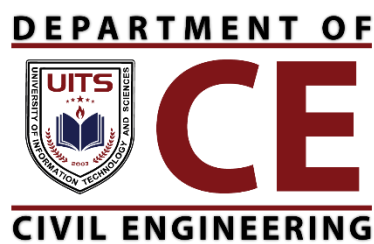


Syllabus

BACHELOR OF SCIENCE IN CIVIL ENGINEERING



DEPARTMENT OF CIVIL ENGINEERING
FACULTY OF SCIENCE AND ENGINEERING



University of Information Technology & Sciences
(UITS), Dhaka

August 2023

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Course Requirements for Undergraduate Students

1. Program Name : Bachelor of Science in Civil Engineering
Department of Civil Engineering will run the program.

2. Awarded Degree:

Full Name: Bachelor of Science in Civil Engineering

Abbreviation: B.Sc. in Civil Engineering

Degree requirement: Minimum CGPA of 2.25 and total 160 credit hours.

3. Marks Distribution

Theory Courses:

Class Attendance	10%
Class Test/ Class Assessment	20%
Final Examination	70%

Lab Courses:

Attendance	20%
Lab Performance/ Reporting	30%
Quizzes	30%
Viva	20%

4. Duration of Classes

For 1 credit hour theory class the duration of the class is 60 minutes with a minimum of 50 minutes of effective lecture time.

For 1 credit hour sessional/practical/laboratory design class, the duration of the class is 120 minutes with a minimum of 100 minutes effective lecture time.

5. Category of Courses:

Course type	Credits
General Education Courses	9
Interdisciplinary Courses	4
Basic Sciences	11
Mathematics	12
Core Course	92.5
Elective Courses	11
Thesis	4.5
Capstone Project	3
Total	147

i) General Education Courses:

Course Code	Course Name	Credits
GEDXXXXXXXX	General Education Group-1	2.0
GED 0232101	The Four Skills of Communication in English I	2.0
GED 0232102	Developing English Language skills lab	1.0
GED 0411153	Accounting	2.0
GED XXXXXXXX	General Education Group-2	2.0
	Total	9.0

General Education Group-1 (any one)		
GED 0222119	History of the Emergence of Independent Bangladesh	2.0
GED 0232117	Functional Bangla	2.0
GED 0222105	Bangladesh Studies	2.0

General Education Group-2 (any one)		
GED 0314155	Sociology	2.0
GED 0311157	Economics	2.0
GED 0312159	Government	2.0

ii) Interdisciplinary Courses:

Course Code	Course Name	Credits
EEE 0713241	Fundamentals of Electrical Engineering	3.0
CSE 0611 252	Computer Programming Lab	1.0
	Total	4.0

iii) Basic Science Courses:

Course Code	Course Name	Credits
CHEM 0531175	Engineering Chemistry	3.0
PHY 0533175	Physical Optics, Waves and Oscillation, Heat and Thermodynamics	3.0
CHEM 0531176	Engineering Chemistry Lab	1.0
PHY0533176	Engineering Physics Lab	1.0
PHY 0533177	Structure of Matter, Electricity and Magnetism and Modern Physics	3.0
	Total	11

iii) Mathematics:

Course Code	Course Name	Credits
MATH 0541153	Differential and Integral Calculus, Matrices	3.0
MATH 0541155	Differential Equations and Statistics	3.0
MATH 0541257	Coordinate Geometry and Vector Analysis	3.0
MATH 0541259	Fourier Analysis and Laplace Transformation	3.0
	Total	12

iv) Core Courses:

Course Code	Course Name	Credits
CE 0732101	Engineering Mechanics	3.0
CE 0732102	Civil Engineering Drawing	1.0
CE 0732103	Surveying	3.0
CE 0732104	Computer Aided Drafting	1.0
CE0732106	Practical Surveying	1.0
CE0732108	Workshop Sessional	1.0
CE 0732201	Engineering Materials	3.0
CE 0732203	Engineering Geology and Geomorphology	3.0
CE0732251	Mechanics of Solids I	3.0

Course Code	Course Name	Credits
CE0732 202	Details of Construction Lab	1.0
CE 0732204	Engineering Materials Lab	1.0
CE 0732209	Numerical Methods and Analysis	2.0
CE 0732253	Mechanics of Solids II	3.0
CE 0732241	Fluid Mechanics	3.0
CE 0732311	Water Supply Engineering	3.0
CE 0732304	Engineering Computation Lab	1.0
CE 0732206	Quantity Surveying	1.0
CE 0732208	Structural Mechanics Lab	1.0
CE 0732242	Fluid Mechanics Sessional	1.0
CE 0732493	Professional Practices, Communication and Ethics	3.0
CE 0732351	Structural Analysis and Design I	3.0
CE 0732355	Design of Concrete Structures I	3.0
CE 0732313	Waste water and Sanitation Engineering	3.0
CE 0732321	Principles of Soil Mechanics	3.0
CE 0732314	Environmental Engineering Lab-I	1.0
CE 0732324	Geotechnical Engineering Lab-I	1.0
CE 0732357	Design of Concrete Structures II	3.0
CE 0732323	Foundation Engineering	3.0
CE 0732353	Structural Analysis and Design II	3.0
CE 0732331	Transportation Planning and Traffic Engineering	3.0
CE 0732341	Open Channel Flow	3.0
CE0732356	Concrete Structures Design Lab I	1.5
CE 0732302	Remote Sensing and GIS Lab	1.0
CE 0732342	Open Channel Flow Lab	1.0
CE 0732491	Project Planning and Construction Management	3.0
CE 0732359	Design of Steel Structures	3.0
CE 0732451	Structural Analysis and Design III	3.0
CE 0732333	Pavement Design and Railway Engineering	3.0
CE 0732345	Hydrology, Irrigation Engineering and Flood Management	3.0
CE 0732334	Transportation Engineering Lab-I	1.0
CE 0732360	Steel Structures Design Lab	1.5
CE 0732452	Concrete Structures Design Lab II	1.5
CE 0732497	Sustainability of Development Projects	2.0
	Total	92.5

Elective Courses:

Students specializing in an optional group, shall take Project/Thesis and at least two optional courses and a corresponding lab course from that group and two more optional courses and another corresponding lab course from any other group

Structural Engineering		
Course Code	Course Name	Credits
CE 0732453	Introduction to Finite Element Method	2.0
CE 072455	Prestressed Concrete	2.0
CE 0732457	Design of Concrete Structures III	2.0
CE 0732459	Dynamics of Structures	2.0
CE 0732461	Introduction to Steel-Concrete Composite Structures	2.0
CE 0732454	Computer Aided Analysis and Design Sessional	1.5

Geotechnical Engineering		
Course Code	Course Name	Credits
CE 0732421	Earth Retaining Structures	2.0
CE 0732423	Elementary Soil Dynamics	2.0
CE 0732425	Soil-Water Interaction	2.0
CE 0732424	Geotechnical Engineering Lab II	1.5
CE 0732427	Geotechnical-Earthquake Engineering	2.0

Environmental Engineering		
Course Code	Course Name	Credits
CE 0732411	Solid and Hazardous Waste Management	2.0
CE 0732413	Pollution Management	2.0
CE0732 415	Environmental and Sustainable Management	2.0
CE 0732414	Environmental Engineering Lab II	1.5

Transportation Engineering		
Course Code	Course Name	Credits
CE 0732431	Traffic Planning and Management	2.0
CE 0732433	Pavement Management, Drainage and Airports	2.0
CE 0732435	Urban Transportation Planning and Management	2.0
CE 0732434	Transportation Engineering Lab II	1.5

Water Resources Engineering		
Course Code	Course Name	Credits
CE 0732443	Ground Water Engineering	2.0
CE 0732445	River Engineering	2.0
CE 0732447	Hydraulic Structures	2.0
CE 0732449	Coastal Engineering	2.0
CE0732 448	Water Resources Engineering Lab	1.5

Project/ Thesis:

Course Code	Course Name	Credits
CE 0732490	Thesis	4.5
CE 0732492	Capstone Project	3.0

6. Year/Level/Semester/Term-wise Distribution of Courses

a. First Semester courses

Course Code	Course Name	Credits
CE 0732101	Engineering Mechanics	3.0
CHEM 0531175	Engineering Chemistry	3.0
MATH 0541153	Differential and Integral Calculus, Matrices	3.0
PHY 0533175	Physical Optics, Waves and Oscillation, Heat and Thermodynamics	3.0
GED XXXXXXXX	General Education Group-1	2.0
CE 0732102	Civil Engineering Drawing	1.0
CHEM 0531176	Engineering Chemistry Lab	1.0
PHY 0533176	Engineering Physics Lab	1.0
		17.0

b. Second Semester courses

Course Code	Course Name	Credits
CE 0732103	Surveying	3.0
EEE 0713241	Fundamentals of Electrical Engineering	3.0
GED 0232101	The Four Skills of Communication in English I	2.0
GED 0232102	Developing English Language skills lab	1.0
MATH 0541155	Differential Equations and Statistics	3.0
PHY 0533177	Structure of Matter, Electricity and Magnetism and Modern Physics	3.0
CE 0732104	Computer Aided Drafting	1.0
CE0732106	Practical Surveying	1.0
CE 0732108	Workshop Sessional	1.0
		18.0

c. Third Semester Courses

Course Code	Course Name	Credits
CE 0732201	Engineering Materials	3.0
CE 0732203	Engineering Geology and Geomorphology	3.0
CE 0732251	Mechanics of Solids I	3.0
CE 0732202	Details of Construction Lab	1.0
CE 0732204	Engineering Materials Lab	1.0
CSE 0611252	Computer Programming Lab	1.0
GED 0411153	Accounting	2.0
GED XXXXXXXX	General Education Group-2	2.0
MATH 0541257	Coordinate Geometry and Vector Analysis	3.0
Total		19.0

d. Fourth Semester courses

Course Code	Course Name	Credits
CE 0732209	Numerical Methods and Analysis	2.0
CE 0732253	Mechanics of Solids II	3.0
CE 0732241	Fluid Mechanics	3.0
CE 0732311	Water Supply Engineering	3.0
CE 0732304	Engineering Computation Lab	1.0
CE 0732206	Quantity Surveying	1.0
CE 0732208	Structural Mechanics Lab	1.0
CE 0732242	Fluid Mechanics Sessional	1.0
MATH 0541259	Fourier Analysis and Laplace Transformation	3.0
Total		18.0

e. Fifth Semester courses

Course Code	Course Name	Credits
CE 0732493	Professional Practices, Communication and Ethics	3.0
CE 0732351	Structural Analysis and Design I	3.0
CE 0732355	Design of Concrete Structures I	3.0
CE 0732313	Waste water and Sanitation Engineering	3.0
CE 0732321	Principles of Soil Mechanics	3.0
CE 0732314	Environmental Engineering Lab-I	1.0
CE 0732324	Geotechnical Engineering Lab-I	1.0
Total		17.0

f. Sixth Semester courses

Course Code	Course Name	Credits
CE 0732357	Design of Concrete Structures II	3.0
CE 0732323	Foundation Engineering	3.0
CE 0732353	Structural Analysis and Design II	3.0
CE 0732331	Transportation Planning and Traffic Engineering	3.0
CE 0732341	Open Channel Flow	3.0
CE 0732356	Concrete Structures Design Lab I	1.5
CE 0732302	Remote Sensing and GIS Lab	1.0
CE 0732342	Open Channel Flow Lab	1.0
Total		18.5

g. Seventh Semester courses

Course Code	Course Name	Credits
CE 0732491	Project Planning and Construction Management	3.0
CE 0732359	Design of Steel Structures	3.0
CE 0732451	Structural Analysis and Design III	3.0
CE 0732333	Pavement Design and Railway Engineering	3.0
CE 0732345	Hydrology, Irrigation Engineering and Flood Management	3.0
CE 0732334	Transportation Engineering Lab-I	1.0
CE 0732360	Steel Structures Design Lab	1.5
CE 0732490	Thesis	1.5
CE 0732492	Capstone project	1.0
Total		20.0

h. Eight Semester courses

Course Code	Course Name	Credits
CE 0732490	Thesis	3.0
CE 0732492	Capstone project	2.0
CE 0732452	Concrete Structures Design Lab II	1.5
CE 0732497	Sustainability of Development Project	2.0
CE XXXXXXXX	Elective Course Group-1(Major)	2.0
CE XXXXXXXX	Elective Course Group-1(Major)	2.0
CE XXXXXXXX	Elective Course Group-1(Lab.) (Major)	1.5
CE XXXXXXXX	Elective Course Group-2 (Minor)	2.0
CE XXXXXXXX	Elective Course Group-2 (Minor)	2.0
CE XXXXXXXX	Elective Course Group-2 (Lab.) (Minor)	1.5
Total		19.5

Structural Engineering

Course Code	Course Name	Credits
CE 0732453	Introduction to Finite Element Method	2.0
CE 0732455	Prestressed Concrete	2.0
CE 0732457	Design of Concrete Structures III	2.0
CE 0732459	Dynamics of Structures	2.0
CE 0732461	Introduction to Steel-Concrete Composite Structures	2.0
CE 0732454	Computer Aided Analysis and Design Sessional	1.5

Environmental Engineering

Course Code	Course Name	Credits
CE 0732411	Solid and Hazardous Waste Management	2.0
CE 0732413	Pollution Management	2.0
CE 0732415	Environmental and Sustainable Management	2.0
CE 0732414	Environmental Engineering Lab II	1.5

Geotechnical Engineering

Course Code	Course Name	Credits
CE 0732421	Earth Retaining Structures	2.0
CE 0732423	Elementary Soil Dynamics	2.0
CE 0732425	Soil-Water Interaction	2.0
CE 0732424	Geotechnical Engineering Lab II	1.5
CE 0732427	Geotechnical-Earthquake Engineering	2.0

Transportation Engineering

Course Code	Course Name	Credits
CE 0732431	Traffic Planning and Management	2.0
CE 0732433	Pavement Management, Drainage and Airports	2.0
CE 0732435	Urban Transportation Planning and Management	2.0
CE 0732434	Transportation Engineering Lab II	1.5

Water Resources Engineering

Course Code	Course Name	Credits
CE 0732443	Ground Water Engineering	2.0
CE 0732445	River Engineering	2.0
CE 0732447	Hydraulic Structures	2.0
CE 0732449	Coastal Engineering	2.0
CE 0732448	Water Resources Engineering Lab	1.5

Program Learning Outcomes (PLOs):

PLO No.	PLO Statement	Learning Domain
PLO 1	Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in K1 to K4 respectively to the solution of complex engineering problems.	Cognitive
PLO 2	Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (K1 to K4)	Cognitive
PLO 3	Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (K5)	Cognitive
PLO 4	Conduct investigations of complex problems using research-based knowledge (K8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.	Cognitive, Psychomotor
PLO 5	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations. (K6)	Psychomotor
PLO 6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems. (K7)	Cognitive, Affective
PLO 7	Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts. (K7)	Cognitive, Affective
PLO 8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. (K7)	Cognitive, Affective
PLO 9	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.	Affective
PLO 10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	Affective
PLO 11	Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	Cognitive, Affective
PLO 12	Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	Affective

7. Course Contents

First Year Semester 1:

Course Code: CE 0732101	Course Title: Engineering Mechanics	Credits: 03
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Rationale of the Course:

This course has been designed to give basic knowledge of statics and kinetics of engineering mechanics.

