterization.

The laboratory is equipped with multiple universal testing machines with varying ranges, including high-capacity systems suitable for structural-scale specimens, as well as small-scale machines for testing soft materials and small specimens. Facilities are available for tensile, compression, bending, shear, torsion, fatigue, and relaxation testing of steel, reinforced concrete components, bolts, plates, rubber, and composite elements. Bending and re-bending test setups for reinforcing bars, pull-out test arrangements, anchorage and hydraulic jack test frames, and proof-load testing facilities are available for structural components.

Advanced strain-measuring arrangements, extensometers of different gauge lengths, strain-gauge setups for concrete cylinders and cubes, deformation-measuring instruments for reinforcement bars, and multichannel data-acquisition systems are available to support precise experimental investigations. The laboratory also includes fatigue and relaxation testing machines for steel, hardness testers, impact testing facilities, and non-destructive and semi-destructive testing apparatus.

Calibration-grade load cells, load columns, proving rings, pressure gauge calibrators, crane scales, digital weighing scales, and standard calibration weights ensure accuracy and reliability of measurements. Specimen preparation and handling facilities include shear cutters, nut-bolt testing setups, small-specimen preparation tools, and ovens for controlled heating.

Highlights of Strength of Materials Laboratory

Model structural frames and components, including trusses, beams, frames, scaffolding systems, rail sleeper test setups, and pipe test frames, are available for simulating prototype structural behavior under controlled laboratory conditions. The laboratory thus provides comprehensive facilities for both routine instructional experiments and advanced experimental studies in structural engineering and material performance.

2.3.2 Concrete Laboratory

The Concrete Laboratory is situated on the ground floor and occupies approximately 560 sq. m. The laboratory provides adequate space and infrastructure for casting and testing reinforced concrete beams, slabs, columns, cylinders, cubes, and other structural and non-structural elements under controlled conditions. The Concrete Laboratory provides comprehensive facilities for teaching, research, quality control, and performance evaluation of cementitious materials and masonry products.

The laboratory is equipped with multiple high-capacity automatic and semi-automatic compression testing machines of varying load ranges suitable for testing concrete cubes, cylinders, bricks, concrete blocks, and masonry units in accordance with major ASTM, EN, and relevant national standards. Facilities are available for routine and advanced testing of cement, aggregates, fresh concrete, and hardened concrete. These include mortar mixers, mortar strength testing machines, jolt compaction apparatus, length comparators, standard cube and cylinder molds, slump cones, vibrators, unit weight measurement setups, standard sieves, and specific gravity apparatus.

The laboratory supports testing of brick, concrete block, and cement products, including compressive strength, dimensional tolerance, absorption, and durability-related properties in accordance with standard specifications. Specimen preparation and curing facilities include concrete mixers, batching arrangements, weighing systems of different capacities, curing tanks, temperature-controlled ovens, distilled water plants, fume hoods, and core-cutting machines for extracting hardened concrete cores.

Advanced non-destructive and durability assessment facilities are available, including rebound hammer testing, ultrasonic pulse velocity (UPV), ferroscan for reinforcement detection and cover measurement, half-cell potentiometer for corrosion potential assessment, electrical resistivity testing, and rapid chloride permeability test (RCPT).The laboratory also provides facilities for prestressing-related testing and controlled thermal curing.

Highlights of Concrete Laboratory

2.3.3 Environmental Engineering Laboratory

Located on the 3rd floor, the laboratory is equipped to conduct routine physical, chemical, and bacteriological analyses of water and wastewater, and to support undergraduate instruction and project work. Facilities are available for bench-scale treatment studies, including coagulation–flocculation, settling, biological treatment, and adsorption experiments.

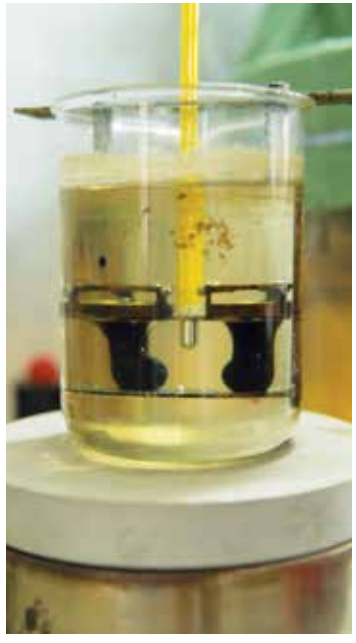
The laboratory is equipped with essential analytical instruments, including pH meters, electrical conductivity (EC) meters, dissolved oxygen (DO) meters, turbidity meters, digital titrators, balances, biological oxygen demand (BOD) incubators, chemical oxygen demand (COD) reactor, centrifuge, horizontal shaker, suction pump with filtration cup, and silt density index (SDI) test kits. Supporting facilities include flocculators, column settling apparatus, ovens, muffle furnace, low-temperature incubator, autoclave, ultrasonic water bath, sonicator, water bath, freezer and refrigerator, desiccators, hot plates with stirrers, magnetic stirrers with stands, dehumidifier, distilled and reverse osmosis deionization (RO–DI) water units, and toxicity characteristics leaching procedure (TCLP) apparatus for leaching assessment. Air and environmental monitoring equipment includes a flue gas analyzer, respirable and fine particulate samplers, gaseous samplers, a sound level meter, and a GPS meter.

The laboratory also supports postgraduate research and advanced analytical investigations. The laboratory houses modern, high-precision instruments for detailed characterization of water, wastewater, solid waste, and environmental samples.

Notable equipment includes an Atomic Absorption Spectrophotometer (AAS) for heavy metal analysis, a Spectrophotometer for colorimetric and anion chemistry analysis, a Total Organic Carbon (TOC) Analyzer for organic carbon quantification, an Ion Chromatograph for major anions and cations, a Kjeldahl Digestion Apparatus and Automatic Kjeldahl Nitrogen Analyzer for total nitrogen determination, and a Gas Chromatography–Mass Spectrometry (GCMS) system for trace organic compound identification. Additional analytical instruments include a Flame Photometer for alkali and alkaline earth metals, a Bomb Calorimeter for energy content determination, a laboratory microscope for microbiological observation, a microwave digester, a nitrogen evaporator, and an Oxitop system for respirometric studies.

Highlights of Environmental Engineering Laboratory

Together, these facilities enable comprehensive research in water quality assessment, pollution monitoring, environmental chemistry, solid and hazardous waste characterization, and process evaluation. Multiple sets of some setups are also available.



Highlights of Transportation Engineering Laboratory

2.3.4 Transportation Engineering Laboratory

Located on the ground floor of the Old Academic Building, and occupying approximately 200 sq. m, the laboratory is equipped to conduct routine and advanced testing of highway construction materials, including soil, aggregates, and bituminous materials in accordance with standard specifications.

The bitumen testing facilities include a dynamic shear rheometer (DSR) for rheological characterization of asphalt binders, a bitumen content tester for extraction analysis, a viscosity tester, a penetration test apparatus (penetrometer), a ductility testing setup with standard molds, a ring and ball softening point apparatus, a water bath, heaters, a vacuum pump, an open cup flash point setup, and a pycnometer for specific gravity determination. Aggregate testing equipment includes a sieve analysis setup, a Los Angeles abrasion (LAA) machine, an aggregate crushing value (ACV) apparatus, a ten percent fines value (TFV) apparatus, an aggregate impact value (AIV) apparatus, a flakiness index sieve, an elongation index gauge, and a unit weight measurement setup. For soil and pavement evaluation, the laboratory is equipped with a California Bearing Ratio (CBR) testing apparatus and associated compaction and preparation equipment. Supporting facilities such as ovens, balances, and temperature-controlled baths ensure accurate sample conditioning and measurement. Multiple sets of some setups are also available.

The laboratory provides comprehensive facilities for teaching, quality control testing, and research related to pavement materials and highway engineering.

2.3.5 Traffic Engineering, Survey and GIS Laboratories

The Traffic Engineering and GIS (Geographic Information System) laboratory is housed on the second floor and has a floor area of 160 sq. m. It facilitates the analysis and interpretation of field traffic studies and observational work on traffic behavior, which are essential parts of lecture/sessional courses as well as research in traffic and transportation engineering at both undergraduate and postgraduate levels. It also facilitates detailed geometric design of road links, bridge approaches, intersections, and signals; modeling of traffic and pedestrian behavior;

and synthesis of alternative traffic schemes. This laboratory has been further equipped with modern tools, including GIS, remote sensing, video image processing, and devices for measuring and monitoring the road environment.

Highlights of Traffic Engineering, Survey and GIS Laboratories

A Traffic Signal Controller Unit

2.3.6 Geotechnical Engineering Laboratory

Housed on the 2nd floor, the laboratory occupies approximately 400 sq. m and provides comprehensive facilities for soil classification, index testing, strength evaluation, compressibility analysis, and permeability assessment.

The laboratory is equipped with multiple triaxial testing systems, including advanced and cyclic triaxial machines, for routine and specialized soil testing. Strength testing facilities include unconfined compression machines (digital and manual), advanced digital and manual direct shear apparatus, and 300 kN digital as well as manual universal testing machines for soil, rock, asphalt, and concrete specimens. Consolidation characteristics are determined using digital and conventional consolidation equipment.

Permeability testing facilities include standard soil permeability apparatus and horizontal and vertical permeability setups for geotextiles. The laboratory also houses digital and manual California bearing ratio (CBR) testing machines, maximum and minimum density test equipment, and standard compaction machines with 2.5 kg and 5 kg hammers.





Highlights of Geotechnical Engineering Laboratory

Index property testing facilities include a sieve shaker, a hydrometer analysis setup, a limit device for Atterberg limits, a specific gravity test arrangement with a suction system, and a cone penetrometer. Specimen preparation and support facilities include vertical and horizontal extruders, a grinder, an upright drill machine for geotextiles, ovens, a micro-oven, and a distilled water supply system. Facilities are also available for small-scale foundation model testing and for the development of specialized geotechnical test equipment. Multiple sets of some setups are also available.

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 performing the procedure. Accidents often result from an indifferent attitude, a lack of common sense, or a failure to follow instructions. Each student should be aware of what the other students are doing, because all can be victims of another student'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 are responsible for ensuring 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 eyewash, 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 experiments.
(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 the laboratory in charge.
(m)	Report any accident, however minor, immediately.

2.5 Computing Facilities

The Civil Engineering Computer Laboratory was established in 1986 with a single IBM 8088 computer. Since then, it has developed into two separate laboratory units comprising four rooms with a total capacity of approximately 150 computers. The laboratory is equipped with modern, up-to-date computing systems connected through a dedicated network infrastructure to ensure efficient data sharing, high-speed connectivity, and secure operation.

The laboratory supports undergraduate instruction, postgraduate research, and faculty work by providing access to regularly updated and licensed professional software packages. These include software for structural analysis and design, drafting and modeling, geotechnical analysis, numerical simulation, and other core civil engineering applications. Software licenses are routinely procured, maintained, and upgraded to ensure compliance and access to the latest versions.

Faculty members and doctoral and master's students are permitted to use the laboratory during regular working hours. The laboratory operates from 9:00 a.m. to 5:00 p.m. on weekdays and remains closed on weekends. Use beyond regular working hours is allowed with written permission from the Head of the Department and/or the Laboratory in charge. A designated duty teacher remains present during regular working hours to assist users and supervise activities. Appropriate cybersecurity and data protection measures are in place to ensure secure and uninterrupted laboratory operations.

Undergraduate Computer Laboratory

2.6 Class Lectures and Beyond

2.6.1 CE 404: Capstone Project

CE 404 is the culminating design course of the undergraduate Civil Engineering program at BUET, carrying a total of 4.5 credits (1.5 credits in Level 4 Term I and 3.0 credits in Level 4 Term II), bearing the largest credit hours in the program. The course integrates the four major disciplines of civil engineering: Structural, Geotechnical, Transportation, and Environmental Engineering, into a unified, practice-oriented, hands-on project experience.

Students work in groups on a comprehensive project that reflects real-world engineering complexity. Faculty mentors from each discipline are assigned to guide the teams, providing expert feedback and professional insight throughout the design process.

The project addresses multidisciplinary technical challenges. In structural engineering, students confront complex structural systems, including torsional effects in asymmetrically shaped buildings, lateral stability, and wind load analysis for high-rise structures. In geotechnical engineering, they evaluate subsurface conditions, select appropriate foundation systems (such as shallow or deep foundations), and assess the cost implications and constructability of each alternative.

Transportation components require preparing a Traffic Impact Assessment (TIA), along with geometric roadway design, ramp design, access management, and circulation planning. Environmental engineering aspects include conducting an Environmental Impact Assessment (EIA) and designing essential service systems such as septic tanks, overhead and underground water storage tanks, water supply networks, and drainage (plumbing) systems.

During Level 4 Term I, students complete project initiation, feasibility studies, and preliminary design. In Level 4 Term II, they advance to detailed design, prepare the Basis of Design (BoD), perform calculations, and develop drawings and Bills of Quantities (BoQ).

Through rigorous analysis, interdisciplinary coordination, and continuous mentorship, CE 404 transforms theoretical knowledge into practical competence, preparing graduates to function confidently as industry-ready civil engineers capable of addressing complex, real-world challenges.

2.6.2 CE 300: Professional Training in Civil Engineering

CE 300: Professional Training in Civil Engineering is a compulsory 1.00 credit-hour course offered by the Department of Civil Engineering at BUET to prepare students to participate effectively in professional communication, leadership, and innovation. Through structured workplace exposure, students are expected to interact with industry professionals in accordance with workplace norms, maintain proper documentation, and present their work formally. The training

Office Rooms for Students attending Capstone Project Course

Students Tackling Complex Engineering Design Problems through Collaboration

Project Showcase in Jury Board

Students Engaged in Distributed Project Group Tasks

MoU Signing Ceremony between the Department and Partner Organizations

strengthens leadership by cultivating punctuality, discipline, ethical responsibility, teamwork, and coordination within project environments. It also promotes innovation by enabling students to observe contemporary practices, identify practical challenges on-site or in offices, and propose feasible improvements grounded in evidence and field observations.

To ensure strong alignment with industry needs, the department arranges stakeholder consultation meetings with potential employers and partner organizations. The meetings explain the course's objectives, scope, supervision responsibilities, and evaluation procedure, and facilitates direct engagement between academia and industry. Memoranda of Understanding are signed to formalize collaboration and to support sustained professional training opportunities for students.

Students are distributed to host organizations through an organized placement process, generally in small groups, using both student preferences and a lottery. Host organizations include major government agencies and utilities, defense and public service organizations, and private and industrial firms, such as the Department of Public Health, Engineering and Education (DPHE), Rajshahi Water Supply and Sewerage Authority (RWASA), Public Works Department (PWD), Local Government Engineering Department (LGED), Roads and Highways Department (RHD), Power Grid Company Bangladesh (PGCB), Bangladesh Railway, Navy Headquarters, Bangladesh Coast Guard, Crown Cement, and various other industries and agencies.

After completion, students gain a practical understanding of workplace procedures, quality and safety practices, and stakeholder coordination under real constraints. They maintain a daily logbook endorsed by the industry supervisor and submit a prescribed training report before the departmental committee. Performance is assessed through confidential industry feedback and departmental evaluation of the report.

The Department of Civil Engineering at BUET has long been recognized not only for its academic excellence but also for its vibrant extracurricular culture. Through student chapters of international professional bodies, departmental associations, and faculty-led initiatives, BUET nurtures a holistic environment where students grow as engineers, leaders, and community members. These activities complement classroom learning by fostering teamwork, professional networking, and personal development.

2.6.3 Student Chapters: ACI, ASCE, and ITE

The ACI BUET Student Chapter has emerged as a hub for advancing knowledge in concrete technology. In 2025 alone, the chapter organized multiple technical events, including a webinar on undergraduate research in concrete, a bootcamp on BIM and Revit, and a seminar on the sustainability of construction materials. Students also participated in national and international competitions, achieving commendable results. BUET's Civil Engineering team secured 4th place in the 2026 FRP Composites Competition organized by the American Concrete Institute (ACI) at its 2026 Spring Convention. The team developed a corrosion-free, lightweight structural beam using Glass Fiber-Reinforced Polymer reinforcement and locally sourced recyclable aggregates, reducing concrete self-weight by nearly one-third. This achievement reflects BUET's commitment to innovation and excellence, inspiring the next generation of engineers to pursue research-driven solutions for sustainable construction. In 2025, the department also secured 7th place globally in the ACI Eco-Concrete Competition. Site visits, notably to prominent cement industries, provided hands-on exposure to industrial practices, while outreach programs with students promoted earthquake awareness and building safety. Altogether,

Industry Engagement with Top Engineering Officials

Professional Site Exposure

Visit to 24 Engineering Brigade Project Office

Consultation with Faculty and Partner Organizations

more than 298 students engaged in chapter activities during the year, reflecting the chapter's strong impact.

The ASCE BUET Student Chapter, officially recognized in 2023, has quickly become a dynamic platform for civil engineering students. Its activities span seminars, poster competitions, and site visits. Recent highlights include an interactive session on green roof systems, a seminar on professional ethics in megaprojects, and field visits to the Padma Multipurpose Bridge. Social networking events and collaborations with other student chapters further enrich the student experience, while poster competitions showcase innovative research ideas.

The ITE BUET Student Chapter focuses on transportation engineering and has hosted a series of seminars and site visits. In 2025–26, notable events included seminars on connected and automated vehicle technologies, traffic modeling with VISSIM, and the psychology of motion. International experts from Virginia Tech, Queensland University of Technology, and PTV Group shared insights. At the same time, site visits to projects such as the HSIA Underpass and LGED Two-Link Road offered practical exposure.

The Civil Engineering Students' Association (CESA) is the oldest and most organized student body in BUET's history. As a non-political, non-profit association, CESA plays a vital role in fostering co-curricular engagement. It organizes cultural programs, teacher-student discussions, and inter-session activities that strengthen bonds across batches. By motivating students to embrace the essence of civil engineering, CESA cultivates leadership, collaboration, and a sense of professional identity.

Beyond student-led initiatives, faculty members actively participate in extracurricular activities, including cricket and football. These matches, often involving both faculty and students, create a spirit of camaraderie and mutual respect. They remind the community that engineering is not only about technical rigor but also about teamwork, resilience, and shared joy.

Together, these extracurricular activities enrich the Civil Engineering Department's culture. They provide platforms for students to test their knowledge in real-world contexts, engage with industry professionals, and develop soft skills such as communication and leadership. Whether through international competitions, national seminars, site visits, or cultural programs, BUET's civil engineering students are consistently encouraged to broaden their horizons.

Insightful Technical Seminar by ITE Students' Chapter

2.7 Library Facilities

Civil Engineering Library: The Department of Civil Engineering has its own library on the third floor of the Civil Engineering Building. It has a collection of specialized texts, 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 p.m. to 2:30 p.m.

The BUET Central Library serves as the university's main academic information hub, providing extensive printed and digital resources to support teaching and research. The printed collection includes over 139,000 books, more than 218 journal titles, and about 19,500 bound journal volumes, as well as government publications and institutional theses. Users can access these materials through the Online Public Access Catalog (OPAC) and the Institutional Repository, which hosts postgraduate theses, undergraduate project reports, and other university publications.