Course Learning Outcomes

CLO1	Develop knowledge of the basic principles and terminology of structural mechanics by identifying coplanar, and non-coplanar forces and moments in the structural system.
CLO2	Solve Frames and different type of Trusses.
CLO3	Calculate impulse, momentum, and moments of inertia.
CLO4	Find centroids of the structural element.
CLO5	Explain the basic working principles of flexible chords, plane motion, friction, and virtual work principle.

Course Content:

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.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)												
	1	2	3	4	5	6	7	8	9	10	11	12	
CLO1	√	√											
CLO2		√											
CLO3		√											
CLO4		√											
CLO5	√	√											

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Interactive learning	Examination, Assignment, Class Test
CLO2	Lecture, Interactive learning	Examination, Assignment, Class Test
CLO3	Lecture, Interactive learning	Examination, Assignment, Class Test
CLO4	Lecture, Interactive learning	Examination, Assignment, Class Test
CLO5	Lecture, Interactive learning	Examination, Assignment, Class Test

Course Code: CHEM 0531175	Course Title: Engineering Chemistry	Credits:3.0
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Rationale of the Course:

This course is a basic chemistry covering the field of inorganic, organic and physical chemistry. The course emphasizes on the basic concepts, theories and solves quantitative problems which can be applied in a wide spectrum of engineering disciplines.

Course Learning Outcomes:

CLO1	Define different basic parameters in the field of inorganic, organic and physical chemistry i.e., atomic structure, periodic table, chemical bonding, acids and bases, chemical equilibrium, thermo-chemistry and different types of solutions, phase rule etc.
CLO2	Explain different basic theories in the field of selective organic reactions such as Oxidation-reduction, Substitution, Addition, Polymerization, Alkylation reactions etc.
CLO3	Solve quantitative problems in the field of inorganic, organic and physical chemistry i.e., solutions, thermochemistry, chemical kinetics, electrical properties of solution etc.

Course Content:

Atomic Structure: Concepts of atomic structure, Different atom models, quantum theory and electronic configurations, Heisenberg's uncertainty principle

Periodic Table: Periodic classification of elements, Periodic properties of elements, Properties and uses of noble gases

Chemical Bonding: Types and properties of chemical bonding, Lewis theory, VBT, MOT, Hybridization and shapes of molecules

Selective organic reactions: Oxidation-reduction, Substitution, Addition, Polymerization, Alkylation reactions

Phase Rule: Basic terms and phase rule derivation, Phase diagram of water and carbon dioxide

Solutions: Solutions and their classification, Unit expressing concentration, Colligative properties and dilute solutions, Raoult's law, Van't Hoff's law of osmotic pressure

Thermochemistry: Laws of thermochemistry, Enthalpy, Hess's law, Heat of formation, Kirchoff's equations, Heat of neutralization, Heat of reaction

Chemical Kinetics: Order and rate of reaction, Pseudo and zero order reaction, Half-life, Determination and factors affecting the rate of a reaction, First order reaction, Second order reaction, Collision theory, Transition state theory

Chemical Equilibrium: Equilibrium law/constant, K_p and K_c, Homogeneous and heterogeneous equilibrium, Van't Hoff's reaction isotherm, Le Chatelier's principle

pH & Buffer Solution: Different concepts of acids-bases, Buffer solution, Mechanism of buffer solution, Henderson-Hasselbalch equation, Water chemistry and pH of water

Electrical properties of solution: Conductors & nonconductors, difference between electrolytic and metallic conduction, electrolytic conductance, Factors influencing the conductivity of electrolytes, Kohlrausch Law & conductometric titrations.

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.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)												
	1	2	3	4	5	6	7	8	9	10	11	12	
CLO1	√												
CLO2	√												
CLO3		√											

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom instruction, Active learning, Practical example.	Examination, Class Test, Assignment.
CLO2	Classroom instruction, Active learning, Practical example.	Examination, Class Test, Assignment.
CLO3	Classroom instruction, Active learning, Practical example.	Examination, Class Test, Assignment.

Course Code: MATH0541153	Course Title : Differential and Integral Calculus, Matrices	Credits: 3.0
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Rationale of the Course:

Differentiation finding the rate of change of a function with respect to the variable on which it depends. Students should be able to work with functions represented in a variety of ways: graphical, numerical, analytical, or verbal. They should understand the connections among these representations. Students should understand the meaning of the derivative in terms of a rate of change and local linear approximation and should be able to use derivatives to solve a variety of problems. Matrices are widely used for specifying and representing geometric transformations (for example rotations) and coordinate changes. In numerical analysis, many computational problems are solved by reducing them to a matrix computation, and this involves often computing with matrices of huge dimension.

CLO1	Analyze the operation of composition of function and be able to apply algebraic equations.
CLO2	Analyze linear, quadratic, power, polynomial, algebraic, rational, trigonometric, exponential, hyperbolic and logarithmic functions and sketch their graphs.
CLO3	Design computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, orthogonality and diagonalization.

Course Content:

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.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2	√	√										
CLO3		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Assignment
CLO2	Lecture, Group Discussion, Assignment	Examination, Class Test
CLO3	Lecture, Exercise, Assignment	Examination, Class Test

Course Code: PHY 533175	Course Title: Physical Optics, Waves and Oscillation, Heat and Thermodynamics	Credits:3.0
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Rationale of the Course

This course is a multi-topic course of Physics including the physical optics, waves and oscillation, besides heat and thermodynamics. This introduces the fundamental concept, laws and applications of those topics. It focuses on the exercises in relation to physical sciences within the topic and help grow mathematical relation to analyze the physical sciences problems as such students would be able to think any physical measure and successfully frame that in mathematical framework.

Course Learning Outcomes:

CLO1	Explain interference, diffraction, polarization, Brewster's law, Malus law, optical activity, simple harmonic oscillations, forced oscillation, resonance, two-body oscillations, reduced mass, differential equation of a progressive wave, stationary wave, group velocity and phase velocity, kinetic theory of gases, mean free path, Brownian motion, laws of thermodynamics, thermodynamic processes, entropy and disorder, thermodynamic functions, Maxwell relation and similar things
CLO2	Analysis the properties and behaviors of light (like interference, diffraction, polarization) and the relevant measurable factors (like fringe width, intensity of fringe in Young's double slit experiment, intensity of light in a single slit, double slits and etc), Newton's rings, Fresnel bi-prism, equipartition of energy, Carnot cycle; efficiency of heat engines, Carnots theorem Maxwell relations, Clausius-Clapeyron equation, two-body oscillations, reduced mass, Lissajous figures and similar things
CLO3	Compare between interference and diffraction, Fresnel and Fraunhofer diffraction , standing and progressive wave, transverse and longitudinal wave, reversible and irreversible thermodynamic processes, heat and temperature, and similar things

Course Content:

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

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

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

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs):

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√										
CLO3	√											

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture delivery, Hand out providing	Examination, Assignment, Class Test
CLO2	Lecture delivery, Hand out providing	Examination, Assignment, Class Test
CLO3	Lecture delivery, Hand out providing	Examination, Assignment, Class Test

Course Code: GED 0222119	Course Title: History of Emergence of Independent Bangladesh	Credits:2.0
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Rationale of the Course:

The aim of this course is to acquaint the students with the history of Bangladesh in order to instill in them the spirits of nationalism so as to enable them to become proud citizens of Bangladesh.

Course Learning Outcomes:

CLO1	Discuss the glorious past of Bangladesh and the creations of ancestors
CLO2	Designate the deferent phases of the historical development and the diversity of Cultural trait
CLO3	Estimate the heroic movements of the people of Bangladesh
CLO4	Appraise the contribution of Bangabandhu Sheikh MujiburRahmanand alsoBangalees in the liberation war of Bangladesh
CLO5	Evaluate the emergence of Bangladesh as an independent country

Course Content:

Political Geography: Principalities (Janapads). Attempts in History for Building Undivided state of Bengal and the Partition of Indian Sub-continent-Shashanka (b) The Palas and the Senas (c) The Muslim Sultanate-IkhtiyarUddin Muhammad BakhtiyarKhalji,SultanShamsuddinIliyas Shah (d) The Mughals and Bengal-Revolt of the Bara-Bhuiyans (e) Bengal and the British- The Battle of the Plassey, The First War of Independence –the so-called Sepoy Mutiny. (f) Emergence of middle class, renaissance of Bengal and contribution of noted personalities: Raja Rammohon Roy, Henry Luies Vivian Derozio, Debendranath Tagore, Iswar Chandra Vidyasagar, Nawab Abdul Lateef.The Partition of Bengal in 1905 and its Annulment in 1911. The India Act of 1935 and the Lahore Resolution of 1940-Bengal Pact and DeshbanduChittaranjanDas. Creation of Pakistan and status of Bengal within Pakistan. The Language Movement and the Politics of United Front (Jukto- Front). Growing Disparity between East and West Pakistan and Struggle for Autonomy under Military Rule in Pakistan. Bangabandhu Sheikh MujiburRahman and His Historic Six Point Charter, 1966. TheAgartata Conspiracy and the Mass Upsurge of 1969.Abdication of Ayub Khan, Martial Law of 1969 and the 1970 Election. The Liberation of 1971-Non-cooperation Movement and the historic 7th March Speech of Bangabandhu, Declaration of Independence on 26th March by Bangabandhu and his arrest, Formation of Mujibnagar Government in April, 1971, Role of MuktiBahini, the Allied Power and the Great Powers and Surrender of the Pakistani Army on 16th December (Victory Day). Great Men and History- Role of Bangabandhu and the Emergence of Bangladesh.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs):

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1						√						
CLO2						√						
CLO3							√					
CLO4		√										
CLO5		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture delivery, Hand out providing	Examination, Assignment, Class Test, Presentation
CLO2	Lecture delivery, Hand out providing	Examination, Assignment, Class Test, Presentation
CLO3	Lecture delivery, Hand out providing	Examination, Assignment, Class Test, Presentation

Course Code: GED 0232117	Course Title: Functional Bangla	Credits: 2.0
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Rationale of the Course:

একজন শিক্ষার্থী যাতে বাংলা ভাষার জন্ম ও ক্রমবিকাশ, ভাষার সংগঠন ও প্রক্রিয়া সম্পর্কে জানতে পারে এবং ভাষার শুদ্ধ ব্যবহার তথা শুদ্ধ উচ্চারণ ও শুদ্ধ বানান সম্পর্কে সম্যক জ্ঞান লাভ করে ব্যক্তিগত ও পেশাগত জীবনে ইতিবাচক পরিবর্তন নিয়ে আসতে পারে সেটিই এই কোর্সটির পাঠক্রম উদ্দেশ্য। এর আবশ্যিকীয় অংশ হিসেবে তাদেরকে বাংলা সাহিত্য সম্পর্কে ধারণা লাভ করতে হবে যেখানে জীবন অভিজ্ঞতা প্রকাশের ভাষাকে প্রায়োগিক চর্চার মাধ্যমে শাণিত করবে।

Course Learning Outcomes :

CLO1	বাংলা ভাষার জন্ম ও ক্রমবিকাশ, ভাষার সংগঠন ও প্রক্রিয়া সম্পর্কে জানতে ও বিশ্লেষণ করতে পারবে।
CLO2	ভাষার শুদ্ধ ব্যবহার তথা শুদ্ধ উচ্চারণ ও শুদ্ধ বানান সম্পর্কে সম্যক জ্ঞান লাভ করে ব্যক্তিগত ও পেশাগত জীবনে ইতিবাচক পরিবর্তন নিয়ে আসতে পারবে।
CLO3	সাহিত্যের বিভিন্ন শাখা তথা কবিতা গল্প প্রবন্ধ নাটক এবং ব্যবহারিক বাংলা রচনা প্রকৃতি সম্পর্কে ধারণা লাভ করবে।
CLO4	জীবন অভিজ্ঞতা প্রকাশের ভাষাকে প্রায়োগিক চর্চার মাধ্যমে শাণিত করবে।
CLO5	বাংলা ভাষা, সাহিত্য ও সংস্কৃতির কিছু প্রায়োগিক চর্চা করবে।

Course Content :

বাংলা ভাষার প্রয়োগ ও অপ-প্রয়োগ, বাংলা বানান ও ভাষাসম্পাদনা, বিরামচিহ্নের প্রয়োগ, পত্রলিখন, জীবন-বৃত্তান্ত তৈরিকরার কাঠামো, কারণ-দর্শনো নোটিশ, অভিযোগ-নামা এবং তারজবাব, সভার কার্য-বিবরণী (রেজুলেশন), নিয়োগবিজ্ঞপ্তি, চাকুরির সাক্ষাৎকার বিষয়ক পত্র, নিয়োগপত্র ও যোগদানপত্র, চারিত্রিক সনদপত্র, অফিস আদেশ/ নোটিশ বা বিজ্ঞপ্তি/ প্রেস বিজ্ঞপ্তি, সূচিনিরবাম্যগাজিনের জন্য বাণী এবং সম্পাদকীয় রচনা, ব্যবহারিক বাংলা রচনা: একুশে ফেব্রুয়ারী, মুক্তিযুদ্ধ, বাংলা ভাষা, বিশ্বায়ন, আকাশ সংস্কৃতি।

Mapping Course Learning Outcomes (CLOs) with the PLOs :

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√			√								
CLO2		√	√									
CLO3			√									
CLO4		√	√									
CLO5			√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy :

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom instruction, Active learning	Examination, Class Test, Assignment.
CLO2	Classroom instruction, Active learning	Examination, Class Test, Assignment.
CLO3	Classroom instruction, Active learning	Examination, Class Test, Assignment.

Course Code: GED 0222105	Course Title: Bangladesh Studies	Credits: 3.0
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Rationale of the Course:

This course has been designed for undergraduate engineering students to help them learn the rich history of Bangladesh, and to provide them with basic knowledge of historical events which eventually led to the formation of Bangladesh and constitution of Bangladesh, current trends in economic development, legislation, citizen charter, cultural aspects which will make them responsible citizen.

Course Learning Outcomes

CLO1	Identify specific stages of Bangladesh’s political history, through the ancient, medieval, colonial and post-colonial periods and critically analyze plurality of cultural identities of Bangladesh.
CLO2	Explain the economy and patterns of economic changes through qualitative and quantitative analysis.
CLO3	Assess the societal, educational and cultural settings of Bangladesh.

Course Content:

Bangladesh Geography: Location, Area, Boundary, Physiography, River system, Forest and Climate, Demography of Bangladesh, Maritime zones.

History: Overview of the ancient Bengal; anthropological identity of the Bengali race; main trends in the history of medieval Bengal; Bengal under the East India Company; religious and social reform movements; nationalist movements, division of the Indian sub-continent; language movement 1948-1952; education movement of 1962; six-point movement of 1966; mass uprising of 1969; war of independence and emergence of Bangladesh in 1971, Constitution of Bangladesh, Political Development and Democratic Transition (1971-1990), Political Development (1991- Present), Bangladesh’s contribution to world peace and its security.

Environment, Economy and Culture: Land, Characteristics of tropical monsoon climate, Forests and biomass, Fish, Minerals, Health, Education, Agriculture, Industries, NGOs, Population, Sociological and Cultural aspects of Bangladesh, Economy and National development, Development and Progress of the Millennium Development Goals (MDGs), Public Administration in Bangladesh, State of Good Governance in Bangladesh, Art and 113 Literature, Main traditional cultural events, Vision-2021, Digitalization, Tourism and Natural Resources, Bangladesh and International Relations.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1						√						
CLO2						√						
CLO3						√						

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom instruction, Active learning	Examination, Class Test, Assignment.
CLO2	Classroom instruction, Active learning	Examination, Class Test, Assignment.
CLO3	Classroom instruction, Active learning	Examination, Class Test, Assignment.

Course Code: CE 0732102	Course Title: Civil Engineering Drawing	Credits: 1.50
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Rationale of the Course :

The course has been designed to gain & develop the basic knowledge of geometry. To make students capable of understanding of orthographic view & isometric view. To make students capable of understanding and building plan, elevation & section view.

Course Learning Outcomes:

CLO1	Attain Knowledge about different geometric planes by hand drawing
CLO2	Depict Interpretation, Section, projection & development of solid geometry
CLO3	Compare Hand drafting knowledge of Isometric & oblique drawing
CLO4	Show Hand drafting knowledge about civil buildings: plan, elevation, section

Course Content:

Introduction to Civil Engineering Drawing; Plane Geometry – Pentagon, Hexagon, Octagon, Ellipse, Parabola, Hyperbola; interpretation of Solids; section and True Shape – Cube, Pyramid, Cone, Prism; projection (Solid Geometry); development the surface – Cube, Pyramid, Cone, Prism; isometric & Oblique Drawing; plan, elevation and section of One Storied Buildings.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)												
	1	2	3	4	5	6	7	8	9	10	11	12	
CLO1	√												
CLO2	√												
CLO3	√												
CLO4			√						√	√			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Class Assessment and discussion	Class Assessment, Quiz, Viva
CLO2	Lecture, Class Assessment and discussion	Class Assessment, Quiz, Viva
CLO3	Lecture, Class Assessment and discussion	Class Assessment, Quiz, Viva
CLO4	Lecture, Class Assessment and discussion	Class Assessment, Quiz, Viva

Course Code: CHEM 0531176	Course Title: Engineering Chemistry Lab	Credits: 1.0
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Rationale of the Course:

This course is a laboratory course for the basic chemistry in the field of inorganic and physical chemistry. The course will be emphasized by fundamental experiments on different fields of chemistry which can be applicable in a wide spectrum of engineering disciplines. This laboratory course will enable students to understand basic chemistry practically as well as do work with team or individual.

Course Learning Outcomes:

CLO1	Define the different parameters regarding inorganic and physical chemistry.
CLO2	Describe the different phenomena regarding acid-base, iodoiodimetric, complexometric and redox titration etc.
CLO3	Construct Experiments by an individual or by a group to determine different phenomena regarding acid-base, iodo-iodimetric, complexometric and redox titration etc.

Course Content:

Quantitative chemical analysis in the field of inorganic and physical chemistry such as: Acid Base titration, Redox titration, Iodometric and Iodometric titration, Complexometric titration. Na₂-EDTA) Solution by using Eriochrome black T indicator.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√											
CLO3				√					√			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom instruction, Laboratory Demonstration, peer group discussion. Team work.	Quiz, Report writing, Viva, Demonstration.
CLO2	Classroom instruction, Laboratory Demonstration, peer group discussion. Team work.	Quiz, Report writing, Viva, Demonstration.
CLO3	Classroom instruction, Laboratory Demonstration, peer group discussion. Team work.	Report writing, Viva, Demonstration.

Course Code: PHY 0533176	Course Title: Engineering Physics Lab	Credits: 1.0
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Rationale of the Course:

This course is a laboratory experiment that covers the experimental aspects of the theoretical multi-topic of Physics courses naming (i) Physical Optics, Waves and Oscillation, Heat and Thermodynamics (PHY 0533175) and (ii) Structure of matters, Electricity and Magnetism, and Modern Physics (PHY 0533177).

Course Learning Outcomes:

CLO1	Outline the requirements for doing an experiment.
CLO2	Relate the underlying theory to the experiment.
CLO3	Determine the experimental value.

Course Content:

Determination of the spring constant and the effective mass of a loaded spring, determination of rigidity modulus of the material of a wire by static method, determination of the focal length of a (i) 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, determination of the moment of inertia of a flywheel about its axis of rotation, determination of the unknown frequency of a tuning fork by Melde's apparatus, determination of the 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 of different frequencies, determination of thermal conductivity of a bad conductor by Lee's method, determination of the mechanical equivalent of heat by electrical method, determination of the threshold frequency for a material of a photocathode and hence find out the value of the Planck's constant Drawing magnetic induction versus current curve for a circular coil using Biot-Savart law and hence to verify tangent law, determination of the pressure-coefficient of air by constant volume air thermometer

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs):

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√											
CLO3		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture delivery, demonstrate manually, group discussion	Quiz, Oral Test, Lab performance and reporting
CLO2	Lecture delivery, demonstrate manually, group discussion	Quiz, Oral Test, Lab performance and reporting
CLO3	Lecture delivery, demonstrate manually, group discussion	Quiz, Oral Test, Lab performance and reporting

First Year Semester 2:

Course Code: CE 0732103	Course Title: Surveying	Credits: 3.0
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Rationale of the Course :

The purpose of this course is to introduce various surveying techniques for conducting land and hydrographic survey, Photogrammetry as well as GIS and GPS which will be useful in various projects in the later semesters and in their professional life.

Course Learning Outcomes

CLO1	Comprehend the working principles of various survey methods, equipment and tools for conducting
CLO2	Explain the principles of various methods for curve settings and earth works calculation for highway/railway projects and understand the components survey
CLO3	Apply different survey methods in solving engineering problems

Course Content:

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

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√										
CLO3		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom instruction, Active learning, Practical example.	Examination, Class Test, Assignment.
CLO2	Classroom instruction, Active learning, Practical example.	Examination, Class Test, Assignment.
CLO3	Classroom instruction, Active learning, Practical example.	Examination, Class Test, Assignment.

Course Code: EEE 0713241	Course Title: Fundamentals of Electrical Engineering	Credits: 3
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Rationale of the Course:

Electrical circuit analysis is the most fundamental concept for electrical engineering, electronics engineering, and computer engineering. To prepare students for more advanced courses in circuit analysis, the "alphabet" of circuits, including wires, resistors, capacitors, inductors, voltage, and current sources, etc. are essential to learn theoretically and practically. In order to accomplish this goal, this course is designed to provide a complete overview of DC electrical circuit analysis used in electrical engineering and electronic engineering.

Course Learning Outcomes:

CLO1	Discuss basic circuit laws applied in simple DC circuits to compute voltage, current, equivalent resistance and power.
CLO2	Use different analysis techniques and circuit theorems to solve complex circuits.
CLO3	Examine natural and step responses of RL and RC circuits.

Course Content:

Voltage, current, power, energy, independent and dependent sources, resistance; Ohm’s law, Kirchhoff’s current and voltage laws; Series and parallel circuits, voltage and current division, wye-delta transformation; Nodal and mesh analysis including super node and super mesh; Source transformation, Thevenin’s, Norton’s and superposition theorems with applications in circuits having independent and dependent sources, maximum power transfer condition and reciprocity theorem; Natural and step responses; Flux, permeability and reluctance, magnetic field strength, magnetic potential, flux density, magnetization curve.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√										
CLO3	√											

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lectures, Discussion with the students, Question and answer session, Problem solving in the class, Interactive and multimedia teaching, Class progress tests.	Class Test, Mid-term, Final Examination
CLO2	Lectures, Question and answer session, Problems solving in the class, Interactive and multimedia teaching, Assignment submission/ report writing, Class progress tests.	Class Test, Assignment / Project, Final Examination
CLO3	Lectures, Question and answer session, Problem solving in the class, Interactive and multimedia teaching, Class progress tests.	Class Test, Final Examination

Course Code: GED 0232101	Course Title: The Four Skills of Communication in English	Credits: 3
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Rational of the Course:

This course is designed to improve English language skills in Listening, Reading, Writing and Speaking. It also consolidates and extends essential language covered in student’s activities like Vocabulary, Grammar & Pronunciation to develop writing skills and confidence in typical problem areas in English.

Course Content:

Speed reading (highlighting, getting information from text quickly finding your way around texts noting key words, following main arguments, interacting with the text and summarization. Extensive reading (reading outside class books selected by teachers; at least two books will be read). Use of complex sentence constructions with connectives also fragments run-ons. Paraphrasing & Summarizing. Organizing a paragraph: topic sentence, detailed sentences, logical order and conclusions. Paragraph writing focusing on the characteristics of patterning, cohesion, coherence and unity in the paragraph, paragraph analysis, development, outlining. Writing different types of essays: narrative, descriptive, exploratory etc. Listening and demonstrating comprehension of a variety of sources at defined competency level (Elementary to pre-intermediate level). Listening and responding to texts (i.e., following instructions, answering questions, reacting to texts etc.) Listening and note-taking. Learning basic grammatical rules (Prepositions, Subject verb agreement, Right forms of verbs, Tense etc.). Usage of Phrasal Verbs. Extending basic sentence construction with vocabulary. Use of word combinations and collocations. Vocabulary building for people and places. Asking for directions. Vocabulary on requests, invitations and suggestions. Expression on opinions, agreeing and disagreeing. Informal debates and group discussions. Public speaking. Situational conversation and dialogue writing. Reading news items and reporting. Storytelling.

Course Learning Outcomes (CLOs):

After successful completion of the course student will be able to

CLO1: Write in an effective manner that demonstrates an understanding of the basic concepts of grammar.

CLO2: Deliver ideas through various modes of communication effectively.

CLO3: Show expertise in communicating and comprehending the general. most situations.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	PLO 1	PLO 2	PLO3	PLO 4	PL O5	PL O6	PL O7	PL O8	PL O9	PLO 10	PLO 11	PLO 12
[CLO1]										√		
[CLO2]												
[CLO3]												

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy:

Course Learning Outcome (CLOs)	Teaching-Learning Strategy	Assessment Strategy
[CLO1]	Lecture, Presentation, Group Discussion, Interactive Teaching	Class Test, Assignment
[CLO2]	Lecture, Example Based Study	Writing Test, Quiz, Presentation
[CLO3]	Lecture, Problem Based Exercise	Class Test, Free Hand Writing

Course Code: GED 0232102	Course Title: Developing English Language Skills Lab	Credits: 1
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Rational of the Course:

The Course Level is focused on developing fluency and accuracy abilities, and to helping students reach a level of competence that will allow them to interact with a variety of more challenging, sophisticated current topics. This course puts equal weight on reading writing, listening, speaking and test taking strategies. The course also covers sub skills such as academic vocabulary, academic style and study skills each day.

Course Content:

Critical reading (make judgments about how a text is argued, reflecting and making personal response as well as close scrutiny of language to understand writer’s attitude and perspectives). Listening and demonstrating comprehension of a variety of sources at defined competency level (intermediate to upper-intermediate level). Listening comprehension of authentic radio broadcasts in both British and American English Guided conversations (involving different functions and situations, e.g., greetings, requesting, apologizing, etc. Displaying speaking skills at defined competency level & apply speaking skills to a variety of lectures taken for the purpose of business and general tasks and situations. Using the patterns and the rules of English grammar to produce grammatically complete and correct sentences independently. Mechanics of writing: grammar, punctuation and spelling. Two-minute impromptu speaking. Displaying speaking skills at defined competency level & apply speaking skills to a variety of lectures taken for the purpose of business and general tasks and situations. Using the patterns and the rules of English grammar to produce grammatically complete and correct sentences independently. Writing paragraphs following different modes of writing: definition, description, classification, cause and effect, comparison and contrast, argumentative. Equipping with the necessary English language skills for immediate and future academic and professional development. Fostering and cultivating an awareness of own proficiency levels in the four skills (speaking, listening, reading and writing) as well as in grammar and vocabulary; IELTS Reading, Writing, listening & Speaking practice. Guided conversations (involving different functions and situations, e.g., greetings, requesting, apologizing, etc.) Role-plays in various authentic situations preparing and presenting talks on given themes.

Course Learning Outcomes (CLOs):

After successful completion of the course student will be able to

CLO1: Accomplish the skill to skim, scan and focus on target material in academic reading Passages.

CLO2: Formulate, express and defend opinions using appropriate vocabulary.

CLO3: Demonstrate improved listening skills for comprehension and details.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	PLO 1	PLO2	PLO 3	PLO 4	PL O5	PL O6	PL O7	PL O8	PL O9	PLO 10	PLO 11	PLO 12
[CLO1]										√		
[CLO2]										√		
[CLO3]										√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy:

Course Learning Outcome (CLOs)	Teaching-Learning Strategy	Assessment Strategy
[CLO1]	Lecture, Presentation, Group Discussion, Interactive Teaching	Class Test, Assignment
[CLO2]	Lecture, Example Based Study	Writing Test, Quiz, Presentation
[CLO3]	Lecture, Problem Based Exercise	Class Test, Free Hand Writing

Course Code: GED 0232101	Course Title: The Four Skills of Communication in English	Credits: 3
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Rationale of the Course:

Students will have the opportunity to improve English language skills in Listening, Reading, Writing and Speaking. It also consolidates and extends essential language covered in student’s activities like Vocabulary, Grammar & Pronunciation to develop writing skills and confidence in typical problem areas in English.

Course Learning Outcomes (CLOs):

CLO1	Achieve a marked improvement in their: spoken English, reading and listening comprehension, vocabulary, conversation, pronunciation and grammar.
CLO1	Converse freely and make short oral presentations in English.
CLO1	Comprehend, summarize, and discuss the main points of authentic texts about general or academic Reading

Course Content:

Speed reading (highlighting, getting information from text quickly finding your way around texts noting key words, following main arguments, interacting with the text and summarization. Extensive reading (reading outside class books selected by teachers; at least two books will be read). Use of complex sentence constructions with connectives also fragments run-ons. Paraphrasing & Summarizing. Organizing a paragraph: topic sentence, detailed sentences, logical order and conclusions. Paragraph writing focusing on the characteristics of patterning, cohesion, coherence and unity in the paragraph, paragraph analysis, development, outlining. Writing different types of essays: narrative, descriptive, exploratory etc. Listening and demonstrating comprehension of a variety of sources at defined competency level (Elementary to pre-intermediate level). Listening and responding to texts (i.e., following instructions, answering questions, reacting to texts etc.) Listening and note-taking. Learning basic grammatical rules (Prepositions, Subject verb agreement, Right forms of verbs, Tense etc.). Usage of Phrasal Verbs. Extending basic sentence construction with vocabulary. Use of word combinations and collocations. Vocabulary building for people and places. Asking for directions. Vocabulary on requests, invitations and suggestions. Expression on opinions, agreeing and disagreeing. Informal debates and group discussions. Public speaking. Situational conversation and dialogue writing. Reading news items and reporting. Storytelling

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1									√	√		
CLO2										√		
CLO3									√	√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning and Assessment Strategy:

Course Learning Outcome (CLOs)	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Assignment, Mid-Term Exam
CLO2	Lecture, Hand/Multimedia Demonstration	Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Assignment, Final Exam

Course Code: MATH0541155	Course Title: Differential Equation and Statistics	Credits: 3.0
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Rationale of the Course:

Any work revolved around modeling structures, fluids, pollutants and more can be modeled using differential equations. Applications are almost everywhere, from the displacement of a beam to complex shell and membrane displacements or fluid induced non-stable vibration (Flutter). Want to understand structural properties of a bridge or building? The Partial Differential Equation corresponding to Linear elasticity is probably a good first model to apply. Statistics is a critical tool for robustness analysis, measurement system error analysis, test data analysis, probabilistic risk assessment, and many other fields in the engineering world.