Students Earn Global Recognition at FRP Concrete Innovation in ACI 2026 Convention

ASCE Engineering Field Tour at a Cement Factory

ACI Students' Chapter Visit to a Cement Factory

Celebrating Excellence at the Celencia Students Competition Prize Ceremony (ACI & ASCE)

The library provides access to numerous electronic journals and e-books from major publishers such as Elsevier, Springer, SAGE, Cambridge, Oxford, American Society of Civil Engineers (ASCE), American Concrete Institute (ACI), and Emerald through direct subscriptions, the Library Consortium of Bangladesh (LiCoB), and the UGC Digital Library (UDL). Additional research support services include tools such as OpenAthens for remote access, iThenticate for plagiarism detection, and Grammarly and IRIS.AI for research assistance.

2.8 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 the student's progress may otherwise go astray.

Library Facilities

Library Facilities

Gallery Room at the 3rd Floor of the Civil Engineering Building

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).

3.1 Organizational Framework of the Bachelor's Degree Program

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 students' 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 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.

3.2 Student Admission

Students will be admitted to 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 the Admissions Office and will deal with course registration in addition to student admission.

3.3 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:

Classes	*14 weeks*
Recess before Term Final Examination	*2 weeks*
Term Final Examination	*2 weeks*
Total	*18 weeks*

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.

3.4 Course Pattern and Credit Structure

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

3.4.1 Course Designation and Numbering System

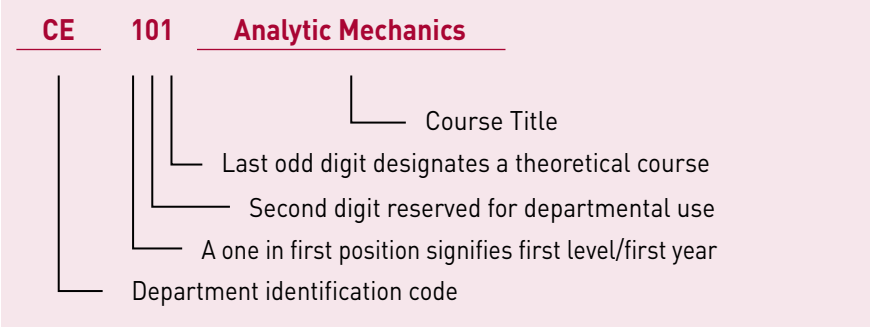
Each course is designated by a two to four-letter word identifying the department and a three-digit number with the following criteria:

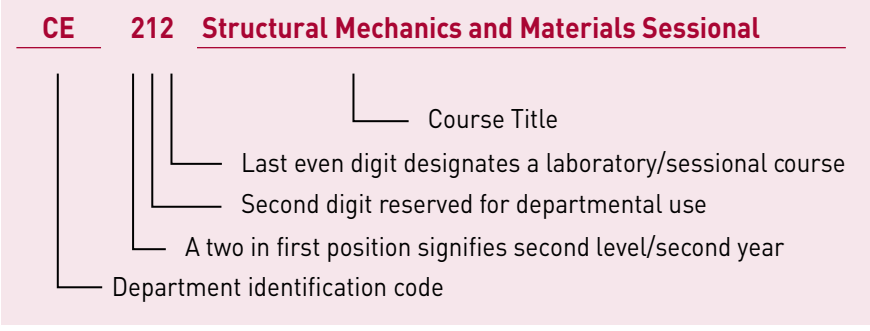
(a) The first digit will correspond to the year/level in which the course is normally taken by the students.

(b) The second digit will be reserved for departmental use for such things as identifying different areas of discipline 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.





3.4.2 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.

3.5 Types of Courses

The courses included in undergraduate curricula are divided into several groups as follows:

3.5.1 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.

3.5.2 Pre-requisite Courses

Some of the core courses are identified as pre-requisite courses. A pre-requisite course is one that 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.

3.5.3 Optional Courses

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

3.6 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 should be designated as the course coordinator. He/she has the full responsibility for coordinating the work of the other members of the department involved in that course.

3.7 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 the 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 Course System's performance 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.

3.8 Teacher Student Contact

The proposed system encourages students to come into 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.

3.9 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. The 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 contact 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 the 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.

Special provisions exist for academically weak students with regard to make-up courses.

3.10 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.

3.10.1 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 registration time. It is absolutely necessary that all students register at the specified time.

3.10.2 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 fewer than 15 credits for graduation.

3.10.3 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 that builds on the pre-requisite course, provided his/her attendance and grades in continuous assessment in the said pre-requisite course are 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 the start of the classes through payment of a late registration fee. Students having outstanding dues to the 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 will they be given the necessary permission to complete the course registration procedure. For the First-Year students, prior department-wise enrolment/admission is mandatory for registration.

3.10.4 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.

3.10.5 Registration Deadline

Students 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.

3.10.6 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 the reason for late registration.

3.10.7 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, the minimum credit requirements needs 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 the 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, the respective teacher's consent will be required.

The Late Registration Fee is not necessary in these cases.

3.10.8 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.

3.11 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 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 the evaluation of a number of projects assigned throughout the term. As discussed earlier, each course has a certain number of credits, which describes 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.

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

Numerical Grade	Letter Grade	Grade Point
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	-

3.11.1 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:

Class participation		10%
Homework Assignment and Quizzes		20%
Final Examination (3 hours)		70%
	Total	**100%**

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

Attendance	Marks
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.

3.12 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.

3.13 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.

3.13.1 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.

3.14 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

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

3.14.1 A Numerical Example

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

Course	Credits	Grade	Grade Points
CE 203	3	A+	4.00
CE 205	3	B	3.00
CE 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:

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

3.15 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

3.16 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.

3.17 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.

3.18 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.

3.19 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.

3.20 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.

3.21 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.

3.22 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.

3.22.1 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.

3.22.2 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.

3.23 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.

3.24 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.

3.25 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.

3.25.1 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.

3.25.2 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.

3.25.3 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 yrs× 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.

3.25.4 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.

3.26 Supplementary Examination

3.26.1 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".

3.26.2 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".

3.27 Attendance, Conduct, Discipline etc.

3.27.1 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.

3.27.2 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.

3.28 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 Outcome-Based Curriculum Framework for the Undergraduate Civil Engineering Program

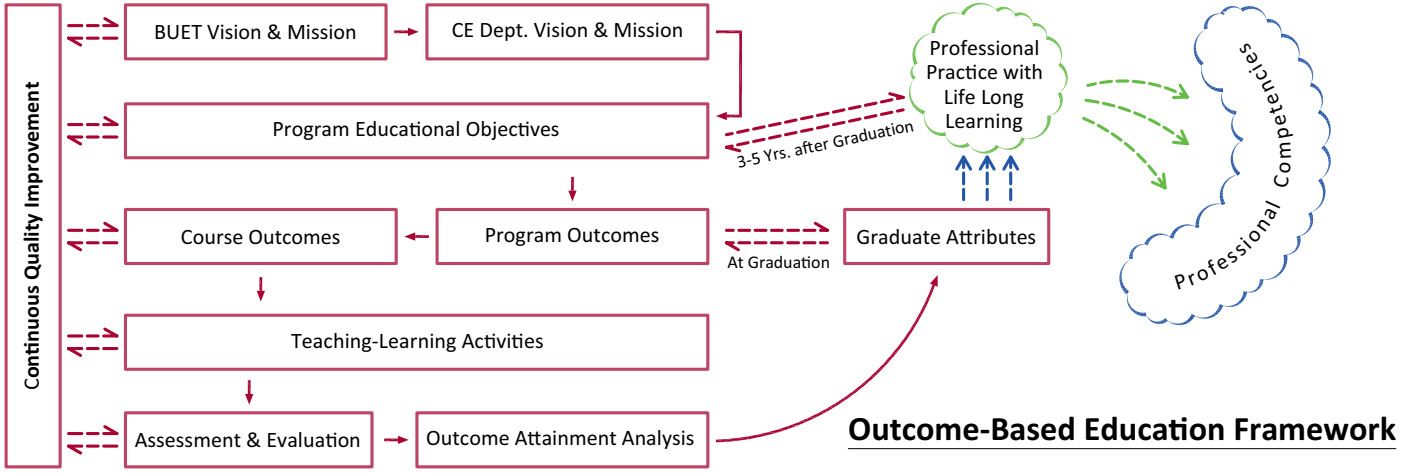
4.1 Introduction

The undergraduate curriculum has been developed to provide students with a strong foundation in engineering science while preparing them for the professional, societal, and technological challenges they will encounter throughout their careers. The curriculum reflects the Department's educational philosophy that engineering competence develops progressively through learning, practice, investigation, design, communication, and professional engagement.

The preceding chapters have presented the heritage and mission of the Department, the academic environment in which learning takes place, and the regulations that govern the program. These elements establish the foundation of educational experience. The curriculum provides the mechanism through which that foundation is transformed into graduate capabilities. It defines what students learn, how they learn, how learning is assessed, and how educational quality is continuously enhanced.

To achieve these goals, the Department adopts an Outcome-Based Education (OBE) framework. Within this framework, educational aspirations are translated into Program Educational Objectives (PEOs), Program Outcomes (POs), and Course Outcomes (COs), which collectively guide curriculum design, teaching-learning activities, assessment practices, and continuous improvement efforts. The framework also ensures that learning experiences remain aligned with the needs of the profession, advances in engineering knowledge, and the expectations of society.

The curriculum is therefore more than a sequence of courses distributed across academic terms. It is an integrated educational system designed to support the development of engineering knowledge, professional skills, ethical responsibility, leadership, innovation, and lifelong learning. Through classroom instruction, laboratory work, professional training, undergraduate research, design projects, student activities, and self-directed learning, students are provided with multiple opportunities to develop and demonstrate the competencies expected of a civil engineer.



Outcome-Based Education Framework

The Outcome-Based Education framework that underpins the undergraduate Civil Engineering program is presented. It explains how educational objectives are translated into measurable outcomes, how those outcomes are attained and evaluated, and how evidence gathered from assessment and stakeholder engagement supports continuous improvement of the curriculum. The overall framework through which the Department transforms educational aspirations into graduate competencies.