Course Learning Outcomes:

CLO1	Solve a variety of first order and higher order differential equations, selecting from several techniques covered in the syllabus.
CLO2	Be able to analyze certain physical problems (tank flow, compound interest, mechanical and electrical vibration), set up their determining differential equations, and solve them using the techniques in 1 above.
CLO3	To familiarize the students with the fundamental concepts of Partial Differential Equations (PDE) which will be used as background knowledge for the understanding of specialized courses in the field of Materials Science and Engineering that follow.
CLO4	Identify the role that statistics can play in the engineering problem-solving process.

Course Content:

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 coefficients. 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 distribution.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2		√										
CLO3	√	√										
CLO4		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Class Test
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Class Test
CLO4	Lecture, Group Discussion	Examination, Class Test

Course Code: PHY 0533177	Course Title: Structure of matter, Electricity and Magnetism, and Modern Physics	Credits: 3.0
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Rationale of the Course:

This course is a multi-topic course of Physics including the structure of solid, electricity and magnetism besides modern physics. This introduces the fundamental concept, laws and applications of those topics. It focuses on the exercises in relation to physical sciences within the topic and help grow mathematical relation to analyze the physical sciences problems as such students would be able to think any physical measure and successfully frame that in mathematical framework.

Course Learning Outcomes:

CLO1	Explain atomic theory, nuclear features, factors and reactions with radioactive properties, linear and angular motion, planetary motion with satellite features, relativistic motion, quantum physics framework with postulates of quantum mechanics and its introduction, structure of solid, crystal system with defects and its relevant studies, band theory, electrostatic system and its measures, circuit and needful laws to study circuit, magnetic system, flux, field, matter wave and similar things
CLO2	Analyze an electrical circuit with principles and determine the factors (like current, load and etc.), formulation of field, force and potential for a charged system, conservation principle of motions, relativistic mass-energy relation, time dilation and length contraction, speed, time period and height of a satellite, magnetic field for current conducting wire, half-life and mean life of a radioisotope and similar things
CLO3	Compare between Galilean and Lorentz transformation in special theory of relativity, crystalline and amorphous, classical and quantum mechanics, conductor, semiconductor and insulator, electrical and magnetic system, matter and wave, nuclear fission and fusion, and similar things.

Course Content:

Linear momentum of a particle, linear momentum of a system of particles, conservation of linear momentum, some applications of the momentum principle; Angular momentum of a particle, angular momentum of a system of particles; Kepler’s law of planetary motion, the law of universal Gravitation, the motion of planets and satellites; Galilean relativity and Einstein’s special theory of relativity; Lorentz transformation equations, Length contraction, Time dilation and mass-energy relation; Photoelectric effect, Compton effect; De Broglie matter waves and its success in explaining; Bohr’s theory, Pauli’s exclusion principle, Constituent of atomic nucleus, Nuclear binding energy, different types of radioactivity, radioactive decay law, Nuclear reactions, nuclear fission, nuclear fusion, atomic power plant; introductory quantum mechanics, Wave function; Uncertainty principle, postulates, Schrödinger time independent equation, expectation value, Probability, Particle in a zero potential, calculation of energy; crystalline and non-crystalline solids, single crystal and polycrystalline solids, unit cell, crystal systems, co-ordinations number, crystal planes and directions, NaCl and CsCl structure, packing factor, Miller indices, relation between inter-planar spacing and Miller indices, Bragg’s law, methods of determination of inter-planar spacing from diffraction patterns; defects in solids: point defects, line defects, bonds in solids, inter-atomic distances, calculation of cohesive and bonding energy; Introduction to band theory: distinction between metal, semiconductor and insulator, Electric charge and Coulomb’s law, Electric field, concept of electric flux and the Gauss’s law- some applications of Gauss’s law, Gauss’s law in vector form, Electric potential, relation between electric field and electric potential, capacitance and dielectrics, gradient, Laplace’s and Poisson’s equations, Current, Current density, resistivity; Magnetic field, Ampere’s law and Biot-Savart law with their applications, Laws of electromagnetic induction- Maxwell’s equation.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs):

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√										
CLO3	√											

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture delivery, Hand out providing	Examination, Assignment, Class Test
CLO2	Lecture delivery, Hand out providing	Examination, Assignment, Class Test
CLO3	Lecture delivery, Hand out providing	Examination, Assignment, Class Test

Course Code: CE 0732104	Course Title: Computer Aided Drafting	Credits: 1.0
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Rationale of the Course:

The course has been designed to make students understand significant topics of advanced civil engineering drawing in Auto CAD, to make students capable of understanding and designing building drawing concepts and to make students capable of designing detailing about different sectional views.

Course Learning Outcomes:

CLO1	Explain Various types of an isometric view, plan and section drawings, and use of Auto CAD software.
CLO2	Depict Various types of civil engineering drawings and use of Auto CAD software.
CLO3	Compare civil engineering hand drawing with civil engineering drawing in Auto CAD.
CLO4	Illustrate various types of shallow footings, pile foundation, column, beam, slab detailing, septic tank, rooftop tank, box and arch culvert, truss and community overhead tank.

Course Content:

Download and installation process of AutoCAD software; Understanding the AutoCAD workspace and user interface; Setting drawing limits and page setup; Layer setup, various functions of layers, line type functions; Drawing Setup in AutoCAD; Practical Drawing & Modify Tools; Inquiry Commands, Practical Drawing & Modify Tools; Building: Plan, Section & Elevation View; Stair: Plan, Section View; Reinforcement Detailing: Beam & Stair; section & elevation view of box culvert; shallow foundation detailing; slab detailing.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2					√							
CLO3	√											
CLO4					√				√	√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Class Assessment	Class Assessment, Quiz, Viva
CLO2	Lecture, Class Assessment, Assignment	Class Assessment, Quiz, Viva
CLO3	Lecture, Class Assessment, Assignment	Class Assessment, Quiz, Viva
CLO4	Lecture, Class Assessment, Assignment	Class Assessment, Quiz, Viva

Course Code: CE 0732106	Course Title: Practical Surveying	Credits: 1.0
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Rationale of the Course:

The purpose of this course is to introduce various instruments of surveying and applying those in the field. This course will orient the students with the use of various instruments of surveying and applying those in the field of survey and train the students to plan and execute survey work for any engineering project. It will utilize the students' theoretical knowledge on surveying (CE-103) into practical fields. This course will be useful for the students in professional field.

Course Learning Outcomes:

CLO1	Delineate different concepts and measurement technique for surveying.
CLO2	Demonstrate the ability to use modern surveying instruments to learn traversing, leveling, contouring curve setting technique and their application.
CLO3	Develop concepts of tacheometry and its application.
CLO4	Apply the modern surveying concepts to practical projects.

Course Content:

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

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1				√	√							
CLO2				√	√				√			
CLO3				√	√				√			
CLO4					√					√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Field Work, Field Application Problem Based Learning (PBL), Report preparation, Quiz& viva	Class Performance/ Field Work, Lab report, Viva, Final Quiz
CLO2	Lecture, Field Work, Field Application Problem Based Learning (PBL), Report preparation, Quiz& viva	Field Work, Lab report, Viva, Final Quiz
CLO3	Lecture, Field Work, Field Application Problem Based Learning (PBL), Report preparation, Quiz& viva	Field Work, Lab report, Viva, Final Quiz
CLO4	Lecture, Field Work, Field Application Problem Based Learning (PBL), Report preparation, Quiz& viva	Field Work, Lab report, Viva, Final Quiz

Course Code: CE 0732108	Course Title: Workshop Sessional	Credits: 1.0
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Rationale of the Course:

This course has been designed to give basic knowledge of carpentry, machine, and welding tools and its use and produce of a wooden structure.

Course Learning Outcomes:

CLO1	Explain the procedure of estimating a wooden structure.
CLO2	Detect the defects of timber, their problems and their solution (such as: seasoning) and wood products.
CLO3	Select the correct joint and make a specific job using Carpentry tools.
CLO4	Produce a regular shape of a given wood as instructed individually.
CLO5	Make a specific job in the Lathe machine and different kinds of joints in welding.

Course Content:

Carpentry Shop Wood working tools, Machine Shop (3/4 hours per week) Kinds of tools, Welding Shop (3/4 hours per week) Methods of metal joints.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2				√								
CLO3			√									
CLO4									√			
CLO5									√			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Practical Demonstration, Team work	Report Writing, Quiz, Viva
CLO2	Lecture, Practical Demonstration, Team work	Report Writing, Quiz, Viva
CLO3	Lecture, Practical Demonstration, Team work	Report Writing, Quiz, Viva

Second Year Semester 1:

Course Code: CE 0732201	Course Title: Engineering Materials	Credits: 3.0
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Rationale of the Course:

This course has been designed to discuss the major topics of civil engineering and construction materials such as —aggregate, brick, cement; sand, lime, mortars; concrete; concrete mix design; ferrocement, wood, wood products; advanced fiber reinforced polymer (FRP) composites. This course also covers stress and strain response of solid materials; plane stress and strain condition; identification of strain components of elastic, elasto-plastic and elasto-visco-plastic materials; time dependent strain response of these materials due to different types of loadings; mathematical and simple rheological modeling for prediction of creep behavior; corrosion and prevention of steel in RC structures.

Course Learning Outcomes:

CLO1	Develop knowledge how to use civil engineering materials for sustainable infrastructure.
CLO2	Design and use materials in engineering purpose.
CLO3	Develop knowledge of the stresses and the deformations of materials under loading.
CLO4	Implement structural repair method with appropriate materials.
CLO5	Understand steel corrosion and its prevention methods.

Course Content:

Major engineering aspects of Aggregate, brick, cement; sand, lime, mortars; concrete; concrete mix design; ferrocement, wood, wood products; advanced fiber reinforced polymer (FRP) composites. Aggregate blending, mortar mix and concrete mix design for different categories of use. Stress and strain response of solid materials; plane stress and strain condition; identification of strain components of elastic, elasto-plastic and elasto-visco-plastic materials. Structural repairing of civil engineering structure (RCC structure) with ferrocement and FRP using contemporary technique. Corrosion and prevention of steel in RC structures, offshore structures and ground applications.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2	√		√									
CLO3	√											
CLO4	√	√										
CLO5		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO2	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO4	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO4	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam

Course Code: CE 0732203	Course Title: Engineering Geology and Geomorphology	Credits: 3.0
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Rationale of the Course:

The course has been designed to discuss the different types of 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 landforms, 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 are also discussed in this course.

Course Learning Outcomes:

CLO1	Identify the most important rocks and minerals and interpret geological maps with an emphasis on making construction decisions.
CLO2	Determine the main processes that occur in rivers, and the means for observing them.
CLO3	Analyze and evaluate data and appropriately solve problems both technical and environmental.
CLO4	Assess some of the techniques for analysis of channel morphology and processes and understand stream response to natural and human induced environmental change.

Course Content:

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 landforms. 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.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3	√	√										
CLO4	√	√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO2	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO4	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam

Course Code: CE 0732251	Course Title: Mechanics of Solids I	Credits: 3.0
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Rationale of the Course:

The course has been designed to develop basic knowledge about stress, strain, deformation, deflection, beam statics, SFD and BMD – those topics are very important for structural analysis in Civil engineering. To acquire knowledge deeply about structural mechanics and mechanics of solid as well as static bodies, this course has been added to the curriculum. With this course the students will have a proper knowledge about structure part of Civil engineering.

Course Learning Outcomes:

CLO1	Develop basic knowledge about both stress-strain concept and analysis
CLO2	Comprehend about deformation, deflection due to axial loading and analysis
CLO3	Explain beam statics.
CLO4	Develop understanding on elastic analysis due to torsion
CLO5	Analyze flexural and shear stress in beam

Course Content:

Concepts of stress and strain, constitutive relationships; deformations due to tension, compression a temperature change; beam statics: reactions, axial force, shear force and bending moments; axial force, shear force and bending moment diagrams using method of section and summation approach; elastic analysis of circular shafts, solid noncircular and thin-walled tubular members subjected to torsion; flexural and shear stresses in beams; shear center; thin-walled pressure vessels.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√											
CLO3		√										
CLO4	√											
CLO5	√	√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Quiz
CLO4	Lecture, Group Discussion	Examination, Class Test
CLO5	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz

Course Code: GED0411153	Course Title: Accounting	Credits: 2.0
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Rationale of the Course:

This course aims to understand the basic ideas of principles of accounting and managerial accounting. It has been designed to make the students able to prepare the financial statements and internal cost reports to take economic decisions for the organizations. Discuss the application of Basic Accounting process in various types of business in Bangladesh. Introduce with the Financial Statements of the service and merchandising organization and how-to analysis of the financial statements of the business.

Course Learning Outcomes:

CLO1	Develop a thorough understanding of accounting records and how to record transactions in them
CLO2	Able to prepare the various steps of the accounting cycle of the service industries and the financial statements.
CLO3	Demonstrate knowledge of managerial accounting concepts and its application.
CLO4	Apply the concepts of accounting to decide for internal and external parties.

Course Content:

Purpose of accounting, Introduction to the accounting equation and financial statements, Generally Accepted Accounting Principles, Accounting principles and transaction analysis, Record transactions, post to ledger and prepare a trial balance, Justify and prepare adjusting journal entries and an adjusted trial balance, Using a work sheet, closing the books, Preparation of the Balance Sheet and Income Statement, Cost, Expenses, Loss, Classification of costs, costs behavior, cost control, cost reduction, cost management, cost statement, Cost Sheet , Types of cost behavior patterns, analysis of mixed costs through scatter graph, high-low method, least square regression method, the contribution format- a new income statement, problems and solution, Essentials of CVP analysis, Breakeven point, using CVP analysis for decision making, cost panning and CVP, Effects of sales mix on income, contribution margin versus gross margin, multiple cost drivers.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2	√	√										
CLO3			√									
CLO4	√			√								

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Quiz
CLO4	Lecture, Group Discussion, Exercise	Examination, Class Test
CLO5	Lecture, Group Discussion, Exercise Assignment	Examination, Assignment, Quiz

Course Code: MATH0541257	Course Title: Coordinate Geometry and Vector Analysis	Credits: 3.0
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Rationale of the Course:

This course determines different properties of straight lines, circles and conics with identification of curves in two dimension and directional cosines and directional ratios of straight lines manually with geometric interpretations, and different properties of conic sand straight lines in three dimensions. It includes standard operations on vectors in two-dimensional and three-dimensional space and derivatives and integrals of vector functions.

Course Learning Outcomes:

CLO1	Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments.
CLO2	Explain a physical interpretation of the gradient, divergence, curl and related concepts.
CLO3	Apply the relationship between parallel perpendicular lines.

Course Content:

Co-ordinate Geometry: 2-Dimensional co-ordinate geometry: change of axes transformation of co-ordinates, simplification of equations of curves. 3-Dimensional co-ordinate geometry: system of co-ordinates, distance between two points, section formula, projection, direction cosines, equations of planes and lines. 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, Stokes's theorem, Green's theorem and their applications.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)												
	1	2	3	4	5	6	7	8	9	10	11	12	
CLO1		√											
CLO2	√	√											
CLO3	√	√											

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Class Test
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Class Test

Course Code: CE 0732202	Course Title: Details of Construction Lab	Credits: 1.0
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Rationale of the Course:

This course has been designed to discuss the major topics of construction details, such as —Types of building, components of a building, design loads, framed structure and load bearing wall structure; foundations: shallow foundation and deep foundation, brick masonry: types of brick, bonds in brickwork, supervision of brickwork, brick laying tools, defects and strength on brick masonry, load bearing and non-load bearing walls, cavity walls, partition walls; lintels and 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; house plumbing: water supply and wastewater drainage.

Course Learning Outcomes:

CLO1	Delineate different types of buildings, design loads, bearing capacity of soil, Standard Penetration Test.
CLO2	Depict different types of foundations, defects and strengths of masonry structures, load bearing and non-load bearing walls.
CLO3	Develop concepts of formwork, plastering, pointing, painting, distempering, sound installation, house plumbing.
CLO4	Apply the obtained knowledge to produce cement concrete for construction.

Course Content:

Introduction to construction materials, components of frame structures and steps of construction; Standard Penetration Test; Construction of beam and construction of column; Construction of slab; Details about construction materials: Brick; Foundations: Construction of deep foundation; Construction of shallow foundation; Some problems in construction; Whitewashing and Finishing Materials; Underpinning; Scaffolding; Sound insulation, Thermal Insulation.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√								√			√
CLO3	√											√
CLO4	√								√			√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Class Lecture	Class Assessment, Final Exam, Report Submission
CLO2	Class Lecture	Final Exam, Presentation, Report Submission
CLO3	Class Lecture	Class Assessment, Final Exam, Report Submission
CLO4	Class Lecture	Presentation, Final Exam, Report Submission

Course Code: CE 0732204	Course Title: Engineering Materials Lab.	Credits: 1.0
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Rationale of the Course:

This course has been designed to discuss the topics of laboratory experiments on various building materials such as- fine aggregate, coarse aggregate, cement, bricks and also on cement mortar and structural concrete preparation and properties of concrete. The laboratory experiments include test for specific gravity, unit weight, voids and bulking of aggregates; moisture content and absorption of coarse and fine aggregates; normal consistency and initial setting time of cement; direct compressive strengths of cement mortar; gradation of coarse and fine aggregates; concrete mixed design, design and testing of a concrete mix, sampling and testing of bricks for absorption, unit weight and compressive strength.

Course Learning Outcomes: Upon completion of the course, the students will be able to :

CLO1	Perform the material test (laboratory tests) according to ASTM requirements.
CLO2	Select the appropriate materials for concrete mix.
CLO3	Interpret the various engineering properties of the construction materials.
CLO4	Prepare experimental findings in informal or formal laboratory reports using an appropriate technical writing style.

Course Content:

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

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1				√								
CLO2			√									
CLO3				√								
CLO4		√								√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom instruction, Laboratory Demonstration, peer group discussion. teamwork	Demonstration, viva
CLO2	Interactive teaching, Problem based exercise	Quiz, Demonstration, Viva
CLO3	Classroom instruction, Active learning, Practical example, teamwork	Report writing, Viva
CLO4	Classroom instruction, Active learning, teamwork	Quiz, Report writing, Viva, Presentation.

Course Code: CSE 0611252	Course Title: Computer Programming Lab	Credits: 1.0
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Rationale of the Course:

This course has been designed to discuss basic concepts of programming, algorithm and flowchart. Number system; internal representation of data. Element of structured programming language: constants, variables, data types, operators, expression, Formatted input/output Functions, control statement, arrays, strings, functions, pointers and file management. Fundamental of object-oriented programming (OOP) techniques: object design, classes, inheritance, data abstraction, data encapsulation, polymorphism, operator overloading and templates. Development of programs related to Civil Engineering.

Course Learning Outcomes:

CLO1	Describe concepts of programming, algorithm and flow chart.
CLO2	Develop knowledge about functions, control statement, arrays.
CLO3	Explain variables, functions and object-oriented concept, such as polymorphism, encapsulation and inheritance.
CLO4	Evaluate Civil Engineering related problems using programming.

Course Content:

Introduction to C++, algorithms such as, quick sort, bubble sort. Element of structured programming language: constants, variables, data types, operators, expression, Formatted input/output Functions, control statement, arrays, strings, functions, pointers and file management. Basic concepts of structured and object-oriented programming, loops, conditional statements, operator overloading, templates. Solving problems related to real life problem such as, SFD and BMD of beam, point load and UDL calculation, mechanics, numerical solution of equation of motion etc.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1		√		√	√							
CLO2		√		√								
CLO3		√										
CLO4				√	√							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion, Exercise	Assignments, Report, Viva, Final Quiz
CLO2	Lecture, Multimedia Presentation	Assignments, Report, Viva, Final Quiz
CLO3	Lecture, Exercise	Assignments, Report, Viva, Final Quiz
CLO4	Lecture, Multimedia Presentation	Assignments, Report, Viva, Final Quiz

Course Code: GED 0314155	Course Title: Sociology	Credits: 2.0
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Rationale of the Course:

The discipline of sociology historically has revolved around the mission to comprehend the meaning of society, evaluate the social world decisively, analyze the linkages between individuals and societies, and question the power relations undergirding the organization of contemporary societies. This course intended to develop in students the sociological knowledge and skills that will enable them to think critically and imaginatively about society and social issues.

Course Learning Outcomes:

CLO1	Define sociology as a discipline as well as identify how it is distinct from and related to other disciplines.
CLO2	Analyze theoretical perspectives in sociology, and assess the conceptual differences among them.
CLO3	Evaluate the impact of culture and socialization on individuals and groups.
CLO4	Apply theory and sociological research to interpret current events and case studies.

Course Content:

Sociological Concepts: Sociology, Society, Social Change, Family, Religion, Marriage, Norms and Values, Crime and Punishment, Deviance, Understanding Social Situation. Types of Human Society: Hunting, Fishing, Pastoral Societies. Primitive Societies, Characteristics of Primitive Society, Magic Religion, Food Gathering Society. Culture and Society: Cultural Diversity, Ethnocentrism, Cultural Lag and Cultural Conflict. Factors Affecting Social Life: Geography, Heredity, Culture, Group or Social Factors. Socialization and Class Structure, Classification of Social Stratification, Slavery, Caste, Estate. Theories of Durkheim, August Comte, Karl Marx, Max Weber and Others. Social Mobility in Urban and Rural Area; Social Control: Concepts, Techniques, Types and Agencies of Social Control. Ethnicity and Race: Ethnic Group, Minorities and Race in Rural Society; Indigenous and Marginalized Communities in Bangladesh.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs):

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1		√										
CLO2		√										
CLO3						√						
CLO4		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture delivery, Hand out providing	Examination, Assignment, Class Test, Presentation
CLO2	Lecture delivery, Hand out providing	Examination, Assignment, Class Test, Presentation
CLO3	Lecture delivery, Hand out providing	Examination, Assignment, Class Test, Presentation

Course Code: GED 0311157	Course Title: Economics	Credits: 3.0
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Rationale of the Course:

This course is meant to give students insight into the dynamics of our national economy. It is a core course that will prepare students to be successful in upper division of finance, marketing, business administration and economics courses.

Course Learning Outcomes (CLO):

CLO1	Identify efficiency and equity issues for the economy
CLO2	Understand how national income is determined
CLO3	Analyze factors determining the national unemployment rate
CLO4	Explain factors that affect the inflation rate and the overall price level

Course Content:

Nature and Scope of Economics- PPF-Economic Law - Normative and Positive economics - Utility - Law of Diminishing Marginal Utility, Theory of Demand - Demand Curves - Elasticity of Demand - Consumption - Consumer Surplus - Indifference Curve Analysis, Theory of Supply- Supply Curves- Elasticity of Supply & its Measurement- Exceptional Supply Curves, Theory of Production and Cost: Production Function - Diminishing Returns - Returns to Scale - Cost of Production - Various Economic Concepts of cost - Long Run and Short run Cost Curves - Measurement of Opportunity Cost, Least - Cost Combination, Theory of Firm, Market Structure- Equilibrium of Firm and Industry-Price Determination under Different Market Conditions, Theory of Distribution - Rent-wages - Interest - Profit. Fundamental Concepts of Macroeconomics: Income, Consumption, Savings, Investment, Employment and Output; National Income Accounting : GDP, GNP, NNP, Nominal and Real National Income, Methods of National Income Accounting, Problems of Computing National Income, Usefulness of National Income Accounting; Theory of Income Determination: Classical Approach of Macro-Economics, the Demand for and Supply of Labor, the Equilibrium Level of Employment and Output, Say's Law of Market, Keynesian Approach; Investment: Concepts of Investment, Marginal Efficiency of Investment and Capital; Inflation: Types, Causes, Effects and Control of Inflation. Inflation vs. Deflation. Demand Pull and Cost Push Inflation-Definition and Its Nature, Inflationary Gap, Measurement of Inflationary Gap; Consumption and Savings Function: Concepts of Consumption and Savings Function, MPC,APC, MPS, APS, Short Run and Long Run Views, Keynesian Approach, The Quantity Theory of Money Transaction: Fisher's Equation of Exchange, Cambridge Equation

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs):

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)							
	1	2	3	4	5	6	7	8
CLO1	√	√		√				√
CLO2	√	√		√	√			
CLO3	√							
CLO4	√	√			√			√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture	Quiz
CLO2	Guest speaker (Industry expert)	Group Project
CLO3	Case Study	Presentation
CLO4	Class discussion	Mid Term

Course Code: GED 0312159	Course Title: Government	Credits: 2.0
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Rationale of the Course:

Studying a course like Government helps students from their fundamental knowledge about Bangladesh, especially about her politics, forms of government, organs of government, constitution, NGOs, public service, public policies, governance and e-government, foreign policy, regional and international organizations etc. Government also helps students to be familiar with the administration system of Bangladesh.

Course Learning Outcomes:

CLO1	Discuss the administration system of Bangladesh.
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CLO2	Analyze the government and politics of Bangladesh.
CLO3	Explain the constitution of Bangladesh.
CLO4	Evaluate the foreign policy of Bangladesh.

Course Content:

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.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs):

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1						√						
CLO2						√						
CLO3						√						
CLO4						√						

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture delivery, Hand out providing	Examination, Assignment, Class Test, Presentation
CLO2	Lecture delivery, Hand out providing	Examination, Assignment, Class Test, Presentation
CLO3	Lecture delivery, Hand out providing	Examination, Assignment, Class Test, Presentation

Second Year Semester 2:

Course Code: CE0732209	Course Title: Numerical Methods and Analysis	Credits: 2.0
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Rationale of the Course:

Numerical analysis is employed to develop and analyze numerical methods for solving problems that arise in other areas of mathematics, such as calculus, linear algebra, or differential equations. Of course, these areas already include methods for solving such problems, but these are analytical in nature. Numerical methods in Civil Engineering are now used routinely in structural analysis to determine the member forces and moments in structural systems, prior to design.

Course Learning Outcomes:

CLO1	Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
CLO2	Apply numerical methods to obtain approximate solutions to mathematical problems.
CLO3	Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
CLO4	Analyze and evaluate the accuracy of common numerical methods.

Course Content:

This course has been designed to discuss Motivation and errors in numerical techniques. Solution of algebraic and transcendental equations: method of iteration, False Position method, Newton-Raphson method; Solution of simultaneous linear equations: Cramer’s rule, Iteration method, Interpolation: diagonal and horizontal

difference, differences of a polynomial, Newton’s formula for forward and backward interpolation, Integration: general quadrature formula, Trapezoidal rule, Simpson’s rule, Weddle’s rule; Solution of ordinary differential equations: Euler’s method, Picard’s method, Taylor’s series method, Runge-Kutta method; Least squares approximation of functions: linear and polynomial regression, fitting exponential and trigonometric functions.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs):

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2	√	√										
CLO3	√	√										
CLO4		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment
CLO3	Lecture, Exercise, Assignment	Examination, Assignment
CLO4	Lecture, Group Discussion	Examination, Class Test

Course Code: CE 0732253	Course Title: Mechanics of Solids II	Credits: 3.0
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Rationale of the Course:

This course has been designed to discuss the major topics of solid mechanics such as — Symmetric and unsymmetrical bending of beams; stress transformation, failure criteria; beam deflection by direct integration and moment area method; buckling of columns; elastic strain energy and external work; cable and cable supported structures; bolted, riveted and welded joints.

Course Learning Outcomes:

CLO1	Develop knowledge of the basic principles of symmetric and unsymmetrical bending of beams.
CLO2	Use stress transformation method for failure analysis.
CLO3	Analyze beam members for determination of deflection, stress and strain.
CLO4	Analyze cable and cable supported structures and different types of joints.
CLO5	Explain the basic working principles behind column buckling, elastic strain energy.

Course Content:

Theories and examples of symmetric and unsymmetrical bending of beams. Theory of stress transformation, failure criteria. Mohr’s circle. Beam deflection calculation by direct integration, singularity function, conjugate beam and moment area method. Calculation of cable and cable supported structures. Analysis of bolted, riveted and welded joints. Theories and examples of column buckling. Basic concept of elastic strain energy.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3		√										
CLO4		√										
CLO5	√	√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO2	Classroom instruction, Active learning, Practical example	Class Tests, Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO4	Classroom instruction, Active learning, Practical example	Assignment, Final Exam
CLO5	Lecture, Hand/Multimedia Demonstration	Assignment, Final Exam

Course Code: MATH0541259	Course Title: Fourier Analysis and Laplace Transformation	Credits: 3.0
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Rationale of the Course:

Fourier transform is a mathematical function which transforms a signal from the time domain to the frequency domain. This is a very powerful transformation which gives us the ability to understand the frequencies inside a signal. Fourier series is just a means to represent a periodic signal as an infinite sum of sine wave components. A periodic signal is just a signal that repeats its pattern at some period. The primary reason that we use Fourier series is that we can better analyze a signal in another domain rather in the original domain. The Laplace transform is a particularly elegant way to solve linear differential equations with constant coefficients. The Laplace transform describes signals and systems not as functions of time but rather as functions of a complex variables.