4.2 Program Educational Objectives (PEOs)

The undergraduate Civil Engineering program is designed not only to prepare students for graduation, but also to support their continued professional growth after leaving the University. While Program Outcomes describe the competencies expected at the time of graduation, Program Educational Objectives (PEOs) provide a broader perspective by describing the accomplishments that graduates are expected to achieve within a few years of professional practice, advanced study, research, entrepreneurship, or service to society.

The PEOs reflect the educational aspirations of the Department and represent the long-term expectations from its graduates. These provide an important link between the Department Mission and the competencies developed through the curriculum. Collectively, these graduate attributes encompass the knowledge, professional attributes, leadership qualities, ethical values, and lifelong learning capabilities that enable graduates to develop professional competencies, contribute effectively to the civil engineering profession, and support the broader development of society.

The Program Educational Objectives of the undergraduate Civil Engineering program are as follows:

PEO 1: Graduates will attain a high level of technical expertise so that they are able to succeed in positions in civil engineering practice or research, and in other fields they choose to pursue.

PEO 2: Graduates will develop engineering designs that are based on sound principles and that consider functionality, aesthetics, safety, cost effectiveness and sustainability with professional ethics.

PEO 3: Graduates will practice lifelong learning through professional education.

PEO 4: Graduates will play a constructive role in addressing societal needs.

PEO 5: Graduates will be leaders, both in their chosen profession and in other activities.

4.3 Program Outcomes (POs)

The ultimate measure of an engineering curriculum is the capability of its graduates. Upon completion of the undergraduate program, students are expected to possess not only a strong foundation in engineering knowledge, but also the ability to analyze problems, develop solutions, communicate effectively, work collaboratively, exercise professional judgment, life long learning to keep them up-to-date throughout their career, and respond responsibly to the needs of society. These expectations are expressed through the Program Outcomes (POs).

Program Outcomes define the knowledge, skills, attitudes, and professional competencies that students are expected to demonstrate by the time of graduation. They serve as the principal reference points for curriculum design, teaching-learning activities, assessment, and continuous improvement. Every course, laboratory, project, professional training activity, undergraduate research experience, and capstone exercise contributes in varying degrees to the attainment of one or more Program Outcomes.

The Program Outcomes adopted by the Civil Engineering program reflect the competencies expected of contemporary engineering graduates. Collectively, those encompass engineering knowledge, problem analysis, design, investigation, modern tool usage, sustainability, ethics, teamwork, communication, project management, and lifelong learning. These outcomes establish a common framework through which student achievement can be evaluated and educational effectiveness can be continuously enhanced.

The Program Outcomes of the undergraduate Civil Engineering program are as follows:

PO1: *Engineering knowledge:* Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PO2: *Problem analysis:* Identify, formulate, research and analyze complex engineering problems and reach substantiated conclusions using the principles of mathematics, the natural sciences and the engineering sciences.

PO3: *Design/development of solutions:* Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and of cultural, societal and environmental concerns.

PO4: *Investigation:* Conduct investigations of complex problems, considering experimental design, data analysis and interpretation and information synthesis to provide valid conclusions.

PO5: *Modern tool usage:* Create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modeling, to complex engineering activities with an understanding of their limitations.

PO6: *The engineer and society:* Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO7: *Environment and sustainability:* Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

PO8: *Ethics:* Apply ethical principles and commit to the professional ethics, responsibilities and the norms of the engineering practice.

PO9: *Individual work and teamwork:* Function effectively as an individual and as a member or leader of diverse teams and in multidisciplinary settings.

PO10: *Communication:* Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.

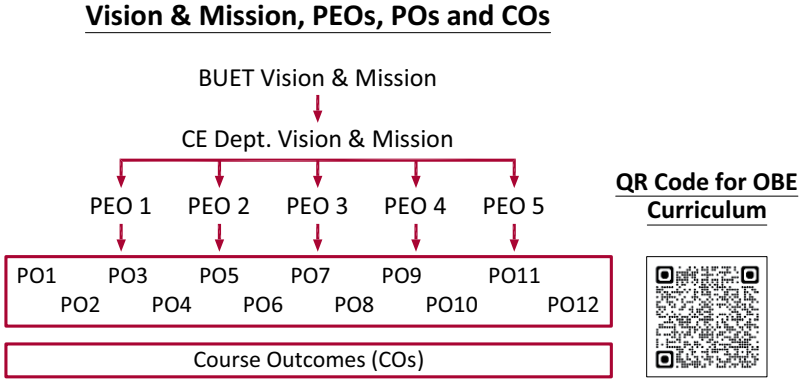
PO11: *Project management and finance:* Demonstrate knowledge and understanding of engineering and management principles and apply these to one's work as a team member or a leader to manage projects in multidisciplinary environments.

PO12: *Life-long learning:* Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change

Together, these outcomes describe the attributes expected of a BUET Civil Engineering graduate at the point of graduation. Their development is supported through Course Outcomes, curriculum alignment, diverse learning experiences, and systematic assessment processes, which are discussed in the following sections.

4.4 Course Outcomes (COs)

Program Outcomes describe the competencies expected of graduates at the completion of the program. Achieving those competencies, however, requires a series of carefully planned learning experiences distributed throughout the curriculum. Course Outcomes (COs) provide the mechanism through which this occurs. These define the specific knowledge, skills, and abilities that students are expected to demonstrate upon successful completion of individual courses and serve as the building blocks of Program Outcome attainment.



Each course within the curriculum has a distinct educational purpose. Some courses strengthen engineering fundamentals and analytical capability, while others emphasize experimentation, design, communication, teamwork, investigation, professional responsibility, and engineering judgment. The corresponding Course Outcomes make these expectations explicit and measurable. As students progress through the program, they encounter these competencies repeatedly in different contexts and at increasing levels of complexity.

The relationship between Course Outcomes and Program Outcomes is central to the Outcome-Based Education framework. Every course contributes to one or more Program Outcomes, and the collective attainment of Course Outcomes across the curriculum supports the achievement of the Program Educational Objectives. Through this structure, learning at the course level contributes directly to the broader educational goals of the program.

The development of graduate competencies extends beyond individual classroom activities. Laboratories, field studies, professional training, student activities, undergraduate research, and integrated design experiences all contribute to outcome attainment. The teaching-learning ecosystem through which students progressively develop professional competence, beginning with foundational learning and advancing through professional practice, research, innovation, and capstone design experiences is illustrated.

The undergraduate Civil Engineering curriculum contains a large number of courses, each with its own Course Outcomes, CO-PO mappings, assessment strategies, and attainment mechanisms. To maintain the compact nature of this booklet, these details are not reproduced here, but available with QR code (page 44).

4.5 Curriculum Mapping and Alignment

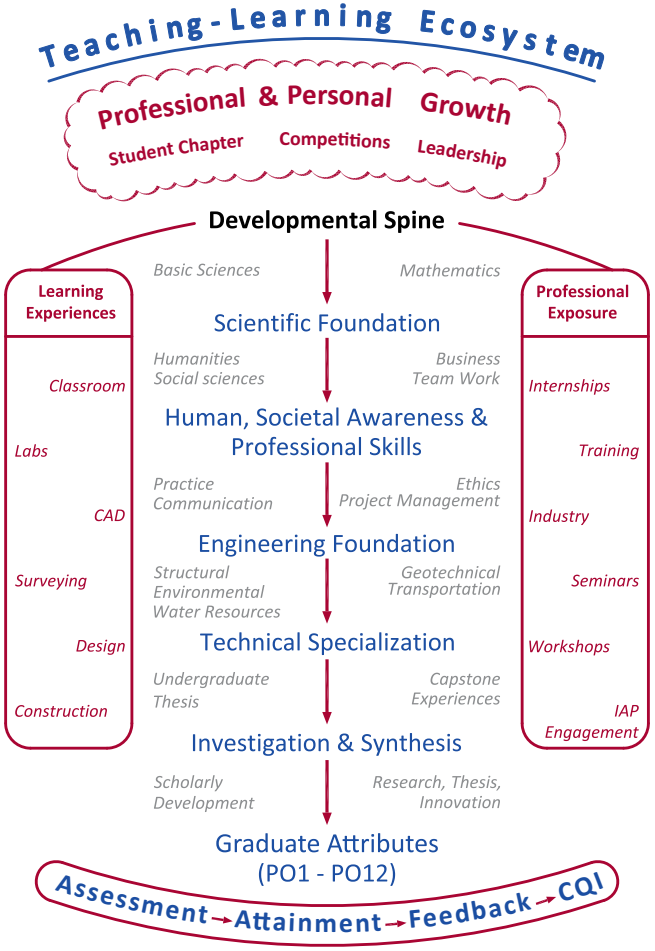
A curriculum achieves its purpose only when its individual components work together toward a common educational goal. Courses, laboratories, professional training, undergraduate research, design projects, assessment activities, and co-curricular experiences must collectively contribute to the development of the competencies expected of graduates. This coherence is achieved through a systematic process of curriculum mapping and alignment.

The starting point of the framework is the Mission of the Department, which reflects the Department's educational aspirations and its commitment to the advancement of civil engineering knowledge, professional practice, and service to society. These aspirations are translated into the Program Educational Objectives (PEOs), which describe the broader accomplishments expected of graduates after entering professional life. The PEOs are further supported by the Program Outcomes (POs), which define the competencies that students are expected to demonstrate by the time of graduation.

The relationship among the Department Mission, PEOs, and POs is illustrated. It highlights a fundamental principle of Outcome-Based Education: graduate competencies are developed intentionally through a structured educational framework rather than emerging as isolated outcomes of individual courses. Every Program Outcome contributes, directly or indirectly, to the achievement of one or more Program Educational Objectives, while the collective achievement of the PEOs supports the realization of the Department Mission.

This alignment extends to the course level through Course Outcomes (COs). Each course is designed to address specific Program Outcomes, and together the courses create a progressive learning pathway that spans throughout the entire undergraduate experience. Foundational courses establish engineering fundamentals, laboratories strengthen experimentation and interpretation skills, analytical and design courses develop technical competence, professional training exposes students to engineering practice, undergraduate research cultivates investigation and innovation, and capstone experiences emphasize integration, decision-making, and professional synthesis.

The curriculum therefore functions as an integrated educational system rather than a collection of independent subjects. Students encounter key competencies repeatedly through different learning experiences and at increasing levels of complexity as they reach higher levels up the ladder. This deliberate alignment helps ensure that learning remains continuous, incremental, purposeful, measurable, and connected to the broader educational goals of the program.



The alignment framework also provides the foundation for assessment, outcome attainment, Continuous Quality Improvement (CQI), and curriculum review. By maintaining clear connections among educational objectives, outcomes, learning experiences, and assessment processes, the Department is able to evaluate program effectiveness and guide future improvements in a systematic and evidence-based manner.

4.6 Course Requirements

The Outcome-Based Education framework described in the preceding sections is implemented through a structured curriculum that combines foundational sciences, engineering fundamentals, discipline-specific courses, laboratory experiences, professional training, undergraduate research, and capstone activities. The course requirements presented in this section establish the academic structure through which students progressively develop the competencies reflected in the Program Outcomes and Program Educational Objectives.

Abbreviation	Department
CE	Civil Engineering
WRE	Water Resources Engineering
EEE	Electrical and Electronic Engineering
ME	Mechanical Engineering
CHEM	Chemistry
PHY	Physics
MATH	Mathematics
HUM	Humanities
SHOP	Workshop

The first digit in the number indicates the year/level for which the course is intended. Odd-numbered courses are theory courses, and even-numbered courses are sessional courses.

A. BASIC SCIENCES
Requirement 12 credits (9+3)

Theoretical		
* PHY 101	Physical Optics, Waves and Oscillation, Heat and Thermodynamics	3 credits
PHY 151	Structure of Matter, Electricity and Magnetism and Modern Physics	3 credits *Prereq. PHY 101*
* CHEM 103	Chemistry I	3 credits
CHEM 105	Chemistry II	3 credits *Prereq. CHEM 103*

* Subjects marked with asterisk (*) indicate compulsory courses

Sessional		
* PHY 102	Physics Laboratory	1.5 credits
* CHEM 114	Inorganic Quantitative Analysis	1.5 credits

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 47 Credits (29+18)

Theoretical		
* CE 101	Analytic Mechanics	3 credits
* CE 103	Surveying	3 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 *Prereq. CE 101*
* CE 213	Mechanics of Solids II	3 credits *Prereq. 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 *Prereq. 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 12.5 Credits (10+2.5)

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

* Subjects marked with asterisk (*) indicate compulsory courses

CE 405	Business and Career Development	3 credits
CE 407	Principles of Project Finance	3 credits
Sessional		
* CE 300	Professional Training in Civil Engineering	1.0 credits
* 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

* Subjects marked with asterisk (*) indicate compulsory courses

G. ENVIRONMENTAL ENGINEERING
Minimum Requirement 8.5 Credits (7+1.5)

Theoretical		
* 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 *Prereq. 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
* WRE 451	Hydrology, Irrigation and Flood Management	3 credits
Sessional		
* WRE 312	Open Channel Flow Sessional	1.5 credits

* Subjects marked with asterisk (*) indicate compulsory courses

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

Courses	Requirements	(total credits to be offered)
A. Basic Science	12	(15)
B. Mathematics	9	(9)
C. Humanities	9.5	(11.5)
D. Basic Engineering	47	(47)
E. Civil Engineering Practice	12.5	(18.5)
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	(8.5)
Total	144.5	
Undergraduate Thesis	3.0	
Capstone Project	4.5	
Optional Courses**		
Theory	8.0	(38 in F to J, Max. 4 from each division)
Grand Total	**160**	

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

The Civil Engineering curriculum comprises courses in basic sciences, mathematics, humanities, engineering fundamentals, professional practice, and the major civil engineering disciplines. Together, these components provide the academic foundation required for the attainment of the Program Outcomes and Program Educational Objectives. The curriculum is distributed across academic terms to facilitate the progressive development of engineering knowledge, analytical capability, design competence, innovation, professional skills, and lifelong learning attributes. The sequencing of courses ensures a logical progression from foundational studies to advanced engineering applications, research, and integrated design experiences.

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

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
1	I	CE 100	Civil Engineering Drawing	1.5	C	
		CE 101	Analytic Mechanics	3	C	
		CHEM 103	Chemistry I	3	C	
		CHEM 114	Inorganic Quantitative Analysis	1.5	C	
		HUM 355	Sociology	2	O	Select one
		HUM 375	Government	2	O	
		MATH 137	Differential and Integral Calculus, Matrices	3	C	
		PHY 101	Physical Optics, Waves and Oscillation, Heat and Thermodynamics	3	C	
		PHY 102	Physics Laboratory	1.5	C	
			Total	**18.50**		

C: Compulsory; O: Optional

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
1	II	CE 102	Computer Aided Drafting	1.5	C	
		CE 103	Surveying	3	C	
		CE 104	Practical Surveying	1.5	C	
		EEE 165	Basic Electrical Technology	3	C	
		HUM 185	English	2	C	
		HUM 274	Developing English Language Skills	1.5	C	
		MATH 139	Differential Equations and Statistics	3	C	
		CHEM 105 *	Chemistry II	3	O	Select one
		PHY 151 *	Structure of Matter, Electricity and Magnetism and Modern Physics	3	O	
		SHOP 132	Workshop Sessional	1.5	C	
			Total	**20.00**		

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 200	Details of Construction	1.5	C	
		CE 201	Engineering Materials	3	C	
		CE 202	Materials Sessional	1.5	C	
		CE 203	Engineering Geology and Geomorphology	3	C	
		CE 204	Computer Programming Sessional	1.5	C	
		CE 210	Architectural, Engineering and Planning Appreciation	1.5	C	
		CE 211 *	Mechanics of Solids I	3	C	(Prereq. CE 101)
		HUM 353	Accounting	2	C	
		MATH 237	Laplace Transform and Vector Analysis	3	C	
			Total	**20.00**		

C: Compulsory

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
2	II	CE 205	Numerical Methods	2	C	
		CE 206 *	Engineering Computation Sessional	1.5	C	(Prereq. CE 204)
		CE 207	Applied Mathematics for Engineers	3	C	
		CE 208	Quantity Surveying	1.5	C	
		CE 212	Structural Mechanics and Materials Sessional	1.5	C	
		CE 213 *	Mechanics of Solids II	3	C	(Prereq. CE 211)
		HUM 217	Engineering Economics	2	C	
		WRE 211	Fluid Mechanics	3	C	
		WRE 212	Fluid Mechanics Sessional	1.5	C	
			Total	**19.00**		

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	C	
		CE 302	Professional Practices and Communication Sessional	1.5	C	
		CE 311 *	Structural Analysis	4	C	(Prereq. CE 213)
		CE 315	Design of Concrete Structures I	3	C	
		CE 331	Environmental Engineering I	3	C	
		CE 332	Environmental Engineering Laboratory	1.5	C	
		CE 341 *	Principles of Soil Mechanics	4	C	(Prereq. CE 203)
		CE 342	Geotechnical Engineering Laboratory	1.5	C	
			Total	**21.50**		

C: Compulsory

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
3	II	CE 300	Professional Training in Civil Engineering	1	C	
		CE 316	Bridge Design Sessional	1.5	C	
		CE 317 *	Design of Concrete Structures II	3	C	(Prereq. CE 315)
		CE 319	Design of Steel Structures	3	C	
		CE 320	Steel Structures Design Sessional	1.5	C	
		CE 333	Environmental Engineering II	4	C	
		CE 351	Transportation Engineering I: Transportation Planning & Traffic Engineering	3	C	
		WRE 311	Open Channel Flow	4	C	
		WRE 312	Open Channel Flow Sessional	1.5	C	
			Total	**22.50**		

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 400 **	Undergraduate Thesis	1.5	C	
		CE 401	Project planning and Construction Management	4	C	
		CE 404	Capstone Project	1.5	C	
		CE 410	Building Design Sessional	1.5	C	
		CE 411 *	Analysis of Indeterminate Structures	3	C	(Prereq. CE 311)
		CE 441	Foundation Engineering	3	C	
		CE 451	Transportation Engineering II: Pavement Design and Railway Engineering	4	C	
		CE 452	Transportation Engineering Sessional I: Highway Materials and Traffic Engineering Design	1.5	C	
		WRE 451	Hydrology, Irrigation and Flood Management	3	C	
			Total	**23.00**		

C: Compulsory

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
4	II	CE 400 **	Undergraduate Thesis	1.50	C	
		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 404	Capstone Project	3.00	C	
		CE 413	Introduction to Steel-Concrete Composite Structures	2.00	O	Select two (Structural Engineering)
		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	

continued to the next page

*: Registration of this course requires obtaining minimum F grade in its pre-requisite course
**: To register in division of specialization from Structural, Environmental, Geotechnical, and Transportation Engineering.

continued from the previous page

Level	Term	Course No.	Course Title	Credit Hours	Status of Course	Selection Basis/ Remarks
		CE 433	Solid and Hazardous Waste Management	2.00	O	Select two (Environmental Engineering)
		CE 435	Environmental Pollution Management	2.00	O	
		CE 437	Basic Environmental Management	2.00	O	
		CE 443	Earth Retaining Structures	2.00	O	Select two (Geotechnical Engineering)
		CE 445	Elementary Soil Dynamics	2.00	O	
		CE 447	Soil-water Interaction	2.00	O	
		CE 453	Transportation Engineering III: Traffic Engineering Design and Management	2.00	O	Select two (Transporation Engineering)
		CE 455	Transportation Engineering IV: Pavement Management, Drainage and Airport	2.00	O	
		CE 457	Transportation Engineering V: Urban Transportation Planning and Management	2.00	O	
			Total	**15.50**		

C: Compulsory, O: Optional

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

Curricula evolve over time to accommodate advances in engineering knowledge, educational practices, accreditation requirements, and the needs of the profession. The course equivalence table provides a reference for relating courses from different curriculum versions and facilitates academic administration during curriculum transitions and necessary transformation.