Course Learning Outcomes:

CLO1	Explain the concept of Fourier transform & Fourier series.
CLO2	Analyze Laplace transform of a function from the definition of a Laplace transform, and apply the Laplace transform of the exponential, cosine and sine functions.
CLO3	Conduct Laplace transform of derivatives, integrals and general or complete solutions to linear ODEs.

Course Content:

Fourier Analysis: Real and complex form of Fourier series; Finite transform; Fourier Integral; Fourier transforms and their uses in solving boundary value problems of wave equations. Laplace Transforms: Definition; Laplace transforms of some elementary functions; 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; Evaluation of improper integrals.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Quiz

Course Code: CE 0732241	Course Title: Fluid Mechanics	Credits: 3.0
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Rationale of the Course:

This course has been designed to give basic knowledge to make students capable of understanding basic concepts of fluids & its characteristics, Similitude and dimensional analysis, steady incompressible flow, and make students capable of solving problems like -various forces on fluid structure, fluid's abnormal characteristics and network.

Course Learning Outcomes:

CLO1	Explain the terminology associated with fluid mechanics and principals of flow rates and velocity measurement.
CLO2	Explain fluid properties correctly to solve problems.
CLO3	Analyze viscous flow problems
CLO4	Compute forces on hydraulic bodies with fluid flows.
CLO5	Analyze pipe flow network and losses in pipe flow.

Course Content:

Development and scope of fluid mechanics, fluid properties, fluid statics, kinematics of fluid flow, fluid flow concepts and basic equations, Bernoulli's equation, energy equation, momentum equation and forces in fluid flow. Similitude and dimensional analysis, steady incompressible flow in pressure conduits, laminar and turbulent flow, general equation for fluid friction, empirical equations for pipe flow, minor losses in pipe flow. Fluid measurement: Pitot tube, orifice, mouthpiece, nozzle, venture meter weir. Pipe flow problems – pipes in series and parallel, branching pipes, pipe networks.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3		√										
CLO4		√										
CLO5		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Examination, Class Test, Assignment
CLO2	Lecture, Hand/Multimedia Demonstration	Examination, Class Test, Assignment
CLO3	Lecture, Hand/Multimedia Demonstration	Examination, Class Test, Assignment
CLO4	Lecture, Hand/Multimedia Demonstration	Examination, Class Test, Assignment
CLO5	Lecture, Hand/Multimedia Demonstration	Examination, Class Test, Assignment

Course Code: CE 0732311	Course Title: Water Supply Engineering	Credits: 3.0
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Rationale of the Course:

This course has been designed to discuss the sources of water supply: ground water and surface water, water quality and water treatment technologies, design of water supply and distribution systems for imparting comprehensive knowledge about Water Supply Engineering.

Course Learning Outcomes

CLO1	Explain basic elements of water supply system.
CLO2	Depict water quality of both surface and ground water.
CLO3	Describe Ground Water Exploration techniques; Surface Water Collection and Transportation.
CLO4	Compare different water purification techniques.
CLO5	Design water treatment units and water distribution systems.

Course Content:

Introduction to water supply engineering; Water supply sources; Ground Water Exploration; Surface Water Collection and Transportation; Pumps and Pumping Machineries; Water Quality; Water Purification; Water Distribution System; Analysis and Design of Distribution Network.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs) :

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3	√	√	√									
CLO4		√										
CLO5			√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture	Class Test
CLO2	Lecture, Group Discussion	Class Test, Final Examination
CLO3	Lecture, Exercise, Assignment	Class Test, Class Assessment, Assignment, Final Examination
CLO4	Lecture, Group Discussion, Assignment	Class Assessment, Assignment, Final Examination
CLO5	Lecture, Group Discussion, Exercise, Assignment	Class Assessment, Assignment, Final Examination

Course Code: CE 0732304	Course Title: Engineering Computation Lab	Credits: 1.0
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Rationale of the Course:

This course has been designed to discuss the major topics of Engineering computation such as— 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.

Course Learning Outcomes:

CLO1	Determine roots and solution of equations, solution of matrix related calculation.
CLO2	Explain variables, functions and object-oriented concept, such as polymorphism, encapsulation and inheritance.
CLO3	Compare various mathematical functions using 2D Sub POs and 3D POs.
CLO4	Calculate statistical outcome of large datasets, such as annual rainfall data, traffic speed study.

Course Content:

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.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs) :

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2		√			√							
CLO3	√				√							
CLO4		√			√							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion, Multimedia Presentation.	Class performance, Viva, Quiz
CLO2	Lecture, Group Discussion, Multimedia Presentation.	Class performance, Viva, Quiz
CLO3	Lecture, Exercise, Multimedia Presentation.	Class performance, Quiz, Demonstration
CLO4	Lecture, Group Discussion, Multimedia Presentation.	Class performance, Viva, Quiz

Course Code: CE 0732206	Course Title: Quantity Surveying	Credits: 1.0
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Rationale of the Course:

This course has been designed to be familiarizing with the estimation of building or construction material and also cost involved with any construction works. This course includes material estimate and cost estimate of various building component and other structures.

Course Learning Outcomes:

CLO1	Select appropriate bidder of any project.
CLO2	Estimate the costing of any structure as per PWD rate schedule.
CLO3	Evaluate the tender based on financial proposal
CLO4	Prepare bill of quantity (BOQ) and proposal for any project as per PWD and other rate schedule.

Course Content:

Techniques for the estimation of building or construction material; Cost estimation of various building component and other structures; Estimation of building or construction material and also cost involved with any construction works; Estimation of building or construction material and also cost involved with any construction works.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1		√	√									
CLO2		√									√	
CLO3		√									√	
CLO4											√	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Multimedia Demonstration	Lab Report, Class Performance, Final Quiz, Viva
CLO2	Lecture, Multimedia Demonstration	Lab Report, Class Performance, Final Quiz, Viva
CLO3	Lecture, Multimedia Demonstration	Lab Report, Class Performance, Final Quiz, Viva
CLO4	Lecture, Multimedia Demonstration	Lab Report, Group Presentation, Final Quiz, Viva

Course Code: CE 0732208	Course Title: Structural Mechanics Lab	Credits: 1.0
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Rationale of the Course:

After completing this course, students will be able to learn different structural behavior of construction materials which help them choose suitable materials based on their structural properties.

Course Learning Outcomes:

CLO1	Develop fundamental concepts about properties of mild steel by direct shear, tension and impact test.
CLO2	Compute stress and other material properties of different materials or different structural element.
CLO3	Analyze the behavior of beams under loading.
CLO4	Apply the obtained knowledge to study structural models, truss and frames.

Course Content:

Introduction to different material properties; behavior of mild steel and its properties; Tension test of mild steel, Direct shear test of mild steel; Impact test of metal specimens; Compression test of timber specimens; Hardness test of metals; Slender Column Test; Helical spring test; Discussion on static bending test; Determination of shear center; Study of structural models; Truss, beam-column frame.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√			√								
CLO2		√		√					√			
CLO3		√		√								
CLO4		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Lab Manual	Quiz, Demonstration, Viva
CLO2	Lecture, Lab Manual	Quiz, Demonstration, Viva, Team Work
CLO3	Lecture, Lab Manual	Quiz, Demonstration, Viva
CLO4	Lecture, Hand/Multimedia Demonstration	Quiz, Demonstration, Viva

Course Code: CE 0732242	Course Title: Fluid Mechanics Sessional	Credits: 1.0
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Rationale of the Course:

This course has been designed to discuss the major topics of Fluid Mechanics that would help the students to understand the behavior of fluid under various forces and at different atmospheric conditions. Basic knowledge of measurement techniques is also discussed in this course.

Course Learning Outcomes:

CLO1	Identify the forces acting on a fluid system.
CLO2	Utilize basic measurement techniques of fluid mechanics.
CLO3	Discuss the differences among measurement techniques and their relevance.
CLO4	Understand the practical application of measurement techniques.

Course Content:

Centre of pressure; Bernoulli’s theorem; Flow through Venturi meter; Flow through orifice; Coefficient of velocity by coordinate method; Flow through external mouthpiece; Flow over V-notch; Flow over sharp-crested weir; Fluid friction in pipe; Head loss due to sudden contraction and sudden expansion in a pipe.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs) :

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√		√					√			
CLO2	√	√		√					√			
CLO3	√	√		√								
CLO4	√	√		√								

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Class Assessment, Lab Quiz
CLO2	Lecture, Group Discussion, Exercise, Assignment	Class Assessment, Assignment, Lab Quiz
CLO3	Lecture, Group Discussion, Assignment	Class Assessment, Assignment, Lab Quiz
CLO4	Lecture, Group Discussion, Exercise	Class Assessment, Assignment, Lab Quiz

Third Year Semester 1:

Course Code: CE 0732493	Course Title: Professional Practice Communication and Ethics	Credits: 3.0
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Rationale of the Course:

To give students the basic knowledge of Civil engineering professional practices and make them understand various professional ways of communication as well as several ethical codes which need to be maintained by Civil engineers.

Course Learning Outcomes:

CLO1	Explain various components of Civil Engineering education, projects and project management.
CLO2	Apply different techniques for maintenance of a successful project to achieve shared goals, different contracts, communication.
CLO3	Prepare and present project proposal, report and tender documents by using a range of communication skills that include verbal, meetings, interpersonal and written skills relevant for engineering professionals.
CLO4	Practice the concepts of professionalism, ethics, cultural safety for inter professional collaborations.

Course Content:

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

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√										√	
CLO2		√										√
CLO3									√	√		
CLO4								√	√			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Assignment	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Quiz
CLO4	Lecture, Assignment	Examination, Class Test
CLO5	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz

Course Code: CE 0732351	Course Title: Structural Analysis and Design I	Credits: 3.0
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Rationale of the Course:

This course has been designed to give basic knowledge of stability and determinacy of structures and analyze truss, cable supported structures, and effect of influence line on beam, frame and truss due to moving load.

Course Learning Outcomes:

CLO1	Recognize statically stable and determinate structures.
CLO2	Analyze statically determinate truss and three hinge arches.
CLO3	Draw quantitative influence line diagram for beams, frames and trusses.
CLO4	Analyze the effect of moving load on determinate structure.
CLO5	Analyze cable supported structures e.g., suspension bridges.

Course Content:

The analysis of statically determinate trusses and three hinge arches, influence lines, moving loads on beams, frames and trusses; cables and cable supported structures e.g., suspension bridges.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)												
	1	2	3	4	5	6	7	8	9	10	11	12	
CLO1	√												
CLO2	√	√											
CLO3	√	√											
CLO4	√	√											
CLO5	√	√											

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Examination, Class Test
CLO2	Lecture, Hand/Multimedia Demonstration	Examination, Class Test
CLO3	Lecture, Hand/Multimedia Demonstration	Examination, Class Test
CLO4	Lecture, Hand/Multimedia Demonstration	Examination, Class Test
CLO5	Lecture, Hand/Multimedia Demonstration	Examination, Class Test

Course Code: CE 0732355	Course Title: Design of Concrete Structures I	Credits: 3.0
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Rationale of the Course:

This course has been designed to discuss the major topics of concrete structures such as Fundamental behavior of reinforced concrete, Design and analysis of Beam, slab etc parts of Building design. This course will make a civil engineering student strengthen his/her analytic and design capability that is much needed in structural engineering.

Course Learning Outcomes:

CLO1	Develop knowledge on the fundamental behavior of reinforced concrete
CLO2	Design different types of beams
CLO3	Examine diagonal tension and torsion of beams, shear reinforcement of beams, seismic detailing, bond and anchorage
CLO4	Design one-way slabs
CLO5	Explain the basic design principles and design a two-way edge supported slabs.

Course Content:

Introduction to Concrete Structures, Design methodology of structural elements, Basic knowledge of RCC structures, Analysis of Beam using WSD and USD method, Design of Singly reinforced beam, doubly reinforced beam, T beam analysis and Design, Web reinforcement design, Analysis and design of one-way slab, Bond and anchorage for design, two-way edge supported slab.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)												
	1	2	3	4	5	6	7	8	9	10	11	12	
CLO1	√												
CLO2		√	√										
CLO3			√										
CLO4		√	√										
CLO5	√		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Quiz
CLO4	Lecture, Group Discussion	Examination, Class Test
CLO5	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz

Course Code: CE 0732313	Course Title: Waste Water and Sanitation Engineering	Credits: 3.0
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Rationale of the Course:

The course has been designed to discuss the major topics of environmental sanitation and wastewater engineering such as- estimation of wastewater; wastewater collection systems; hydraulics of sewer; design, construction and maintenance of sanitary sewer and storm drainage system; sewer appurtenances; plumbing system; microbiology of wastewater; wastewater characteristics; wastewater treatment and disposal; treatment and disposal of industrial effluents; sludge treatment and disposal; sanitation and health; low cost sanitation technology; septic tank system and sustainability of water.

Course Learning Outcomes:

CLO1	Explain sewage system, sewage hydraulics, pipe materials, waste collection system.
CLO2	Depict microbiology of sewage and wastewater.
CLO3	Compare chemical properties of industrial, domestic and storm sewage.
CLO4	Design septic tank, activated sludge process and trickling filter as per Bangladesh standard.
CLO5	Apply low cost techniques to provide sanitation for rural community.

Course Content:

Introduction to Sanitation; sanitation and health; low cost sanitation technology; septic tank system and sustainability of water, estimation of wastewater; wastewater collection systems; hydraulics of sewer; design, construction and maintenance of sanitary sewer and storm drainage system; sewer appurtenances; plumbing system; microbiology of wastewater; wastewater characteristics; wastewater treatment and disposal; treatment and disposal of industrial effluents; sludge treatment and disposal.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3	√											
CLO4	√		√									
CLO5		√	√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Quiz
CLO4	Lecture, Group Discussion	Examination, Class Test
CLO5	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz

Course Code: CE 0732321	Course Title: Principles of Soil Mechanics	Credits: 3.0
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Rationale of the Course:

The course has been designed to discuss the basic knowledge of Geotechnical Engineering such as-formation, type and identification of soils and cover the theories of stress-strain-strength characteristics of soils; compressibility and settlement behavior of soils.

Course Learning Outcomes:

CLO1	Determine different types of soil and their composition including soil classification by USCS method.
CLO2	Explain permeability, seepage and consolidation of soil.
CLO3	Analyze total and effective stress, Shear strength of soil stress due to surface load.
CLO4	Calculate lateral earth pressure using Rankine’s method, Culmann’s graphical method.
CLO5	Evaluate the compressibility of soil due to loads.

Course Content:

This course has been designed to discuss the major topics of Geotechnical Engineering such as-formation, type and identification of soils; soil composition; soil structure and fabric; index properties 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.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2	√	√										
CLO3		√										
CLO4	√	√										
CLO5	√	√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Quiz
CLO4	Lecture, Group Discussion	Examination, Class Test
CLO5	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz

Course Code: CE 0732314	Course Title: Environmental Engineering Lab I	Credits: 1.0
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Rationale of the Course:

After completing this course, students will be able to learn the major topics of water quality requirements, water and wastewater sampling techniques, physical, chemical and biological tests of water and wastewater.