2008 Syllabus			2020 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	3.00
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

2008 Syllabus			2020 Syllabus		
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
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
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 300	Professional Training in Civil Engineering	1.00
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
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

2008 Syllabus			2020 Syllabus		
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
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 404	Capstone Project	4.50
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
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
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

2008 Syllabus			2020 Syllabus		
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
CE 454	Transportation Engineering Sessional II: Pavement Design and Traffic Studies	1.50	NIL		
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
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 151	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
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

2008 Syllabus			2020 Syllabus		
Course No.	Course Title	Credit Hours	Course No.	Course Title	Credit Hours
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

4.10 Assessment and Evaluation Framework

The Civil Engineering program adopts a comprehensive assessment and evaluation framework to ensure that students achieve the intended Course Outcomes (COs) and Program Outcomes (POs). Assessment methods are selected to measure not only technical knowledge and analytical abilities but also professional skills, communication competence, teamwork, leadership, ethical awareness, and lifelong learning attributes and most relevantly to solve complex problems. Both direct (e.g., examinations, quizzes, assignments, laboratory work, projects, presentations, reports) and indirect assessment tools (surveys, and stakeholders' feedback) are employed.

For regular courses, student performance is assessed through a combination of formative and summative evaluations. Assessment data are systematically collected and analyzed to determine the attainment of Course Outcomes and Program Outcomes.

For open-ended and practice-oriented courses, such as Undergraduate Thesis, Capstone Project, and Professional Training in Civil Engineering courses, assessment extends beyond the evaluation of the course instructors. External perspectives from academia, industry, and professional practice are incorporated to enhance the objectivity, relevance, and authenticity of the assessment process.

The Professional Training in Civil Engineering course, at Level 3, evaluates students' practical exposure to professional engineering environments. Assessment is based on training reports, reflective learning exercises, supervisor evaluations, presentations, and professional observations, enabling students to demonstrate the application of engineering knowledge in real-world settings.

In Professional Practices and Communication Sessional, at Level 3, students are assessed through a variety of authentic learning activities, including poster presentations, classroom presentations, technical reports, professional correspondence, group discussions, and role-playing exercises that simulate engineering practice scenarios such as tendering and contract administration processes. These activities are designed to evaluate communication skills, professional ethics, teamwork, leadership, and understanding of engineering practice.

In Capstone Project, at Level 4, students undertake comprehensive engineering projects that integrate knowledge and skills acquired throughout the program curriculum. Project presentations, design reports, technical analyses, and professional deliverables are evaluated by a Jury Board that includes renowned industry experts and professional practitioners. Multiple presentations and review sessions are conducted to assess students' technical competence, problem-solving ability, communication skills, teamwork, project management capability, and professional judgement.

Similarly, Undergraduate Thesis, at Level 4, emphasizes independent investigation, critical thinking, research methodology, technical writing,

and presentation skills. Assessment includes periodic progress reviews, thesis reports, and final defense examinations, with input from faculty supervisor and external faculty members(s).

Through this multidimensional assessment and evaluation system, the program ensures a holistic measurement of student learning, professional preparedness, and graduate attributes while providing reliable evidence for attainment analysis and continuous program improvement.

4.11 Program Outcome Attainment Process

Program Outcome attainment provides a systematic approach for evaluating the effectiveness of the curriculum in developing the competencies expected of graduates. The process relies on evidence generated through assessment activities and enables the Department to determine the extent to which students are achieving the intended learning outcomes of the program.

The attainment process begins with the evaluation of Course Outcomes (COs) through direct and indirect assessment methods. Since individual Program Outcomes are supported by multiple courses and learning experiences, evidence from across the curriculum is analyzed to assess overall Program Outcome attainment. This approach recognizes that graduate competencies develop progressively through coursework, laboratories, professional training, undergraduate research, design activities, and other educational experiences.

Attainment results provide valuable information regarding student achievement, curriculum effectiveness, and areas requiring further attention. These findings support academic decision-making and serve as an important input to stakeholder consultations, Continuous Quality Improvement (CQI), and curriculum review activities.

Detailed attainment methodologies, assessment instruments, CO-PO mappings, attainment thresholds, and evaluation procedures are available in the Department's OBE Curriculum document and related academic guidelines.

4.12 Stakeholder Involvement in Curriculum Development

The quality and relevance of an engineering curriculum depend on its ability to respond to the needs of students, the profession, industry, and society. For this reason, stakeholder engagement forms an important component of curriculum development and continuous improvement within the Civil Engineering program.

The Department regularly obtains feedback from students, alumni, employers, faculty members, professional bodies, and other relevant stakeholders. In particular, the formulation and engagement of the Industry Advisory Panel (IAP) provides an important mechanism for strengthening the connection between academic preparation and professional practice. The IAP assists the program in maintaining a curriculum that is outcome-based, practice-oriented, current, and responsive to the evolving needs of the engineering profession. The Panel also contributes valuable perspectives on curriculum review, student industrial exposure, graduate preparedness, and emerging industry expectations.

Stakeholder feedback and Industry Advisory Panel recommendations complement assessment and attainment data by providing insights into curriculum relevance, educational effectiveness, and future professional requirements. This information contributes to the evaluation of Program Educational Objectives, Program Outcomes, curriculum content, and teaching-learning activities, and serves as an important input to Continuous Quality Improvement (CQI) and curriculum review processes.

Through sustained engagement with its stakeholders and industry partners, the Department seeks to ensure that the curriculum remains academically rigorous, professionally relevant, and responsive to accommodate future challenges and opportunities.

4.13 Continuous Quality Improvement (CQI)

Continuous Quality Improvement (CQI) is a fundamental principle of the Outcome-Based Education framework. It provides a systematic mechanism for using evidence to enhance student learning, strengthen curriculum effectiveness, and maintain the long-term quality and relevance of the program.

The CQI process integrates information obtained from assessment activities, Program Outcome attainment analyses, stakeholder feedback, faculty observations, and developments in engineering education and professional practice. This evidence is reviewed to identify strengths, recognize areas requiring improvement, and determine appropriate corrective or enhancement measures.

Improvement actions may include refinements to course content, teaching-learning strategies, assessment methods, laboratory activities, professional training, undergraduate research opportunities, and other educational experiences. The effectiveness of implemented actions is subsequently evaluated through continued assessment and review, thereby establishing a cycle of ongoing enhancement.

Through CQI, the Department continuously enhances the learning experience so that future students are better prepared, more engaged, and better positioned to achieve the Program Outcomes. At the same time, CQI helps ensure that the Civil Engineering program remains responsive to advances in engineering knowledge, evolving professional expectations, accreditation requirements, and societal needs.

4.13.1 Curriculum Review and Revision Process

To maintain academic excellence and professional relevance, as a part of CQI process, the Civil Engineering curriculum is reviewed periodically through a structured and evidence-based process. The review considers student attainment data, assessment results, and feedback obtained from students, faculty members, alumni, industry representatives, and other relevant stakeholders.

The review process evaluates the effectiveness of curriculum structure, course content, teaching-learning activities, assessment practices, and the alignment among Program Educational Objectives, Program Outcomes, and Course Outcomes. It also considers developments in engineering knowledge, emerging technologies, accreditation requirements, professional expectations, societal and global needs to ensure that the curriculum remains current and responsive.

The findings from attainment analyses, stakeholder consultations, and Continuous Quality Improvement (CQI) activities provide the basis for curriculum enhancement and revision. Through this systematic process, the Department continuously strengthens the quality, relevance, and effectiveness of the program while preserving its academic rigor and commitment to producing competent civil engineering graduates.

4.14 Summary

The Outcome-Based Curriculum Framework of the undergraduate Civil Engineering program at BUET establishes the alignment among the Department Mission, Program Educational Objectives, Program Outcomes, Course Outcomes, curriculum structure, assessment processes, stakeholder engagement, and continuous improvement mechanisms.

Through this integrated framework, the curriculum provides a systematic pathway for developing engineering knowledge, professional competence, ethical responsibility, leadership, innovation, and lifelong learning attributes. The combination of structured coursework, laboratory experience, professional training, undergraduate research, and capstone activities supports the attainment of the competencies expected of graduates and the long-term educational objectives of the program.

The following chapter presents the detailed descriptions of individual courses through which the curriculum is implemented and the intended learning outcomes are achieved.

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
3.00 credits, 3 hrs/week

Reconnaissance survey; linear measurements; traverse survey; triangulation, datum, leveling and contouring; calculation of areas and volumes; problems on heights and distances; curves and curve ranging, transition curve, vertical curves; total station and real time kinematic (RTK): introduction, principles and techniques; aerial photography; remote sensing; mapping; introduction to geographic information system (GIS), coordinate system and global positioning system (GPS); Introduction to UAV (drone), LiDAR, GPR (Ground penetrating radar) based survey techniques; Hydrographic Surveying.

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

Linear and angular measurement techniques; traverse surveying; leveling and contouring; curve setting; project surveying; modern surveying equipment including Introduction to UAV (drone), LiDAR and their applications; processing of survey data in AutoDesk Civil 3D software viz. generation of contour, topographic survey map.