Course Learning Outcomes:

CLO1	Develop knowledge about water sampling techniques.
CLO2	Determine physical, chemical, biological properties of water.
CLO3	Analyze solid waste for treatment and disposal.

Course Content:

Water quality requirements, water and waste water sampling techniques, sample preservation; Physical, chemical and biological tests of water and wastewater; breakpoint chlorination, alum coagulation; Sampling and laboratory analysis of solid waste.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√		√					√			
CLO3		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Practical/ Experimental Demonstration	Assignments, Report, Viva, Final Quiz
CLO2	Lecture, Practical/ Experimental Demonstration	Assignments, Report, Viva, Final Quiz
CLO3	Lecture, Practical/ Experimental Demonstration	Assignments, Report, Viva, Final Quiz

Course Code: CE 0732324	Course Title: Geotechnical Engineering Lab-I	Credits: 1.0
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Rationale of the Course:

This course has been designed to discuss the experimental procedure for engineering properties of soil for enabling students for designing sub-structure.

Course Learning Outcomes:

CLO1	Explain various types of geotechnical engineering test.
CLO2	Develop knowledge on the behavior of various types of soil.
CLO3	Compare soil properties of fine grained and coarse-grained soil.
CLO4	Evaluate the parameters of shear strength, settlement & permeability of various types of soil.

Course Content:

Principle topics of field identification tests; Grain size analysis by sieve and hydrometer; Minimum water content for LL, PL and stress-strain-strength characteristics of soil; Design of soil system by compaction test, relative density test, direct shear tests, consolidation tests.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3		√		√					√			
CLO4		√		√					√			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Lab Report, Class Performance, Final Quiz, Viva
CLO2	Lecture, Hand/Multimedia Demonstration	Lab Report, Class Performance, Final Quiz, Viva
CLO3	Lecture, Hand/Multimedia Demonstration	Lab Report, Class Performance, Final Quiz, Viva
CLO4	Lecture, Hand/Multimedia Demonstration	Lab Report, Class Performance, Final Quiz, Viva

Third Year Semester 2:

Course Code: CE 0732357	Course Title: Design of Concrete Structure II	Credits: 3.0
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Rationale of the Course:

To make students capable designing of various foundations, designing of column supported slabs, introduction to floor systems, design of columns under uniaxial and biaxial loading, introduction to slender column and make students capable designing of seismic detailing, shear wall, structural forms and basic introduction to pre-stressed concrete, analysis and preliminary design of pre-stressed beam sections.

Course Learning Outcomes:

CLO1	Analyze different types of floor systems and shear walls.
CLO2	Design column supported slabs.
CLO3	Examine uniaxial and biaxial loading effect on columns.
CLO4	Design column, footing and pile cap, mat foundation, shear wall design.
CLO5	Explain the basic working principles behind pre-stressed concrete through analysis of pre-stressed beam sections, seismic detailing.

Course Content:

This course has been designed to discuss the major topics of concrete structures such as — 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 and basic introduction to pre-stressed concrete, analysis and preliminary design of pre-stressed beam sections.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2			√									
CLO3		√	√									
CLO4	√	√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment
CLO3	Lecture, Exercise, Assignment	Examination, Assignment
CLO4	Lecture	Examination, Class Test
CLO5	Lecture, Group Discussion, Assignment	Examination, Assignment

Course Code: CE0732323	Course Title: Foundation Engineering	Credits: 3.0
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Rationale of the Course:

This course has been designed to discuss the major topics of sub-soil investigation techniques; geotechnical aspects of building foundations; bearing capacity of shallow and deep foundations; settlement and distortion of foundations; design and construction of footings, rafts and piles. This course also covers the slope stability analyses of natural and man-made earth slope.

Course Learning Outcomes:

CLO1	Comprehend and utilize the geotechnical literature to establish the frame work for foundation design.
CLO2	Implement the site investigation program.
CLO3	Evaluate the soil- structure behavior by obtaining necessary design parameters.
CLO4	Design a foundation system for a structure.
CLO5	Evaluate the earth slope stability.

Course Content:

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.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2	√	√										
CLO3		√										
CLO4			√									
CLO5		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom instruction, Active learning, peer group discussion.	Examination, Class Test
CLO2	Classroom instruction, Active learning, Practical example	Examination, Class test
CLO3	Classroom instruction, Active learning, Practical example	Examination, Class Test
CLO4	Classroom instruction, Active learning, Practical example	Examination, Class Test
CLO5	Classroom instruction, Active learning, Practical example,	Examination, Class Test, Assignment

Course Code: CE 0732353	Course Title: Structural Analysis & Design II	Credits: 3.0
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Rationale of the Course:

This course mainly deals with analysis of indeterminate structures. It begins with a review of the topics of lateral loads such as wind load and seismic load. This subject is intended to provide students with a clear and through understanding of how to idealize and analyze statically indeterminate structure (i.e.: braced truss, portal frame, mill bent and multistoried building frame) using approximate analysis method. This is followed by detailed descriptions and demonstrations through many examples, the analysis of the deflection component of beam, trusses and frames by virtual work method. This course is also expected to enable a good understanding of how space truss analysis is performed. Finally force method (consistent deformation method) of structural analysis of indeterminate structure is introduced to arm the students with the necessary tools to better appreciate the real behavior of structures.

Course Learning Outcomes:

CLO1	Develop knowledge of type, source of lateral loads and their estimation
CLO2	Develop knowledge on indeterminate structure and methods of analysis.
CLO3	Analyze the indeterminate 1D, 2D and 3D structures using approximate method and exact method
CLO4	Calculate the deflection of trusses, beams and frames by using unit load method (virtual work method)

Course Content:

Analysis of Wind load and earthquake load; Idealization of indeterminate structure and methods of analysis; Analysis of structure (i.e.: braced truss, portal frame, mill bent, multistoried building frame and space truss) using approximate analysis method and exact method (force method); the analysis the deflection of beam, trusses and frames by virtual work method (unit load method).

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2	√											
CLO3		√										
CLO4		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO2	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO4	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam

Course Code: CE 0732331	Course Title: Transport Planning and Traffic Engineering	Credits: 3.0
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Rationale of the Course:

This course has been designed to discuss, 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. Transportation in Bangladesh: transportation modes and networks, transport demand and modal share, road classification and design standards.

Course Learning Outcomes:

CLO1	Illustrate various methods to calculate the trip distribution number of highways.
CLO2	Calculate super elevation, horizontal curve, vertical curve etc. of highway.
CLO3	Discuss the factors influencing road vehicle performance characteristics and design.
CLO4	Design the highway lighting system and traffic signaling for various conditions

Course Content:

Introduction to Transportation Engineering; Elements of Transportation System, Types of roads; Transportation Planning Concepts; Transport Planning; Geometric Design of Highways; Traffic Engineering; Parking Study; Traffic Signs; Street Lighting; Traffic Control Devices; O-D study; Traffic Signal Design.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2		√										
CLO3	√		√									
CLO4		√	√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Class Lecture, Hand/Multimedia Demonstration	Class test, Assignment, Final Exam
CLO2	Class Lecture, Hand/Multimedia Demonstration	Assignment, Final Exam
CLO3	Class Lecture, Hand/Multimedia Demonstration	Class test, Assignment, Final Exam
CLO4	Class Lecture, Hand/Multimedia Demonstration	Class test, Assignment, Final Exam

Course Code: CE 0732341	Course Title: Open Channel Flow	Credits: 3.0
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Rationale of the Course:

The course has been designed to give basic knowledge on hydraulic behaviors of open channels and enhance the skill of solving open channel flow problems and design artificial channels with rigid and mobile boundary.

Course Learning Outcomes:

CLO1	Identify the hydraulic behaviors of open channels and their causes.
CLO2	Develop the open channel flow equations from the basic conservation theory.
CLO3	Solve open channel flow problems through the selection and application of proper equations.
CLO4	Analyze and design the artificial channels with rigid and mobile boundary.
CLO5	Recognize the significance, characteristics and applications of hydraulic jump.

Course Content:

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.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2	√	√										
CLO3		√										
CLO4		√	√									
CLO5		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Quiz
CLO4	Lecture, Group Discussion	Examination, Class Test
CLO5	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz

Course Code: CE 0732356	Course Title: Design of Concrete Structures Lab I	Credits: 1.5
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Rationale of the Course:

The course has been designed to make the students able to design and analysis of simple construction and low-rise building with brick foundation. Building design is a prime criterion to make a complete civil engineer and this course also covers simple girder and Slab Bridge. So, by this course civil engineering students will acquire proper knowledge about how to design and analysis something practically.

Course Learning Outcomes:

CLO1	Analyze and design of Slab Bridge
CLO2	Analyze and design of Simple Girder Bridge according to AASHTO and ACI
CLO3	Analyze and design of a low-rise Building according to BNBC

Course Content:

Slab Bridge, Simple Girder Bridge and a low-rise Building (Brick wall design, Brick Foundation Design, Lintel and Sunshade design, one-way edge supported slab design, Slab analysis from floor plan, Beam analysis and design from Floor plan, Reinforcement detailing of structural elements of a building.)

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1		√	√							√		
CLO2		√	√		√					√		
CLO3		√	√		√					√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Assignment, Reporting, Quiz
CLO2	Lecture, Group Discussion, Assignment	Reporting, Quiz, Viva
CLO3	Lecture, Exercise, Assignment	Assignment, Reporting, Quiz, Viva

Course Code: CE 0732302	Course Title: Remote Sensing and GIS Lab	Credits: 1.0
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Rationale of the Course:

The course has been designed to discuss the basic principles and concepts of Remote Sensing (RS) and Geographic Information System (GIS). Details of Co-ordinate System, Map elements and Map Design, Data Interpretation, Digital Image Processing and Spatial analysis are also included to impart comprehensive knowledge about RS and GIS application in Civil Engineering.

Course Learning Outcomes

CLO1	Define the concepts and fundamentals of Geographic Information System (GIS) and Geographic Co-ordinate System.
CLO2	Describe the principles of Remote Sensing techniques and concept of Electromagnetic Spectrum Interactions with Atmosphere and Earth surface.
CLO3	Apply image analysis and data interpretation for basic environmental and socioeconomic variables.
CLO4	Develop research-based analysis utilizing main-stream GIS technology to address a scientific topic of societal concern.

Course Content:

Fundamentals of GIS; Geographic Co-ordinate System; Map Projection in Co-ordinate System; Map Basics & Map characteristics; Map Design; Different types of data used in a GIS; Vector Data Structures and Raster Data Structures; Data Sources, acquisition, entry & analysis; Managing Attribute Tables; Introduction to Remote sensing; Principles of Remote Sensing; Concept of Electromagnetic Spectrum Interactions with Atmosphere and Earth surface; Remote Sensing Systems; Characteristics of Satellite Images, Orbits & Satellite sensor characteristics; Digital Image Processing; Spatial analysis; Geoprocessing; Geo-referencing; Attributes based analysis.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs):

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√											
CLO3				√	√							
CLO4				√	√							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Class Test, Lab Quiz
CLO2	Lecture, Group Discussion	Class Test, Lab Quiz
CLO3	Lecture, Exercise, Assignment	Class Assessment, Assignment, Lab Quiz
CLO4	Lecture, Exercise, Group Discussion, Assignment	Class Assessment, Assignment, Lab Quiz

Course Code: CE 0732342	Course Title: Open Channel Flow Lab	Credits: 1.0
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Rationale of the Course:

The course has been designed to give knowledge on the basic measurement techniques of open channel flow and discuss the differences among measurement techniques, their relevance and applications.

Course Learning Outcomes:

CLO1	Determine the state of flow in open channel.
CLO2	Measure open channel discharge by using different flow measuring devices.
CLO3	Observe hydraulic jump and develop relationship among different parameters of jump
CLO4	Develop generalized specific energy and specific force curve.

Course Content:

This course has been designed to discuss the major topics of flow behavior of open channel by using - Broad crested weir, Sluice gate, Venturi flume, Parshal flume, Cut-Throat flume and observe Hydraulic Jump, Velocity distribution profile, Manning’s roughness coefficient, Specific force and Specific Energy for an open channel.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√							√			
CLO2	√	√		√					√			
CLO3	√	√		√					√			
CLO4	√	√		√					√			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Lab Demonstration, Group Discussion	Reporting, class assessment, Viva, Quiz
CLO2	Lecture, Lab Demonstration, Group Discussion	Reporting, class assessment, Viva, Quiz
CLO3	Lecture, Lab Demonstration, Group Discussion	Reporting, class assessment, Viva, Quiz
CLO4	Lecture, Lab Demonstration, Group Discussion	Reporting, class assessment, Viva, Quiz

Fourth Year Semester 1:

Course Code: CE 0732491	Course Title: Project Planning and Construction Management	Credits: 3.0
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Rationale of the Course:

Students will be able to learn the major topics of project management, construction safety, project evaluation, project planning and scheduling. Project planning and evaluation; feasibility reports; cash flows, payback period, internal rate of return; benefit-cost ratio; cost-benefit analysis case studies; Planning and scheduling, PERT, CPM; resource scheduling; linear programming and application, Principles of management; construction management: management of materials and equipment, site management, contracts and specifications, inspection and quality control, safety, economy. Conflict management; human resource management. Demand forecasting; inventory control; stores management; procurement; legal issues in construction; environmental regulations.

Course Learning Outcomes:

CLO1	Explain the fundamental project management, organization, authority.
CLO2	Depict project cost, annual rate of return, benefit.
CLO3	Compare and evaluate the project.
CLO4	Design of construction safety module.
CLO5	Apply linear programming in product design.

Course Content:

Principles of management; construction management: principles, project organization, methods and practices, technology, management of materials and equipment; Project planning and evaluation; feasibility reports; cash flows, payback period, internal rate of return; benefit-cost ratio; cost-benefit analysis case studies; Planning and scheduling, PERT, CPM; resource scheduling; Contracts and specifications, inspection and quality control, safety, economy. Conflict management; psychology in administration: human factors in management; human resource management. Demand forecasting; inventory control; stores management; procurement; legal issues in construction; Resource scheduling; linear programming and application

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1			√									
CLO2							√		√			√
CLO3									√			
CLO4			√					√				
CLO5			√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO2	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO4	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO5	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam

Course Code: CE 0732359	Course Title: Design of Steel Structures	Credits: 3.0
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Rationale of the Course:

This course has been designed to discuss the major topics of steel structure design and construction such as —Behavioral principles and design of structural steel. This course also covers the design of tension members, bolted and welded connections, compression members, flexural members, design of beam-columns, design of moment connections and column bases. This course is also intended to provide fundamental understanding in detailing of steel structures. All discussions are based on the current American Institute of Steel Construction (AISC) steel design specifications.

Course Learning Outcomes:

CLO1	Identify the ASD and LRFD design philosophies of steel structures and have concept on limit state design.
CLO2	Develop knowledge on the behavior of steel structures.
CLO3	Apply the principles, procedures and current code requirements to the analysis and design of steel tension members, beams, columns, beam-columns and connections.
CLO4	Design simple steel structures based on understanding of behavior & use of code provisions.
CLO5	Illustrate design of structures via detailing concepts.