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

Mechanical behavior and properties of engineering materials: steel-steel products, making of steel, heat treatment, time dependent strain response and corrosion; cement: composition, manufacturing and types; bricks and blocks: manufacturing and classification based on national and international standards; aggregates: coarse & fine aggregates, types and gradation; admixtures; concrete: fresh and hardened states, mix design, durability, creep and shrinkage, non-destructive tests of concrete; mortar; lime; timber and wood products; plastics; ceramic tiles; glass; fiber reinforced polymer (FRP); ferrocement; introduction to green materials and recycled materials.

CE 202: Materials Sessional
1.50 credits, 3 hrs/week

Sampling and preparation of materials to determine different properties used in civil engineering construction; tests of cement: normal consistency, initial setting time, specific gravity, fineness, soundness and compressive strength; gradation of fine and coarse aggregates, tests of aggregates: specific gravity, density, water absorption, unit weight and voids; tests for tensile strength and compressive strength of concrete specimens; tests of bricks: water absorption, efflorescence and compressive strength; tests of blocks; Rebound hammer and Ultrasonic Pulse Velocity (UPV) tests on hardened concrete.

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 high-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

Introduction to different fields of Civil Engineering- Structural, Geotechnical, Transportation, Environmental and Water Resources Engineering; Appreciation of Architecture, Electro-Mechanical Engineering, Urban-Regional Planning and their interactions with Civil Engineering.

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 test of mild steel; bend and rebend test of deformed bar; direct shear test; impact tests of metal specimen; slender column test; static bending test; hardness test of metals; helical spring test; compression test of timber; coupon test of metal plates; tensile test of strand.

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 300: Professional Training in Civil Engineering
1.00 credits, 2 hrs/week

Involvement as a trainee in a Civil Engineering related industry/ projects/ firms to gather knowledge on state-of-the-art practices of Civil Engineering.

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

Project, its characteristic feature, project life cycle; PPP projects and risk matrix; type of contracts, introduction to FIDIC 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 various types of reports; utilizing graphics and visuals; 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 classroom environment. This may include case study analysis – project inception, preliminary design, cost estimate and tendering process; role playing; preparing small reports and proposals; classroom presentations – oral and poster, individual reports submission 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 planning and control: planning and scheduling, bar charts, preparation of network diagram, PERT, CPM, LOB, resource leveling, linear programming in construction management.

Project evaluation: time value of money, economic decision making, annuities and perpetuities, cash flow diagrams, formulations for interest computation, evaluating alternatives by equivalence, effect of inflation on cash flow, benefit-cost ratio, risk and return in capital budgeting, 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 management versus operation management, inventory management, economic order quantity, demand forecasting – newsvendor model, labor and plant management – line balancing, legal and ethical issues in project management, environmental regulations, procurement and value for money, project monitoring and control system.

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

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

Concept of sustainable development; development and economic growth; sustainable development goals (SDGs); SDG indicators; economics and social structure; socio-economic indicators; human development index and human poverty index; poverty reduction strategies in Bangladesh; Bangladesh Delta Plan 2100 and Five-year Plan.

Socio-economic aspects of development projects; socio-economic assessment approach; socio-economic survey; human interest related aspects; land loss, land use and land ownership patterns; population displacement; resettlement and rehabilitation strategies; inequalities in distribution of benefits and losses; institutional and regulatory framework; land acquisition plan and resettlement action plan; community engagement in development projects; climate and disaster resilience of infrastructure; 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 fames.

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. CE 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; discritization 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 devises; 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 *(Prereq. WRE 211)*

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. Hydraulics of bridge and culvert.

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; Weather and Hydrology; Precipitation, Evaporation and transpiration; Infiltration. Stream flow; Application of telemetry and remote sensing in hydrologic data acquisition; Rainfall-runoff relations; Hydrographs, unit hydrographs; Hydrologic routing; Statistical methods in hydrology; Introduction and Overview of irrigation; Water Law of Bangladesh; 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.

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 Fraunhoffer 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, Carnots 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 151: Structure of Matter, Electricity and Magnetism and Modern Physics
3.00 Credit, 3 hrs *(Prereq. PHY 101)*

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; Thermo- chemistry; 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 *(Prereq. CHEM 103)*

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 polarty: 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.)

Introduction to CAD packages and computer-aided drafting: drawing, editing, and dimensioning of simple objects; sectional and isometric views of solid geometrical figures; plan, elevations, and sections of multi-storied buildings: drawings of electrical services of a building; familiarization with electrical services design tools.

CE 221: Mechanics of Solids
4.00 credits, 4 hrs/week. (for WRE Dept.) *(Prereq. WRE 101)*

Stress, strain and generalized Hooke's law; deformations due to tension, compression and temperature change; axial force, shear force and bending moment diagrams of beams using method of section; stress due to symmetric bending of beams, stress due to axial load and bending; shear stresses in beams; elastic analysis of circular shafts in torsion; transformation of stresses, Mohr's circle; beam deflection using moment area method; elastic buckling of columns.

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 center; study of structural models: truss, beam frame.

CE 223: Structural Analysis I
3.00 credits, 3 hrs/week. (for WRE Dept.) ***(Prereq. CE 221)***

Stability and determinacy of structures; analysis of statically determinate trusses; influence lines for statically determinate beams and trusses, moving loads on beams and trusses; approximate analysis of statically indeterminate structures: portal method, cantilever method and vertical load analysis of multi storied building frames; wind and earthquake loads, code provisions.

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.)

Mechanical behavior and properties of engineering materials: steel-steel products, making of steel, heat treatment, time dependent strain response and corrosion; cement: composition, manufacturing and types; bricks and blocks: manufacturing and classification based on national and international standards; aggregates: coarse and fine aggregates, types and gradation; admixtures; concrete: fresh and hardened states, mix design, durability, creep and shrinkage, non-destructive tests of concrete; mortar; lime; timber and wood products; plastics; ceramic tiles; glass; fiber reinforced polymer (FRP); ferrocement; introduction to green materials and recycled materials; concrete and steel under saline condition.

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

Sampling and preparation of materials to determine different properties used in civil engineering construction; tests of cement: normal consistency, initial setting time, specific gravity, fineness, soundness and compressive strength; gradation of fine and coarse aggregates, tests of aggregates: specific gravity, density, water absorption, unit weight and voids; tests for compressive strength of concrete specimens; tests of bricks: water absorption, efflorescence and compressive strength.

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.

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

Design and detailing of a slab bridge; design and detailing of a balanced cantilever bridge; design and detailing of a PC Girder 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; design of columns under uniaxial and biaxial loading, introduction to slender column; structural design of footings, pile caps; seismic detailing; shear wall; structural forms; introduction to prestressed concrete; analysis and preliminary design of prestressed beam sections.

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 369: Civil Engineering Materials & Structural Forms
3.00 credits, 3 hrs/week. (for URP Dept.)

Engineering properties and uses of different construction materials - aggregates, brick, cement, sand, lime, mortars, concrete and steel. Wood properties - mechanical properties, shrinkage and seasoning, treatment and durability; Wood structures and products. Fibre-reinforced polymer (FRP) composites and its application to civil engineering, basic properties of FRP composites and FRP commercial composite products. Ferrocement - advantages and uses. Corrosion of steel in RC structures and its prevention; Uses of steel, concrete and other materials in buildings and structures; Types of foundations and their applications; Concept of bearing capacity and settlement.

Loads on buildings and structures, Estimation of approximate costs. Structural forms and systems buildings, bridges, communication and transmission structures, flyovers and intersections. Functions and types road embankments, irrigation, flood control and drainage structures.

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. water 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.)

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 373: Environmental Pollution and Nanomaterials
3 credits, 3 hrs/week. (for NCE Dept.)

Environmental pollution and its control: causes of water pollution: sources, types and effects of pollutants, oxygen demand in water bodies, heavy metal contamination.

Pollution control measures: quality monitoring and control. Air pollution: sources and types of pollutants, air pollution meteorology, global warming, climate change, acid rain, introduction to air pollution

monitoring and control. Environmental issues regarding nanomaterials: Role of nanomaterials engineering in mitigating environmental pollution, photocatalytic properties of nanomaterials in treating water and wastewater.

CE 381: Principles of Soil Mechanics
4.00 credits, 4 hrs/week. (for WRE Dept.) ***(Prereq. WRE 203)***

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; 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 409: Engineering Geology and Geomorphology
3.00 credits, 3 hrs/week (for URP Dept.)

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 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; multi-storied RC buildings with shear wall and mat foundation for wind and high seismic application; reinforcement design and detailing at joints.

CE 425: Structural Analysis II / Analysis of Indeterminate Structures
3.00 credits, 3 hrs/week. (for WRE Dept.) ***(Prereq. CE 223)***

Stiffness properties of beam elements; stiffness method in analyzing statically indeterminate beams, plane frames and trusses subject to loads support settlements; flexibility method in solving statically indeterminate structures e.g. beams frames and trusses; qualitative influence line diagrams of statically indeterminate beams and frames.

CE 459: Transportation Engineering for Planners
3.00 credits, 3 hrs/week (for URP Dept.)

Introduction to transportation planning: concepts and theories; Road network planning: Country, Regional, and Urban area perspectives; Multi-modal issues in transport planning; Urban transport problems and trends; Characteristics of different transit and para-transit modes, Planning transit network; Transit users' attitude; Policies and strategies for transit development in metropolitan cities.

Introduction to concepts of Transportation Engineering: Traffic Flow Characteristics, Types of Roadway Intersection Control, Grade Separation and Interchanges, Freight Transportation, NMT issues, Road Safety issues, Environmental issues, and Sustainable transport concepts.

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 environmental 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, disposal; planning of sanitation systems. and

Solid waste management: sources and classification; on-site storage and handling; collection, transportation, and disposal; sanitary landfilling 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.) ***(Prereq. CE 381)***

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.

Glimpses of Faculties and Departments

Faculty of Civil Engineering

Department of Civil Engineering

Department of Water Resources Engineering

Faculty of Science

Department of Chemistry

Department of Physics

Department of Mathematics

Faculty of Architecture and Planning

Department of Architecture

Department of Urban & Regional Planning

Department of Humanities

Faculty of Electrical and Electronic Engineering

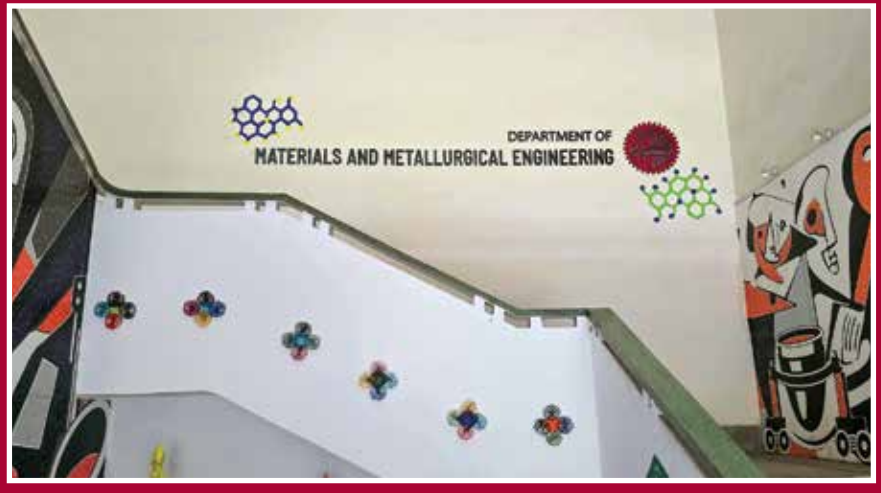
Department of Electronic and Electrical Engineering

Department of Computer Science and Engineering

Department of Biomedical Engineering

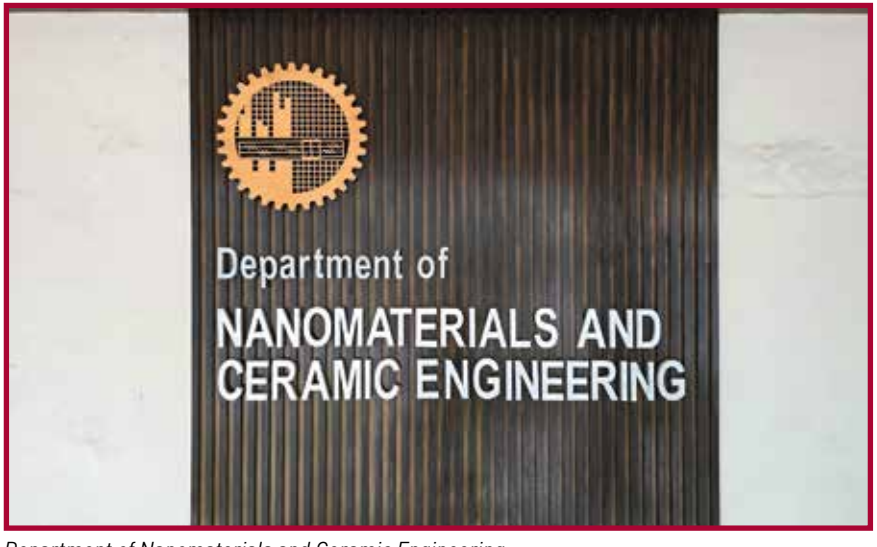
Faculty of Chemical and Materials Engineering

Department of Chemical Engineering



Department of Materials and Metallurgical Engineering

Department of Petroleum and Mineral Resources Engineering



Department of Nanomaterials and Ceramic Engineering

Faculty of Mechanical Engineering

Department of Mechanical Engineering

Department of Naval Architecture and Marine Engineering

Department of Industrial and Production Engineering

Campus Tour

Dr. M. A. Rashid Building

Architecture Building

Mechanical Engineering Building

Shaheed Minar

ECE Building

Urban and Regional Planning Building

The Directorate of Students' Welfare (DSW) Building

Dr. M. A. Rashid Building: Eastern Entrance

Central Cafeteria and Auditorium Complex

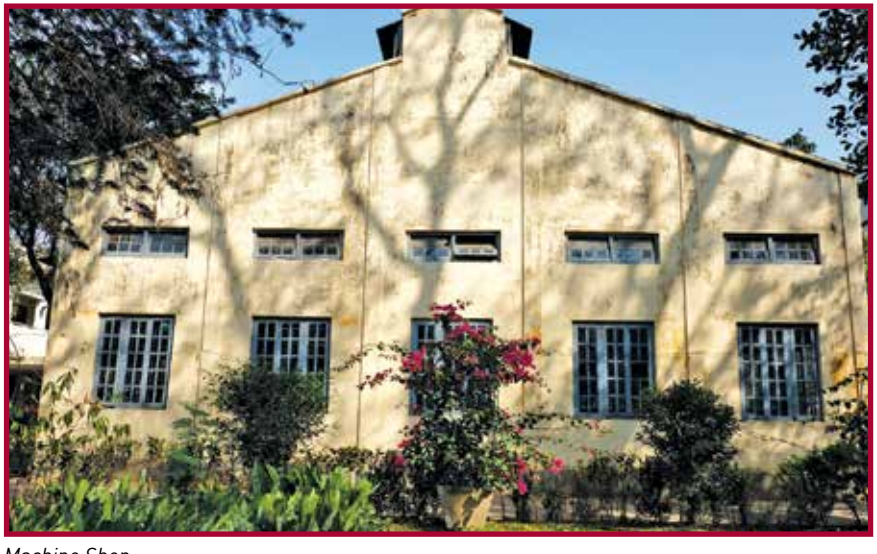
Main Entrance (Gate No. 01)

Vibrant Cafeteria Premise

Auditorium Complex

Garden Spaces of Civil Engineering Building

Controller of Examinations (CoE) Building



Machine Shop

Legacy Park at Old Academic Building

BUET Central Playground

Seminar Room of Civil Engineering Department

BUET Medical Centre

Access to Civil Engineering Department from East

Let's continue our tour with the Department of Civil Engineering at the heart of engineering excellence and innovation

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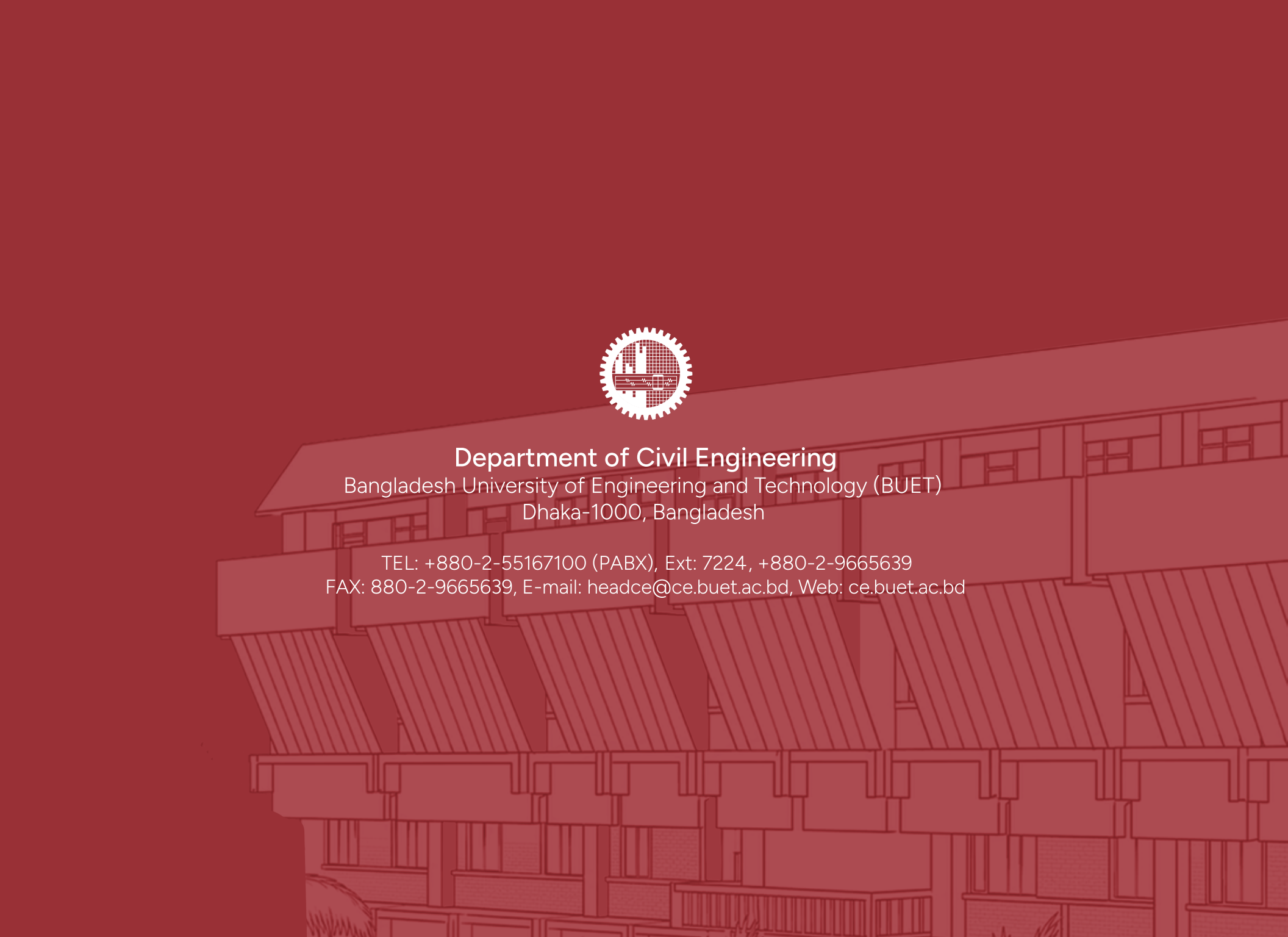

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