Course Content:

Behavioral principles and design of structural steel; design of tension members, bolted and welded connections; compression members; residual stress, local buckling, effective length; flexural members; lateral torsional buckling; design of beam-columns; connection design, moment connections, column bases; detailing of steel structures.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)												
	1	2	3	4	5	6	7	8	9	10	11	12	
CLO1	√												
CLO2	√	√											
CLO3		√	√										
CLO4			√										
CLO5			√							√			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom instruction, Active learning, peer group discussion.	Examination, Class Test
CLO2	Classroom instruction, Active learning, Practical example	Examination, Class test
CLO3	Classroom instruction, Active learning, Practical example	Examination, Class Test
CLO4	Classroom instruction, Active learning, Practical example	Examination, Class Test
CLO5	Classroom instruction, Active learning, Practical example, peer group discussion.	Assignment and presentation.

Course Code: CE 0732451	Course Title: Structural Analysis & Design III	Credits: 3.0
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Rationale of the Course :

This course has been designed to discuss indeterminate structures and different techniques to analyze them using a number of exact methods. Students will be able to analyze elements of a structure using both hand calculation and matrix method.

Course Learning Outcomes:

CLO1	Develop knowledge on the fundamental concept of indeterminacy and influence line of indeterminate structures
CLO2	Compute indeterminacy and influence line of indeterminate structures
CLO3	Analyze indeterminate structures by force method
CLO4	Analyze indeterminate structures by deformation method

Course Content:

Introduction to different structures of civil engineering, Introduction to Indeterminate Structures, Degree of Indeterminacy & Solution Methods, Moment distribution method problems of beam and Frame structures, Stiffness method, Stiffness matrix of beam, truss and frame, Flexibility method, Virtual energy method, Truss problems, Influence line of indeterminate structures.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√										
CLO3		√										
CLO4		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment
CLO3	Lecture, Exercise, Assignment	Examination, Assignment
CLO4	Lecture, Group Discussion	Examination, Class Test

Course Code: CE 0732333	Course Title: Pavement Design and Railway Engineering	Credits: 3.0
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Rationale of the Course:

To make students capable of understanding of different practices of pavement construction, designing different types of pavements, enable them to learn deeply about different aspects of railway engineering, railway components, alignments etc.

Course Learning Outcomes:

CLO1	Explain various components of railways
CLO2	Calculate super elevation, horizontal curve, vertical curve and resistance of railway track.
CLO3	Calculate mix proportion of aggregate and bitumen.
CLO4	Design flexible and rigid pavement using AASHTO, CBR, IRC, RHD methods.

Course Content:

This course has been designed to discuss, Transportation engineering, transportation functions and applications; Highways materials; sub-grade, sub-base and base courses; soil stabilization and soil aggregates in road constructions; low-cost roads; production, properties and uses of bituminous materials and mix design methods; design, construction and maintenance of flexible and rigid road pavements; equipment's; railways: general requirements, alignment, permanent way, station and yards, signaling, points and crossings, maintenance.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√										
CLO3			√									
CLO4	√		√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture	Examination, Class Test
CLO2	Lecture, Group Discussion	Examination, Assignment
CLO3	Lecture, Exercise	Examination, Assignment
CLO4	Lecture	Examination, Class Test
CLO5	Lecture, Group Discussion	Examination, Assignment

Course Code: CE 0732345	Course Title: Hydrology, Irrigation Engineering and Flood Management	Credits: 3.0
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Rationale of the Course:

This course has been designed to discuss the major topics of hydrologic cycle, hydrologic measurement: precipitation, evaporation and stream flow, hydrographs, consumptive use and estimation of irrigation water requirements, methods of irrigation, quality of irrigation water, problems of irrigated land, flood and its management. The course learnings will enable students to solve practical problems regarding Hydrology, Irrigation, and Flood Management.

Course Learning Outcomes:

CLO1	Develop knowledge about various components of hydrologic cycle that affect the movement of water in the earth.
CLO2	Analyze problems regarding stream flow measurements and generating hydrographs.
CLO3	Explain the problems and necessity of irrigation, quality of irrigation water, various irrigation techniques and requirements of the crops.
CLO4	Design distribution systems for canal irrigation.
CLO5	Apply practical knowledge to solve flood related problems in Bangladesh.

Course Content:

Hydrological Cycle and its components; Precipitation, Evaporation, Transpiration, Infiltration; Stream Flow Measurements; Hydrograph; Problems and necessity of irrigation, Quality of irrigation water, Irrigation Requirements, Duty and Delta; Alignment of Canals; Design of Irrigation Canals; Flood Management.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs) :

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√										
CLO3	√	√										
CLO4			√									
CLO5	√						√					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Class Test
CLO2	Lecture, Exercise, Assignment	Class Assessment, Assignment, Final Examination
CLO3	Lecture, Group Discussion, Exercise, Assignment	Class Test, Class Assessment, Assignment, Final Examination
CLO4	Lecture, Exercise, Assignment	Class Assessment, Assignment, Final Examination
CLO5	Lecture, Group Discussion	Class Assessment, Final Examination, Presentation

Course Code: CE 0732334	Course Title: Transportation Engineering Lab I	Credits: 1.0
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Rationale of the Course:

This course has been designed to give basic knowledge of the properties and on the selection of aggregate and bitumen for pavement design and also for learning different field techniques for counting traffic volume and capacity of signalized intersection.

Course Learning Outcomes:

CLO1	Determine different physical properties of coarse aggregates as per British Standard. (BS).
CLO2	Explain various physical properties of bituminous materials.
CLO3	Apply different field techniques to count traffic volume and capacity of a signalized intersection.

Course Content:

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

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1		√		√					√			
CLO2		√		√					√			
CLO3		√		√					√			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Practical Demonstration, Team work	Report Writing, Quiz, Viva
CLO2	Lecture, Practical Demonstration, Team work	Report Writing, Quiz, Viva
CLO3	Lecture, Practical Demonstration, Team work	Report Writing, Quiz, Viva

Course Code: CE 0732360	Course Title: Steel Structure Design Lab	Credits: 1.5
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Rationale of the Course:

To make students capable of doing hand calculations analyzing and designing of steel truss and truss members, analyzing of steel plate girders and using software to analyze and design structure.

Course Learning Outcomes:

CLO1	Analyze and design of Steel truss and truss members
CLO2	Analyze and design of steel plate girder
CLO3	Use software to analyze and design structure.
CLO4	Express effectively about the functioning of steel design and contemporary engineering issues on steel structures related to Specification and code

Course Content:

This course has been designed to discuss the topics of analysis of steel structures, e.g. truss, plate girder; design of members and joints of structures; use of software in analysis and design problems.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1		√	√							√		
CLO2		√	√							√		
CLO3					√							
CLO4									√			√

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Quiz
CLO4	Lecture, Group Discussion	Examination, Class Test
CLO5	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz

Course Code: CE 0732492	Course Title: Capstone project	Credits: 3.0
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Rationale of the Course:

This course has been designed to implement the major skill and knowledge in the different sub fields of Civil Engineering viz. Structural Engineering, Geotechnical Engineering, Environmental Engineering, Transportation Engineering, Water Resources Engineering and Construction Engineering and Project Management. It is a subject in which student will have individual responsibility for the timely completion of a significant engineering project under the guidance of a member of academic staff. Through the course, the students will be expected to demonstrate a professional level of preparation, planning, execution, testing and documentation.

Course Learning Outcomes:

CLO1	Recognize the complex engineering problems and activities.
CLO2	Conduct investigation on specific problem domain.
CLO3	Identify the constraints of the proposed solutions by reviewing the relevant literature.
CLO4	Formulate and implement the specific methodology.
CLO5	Use modern tools and techniques for appropriate analysis and solution
CLO6	Communicate with the different working groups effectively for preparing the presentation, documentation and in execution of the work.
CLO7	Develop a project report and a working model / patent/ publications in peer reviewed journal.

Course Content:

Planning, analysis and design of an integrated civil engineering project with emphasis on any of the sub-discipline viz. structural engineering, environmental engineering, transportation engineering, geotechnical engineering, water resources engineering, construction engineering and project management 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.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2				√								
CLO3		√		√		√						
CLO4		√	√				√					
CLO5					√							√
CLO6									√	√	√	
CLO7			√					√				

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lectures, Active discussion, peer group discussion.	Presentation, Viva
CLO2	Experiential learning, interactive discussion, Guiding.	Demonstration/ Presentation, Viva
CLO3	Lectures, Active discussion, Inquiry-based instruction	Demonstration/ Presentation, Viva
CLO4	Active discussion, peer group discussion.	Presentation, Viva
CLO5	Active discussion, team work	Presentation, Viva
CLO6	Active discussion	Presentation, Viva
CLO7	Lectures, Active discussion, Inquiry-based instruction	Report writing

Fourth Year Semester 2:

Course Code: CE 0732490	Course Title: Project/ Thesis	Credits: 4.5
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Rationale of the Course:

This course has been designed to conduct research work on various topics in the field of civil engineering. This is a process-oriented writing course that integrates reading, research, writing, and oral presentations. Individual or group study of one or more topics from any of the particular engineering facet should be carried out for research. The students will be required to submit thesis/project report at the end of the work.

Course Learning Outcomes:

Upon successful completion, student will able to-

CLO1	Identify the civil engineering specific problems and formulate the research frame work to proceed.
CLO2	Conduct investigation on specific problem domain and identify the constraints of the proposed solutions by reviewing the relevant literature.
CLO3	Use modern technological tools in solving problems and interpret the results to reach valid conclusions.
CLO4	Analyze various aspects of a topic, review, and synthesize knowledge.
CLO5	Communicate with different working groups effectively for preparing the presentation, documentation and in execution of research work.
CLO6	Create technical report having basic key components with rational sequences and develop a standard working model / patent/ publication in peer reviewed entity.

Course Content:

Experimental and theoretical investigation of various topics in structural engineering, environmental engineering, transportation engineering and geotechnical engineering.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2				√	√							√
CLO3				√	√							
CLO4		√		√								√
CLO5									√	√		
CLO6								√		√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lectures, active discussion	Presentation, Viva
CLO2	Experiential learning, interactive discussion, demonstration.	Demonstration/ Presentation, Viva
CLO3	Lectures, active discussion, enquiry-based instruction	Demonstration/ Presentation, Viva
CLO4	Lectures, active discussion, demonstration,	Presentation, Viva
CLO5	Lectures, active discussion, team work	Presentation, Viva
CLO6	Lectures, active discussion	Assignment, report writing

Course Code: CE 0732452	Course Title: Concrete Structures Design Lab II	Credits:1.5
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Rationale of the Course:

This course has been designed to discuss the analysis of buildings and PC girder bridges, design of multistoried RCC frame residential building and simple span PC girder-bridge.

Course Learning Outcomes:

CLO1	Apply modern concept of concrete design for civil engineering practices.
CLO2	Analyze and design a multistoried RCC frame residential building according to updated BNBC code.
CLO3	Analyze various components of PC girder bridges.
CLO4	Design simple span PC girder bridge.

Course Content:

Introduction to modern technologies, techniques and practices of concrete structure Calculate the gravity loads and lateral loads of a multistoried RCC frame residential building, design of building components. Analysis of PC girder bridge. Design of simple span PC girder bridge.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1			√									
CLO2	√	√			√					√		
CLO3	√	√										
CLO4			√		√					√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Assignment, Quiz
CLO2	Classroom instruction, Active learning, Practical example	Assignment, Quiz, Presentation
CLO3	Lecture, Hand/Multimedia Demonstration	Assignment, Quiz
CLO4	Classroom instruction, Active learning, Practical example	Assignment, Quiz, Presentation

Civil Engineering Development and practice Courses:

Course Code: CE 0732497	Course Title: Sustainability of Development Projects	Credits: 2.0
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Rationale of the Course:

This course has been designed to discuss different aspects of basic sustainability issues of development projects.

Course Learning Outcomes:

CLO1	Identify the basic sustainability issues of development projects
CLO2	Apply different tools for sustainability assessment of development projects
CLO3	Evaluate the different development goals for meeting project development challenges in Bangladesh
CLO4	Use different Development Indicators to assess viability of development projects
CLO5	Appraise different Socio- economic impacts of development projects

Course Content:

Environment and sustainable development; Sustainable development goals (SDGs); Economics and social structure; Development and economic growth; Socio-economic indicators; Concept and index of human development; Gender related issues; Human poverty and human poverty-index; poverty reduction strategies in Bangladesh.

Socio-economic aspects of development projects; Concept of sustainability, sustainability of development projects; Human interest related aspects; Land loss, land use and land ownership patterns; Population displacement; resettlement and rehabilitation strategy; Inequalities in distribution of benefits and losses; Climate change and vulnerability aspects.

Socio-economic and environmental impact assessment approach; Socio-economic survey; Development impact assessment tools and applications; Case studies.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√						√					
CLO2		√										
CLO3						√	√					
CLO4							√					
CLO5						√	√					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Interactive learning	Examination, Assignment,
CLO2	Lecture, Interactive learning	Examination, Assignment,
CLO3	Lecture, Interactive learning	Examination, Class Test
CLO4	Lecture, Interactive learning	Examination, Assignment
CLO5	Lecture, Interactive learning	Examination, Class Test
CLO6	Lecture, Interactive learning	Examination, Class Test
CLO7	Lecture, Interactive learning	Examination, Assignment

Structural Engineering:

Course Code: CE 0732453	Course Title: Introduction to Finite Element Method	Credits: 2.0
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Rationale of the Course:

This course has been designed to discuss the basic concepts of Finite Element for different kinds of structures and its application for analysis of structures by computer.

Course Learning Outcomes:

CLO1	Develop knowledge on the fundamental concept of finite element method.
CLO2	Compute basic equations in elasticity, element shapes, nodes, nodal unknowns.
CLO3	Analyze the discretization of a structure and mesh refinement and plane strain analysis of stress deformation problems.
CLO4	Design the structure using it by formulating equation and computer application.

Course Content:

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. Discretization of a structure and mesh refinement, Shape functions, strain displacement matrix. Methods for assembling stiffness equations e.g., Direct approach, Galerkin's method. Virtual work method. Introduction to isoparametric formulation. One dimensional stress-deformation and two-dimensional plane stress and plane strain analysis of stress deformation problems. Numerical integration and computer application.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)												
	1	2	3	4	5	6	7	8	9	10	11	12	
CLO1	√												
CLO2		√											
CLO3		√											
CLO4			√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO2	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO4	Active learning, Multimedia Presentation, Practical example	Class Test, Assignment, Final Exam

Course Code: CE 0732455	Course Title: Prestressed Concrete	Credits: 2.0
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Rationale of the Course:

This course has been designed to provide students with a clear and thorough understanding about the major topics of pre-stressed concrete such as —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. This course also covers the 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.

Course Learning Outcomes:

CLO1	Develop knowledge about concept of prestressing and the behavior of concrete structures.
CLO2	Determine losses of prestress in prestressed concrete structures.
CLO3	Determine the deflection and camber of prestressed concrete members.
CLO4	Apply the provisions of ACI 318 code to the design and detail of prestressed concrete structures for flexure, shear, bearing and torsion.

Course Content:

Introduction & Concept of the Prestressed Concrete, 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. Analysis of sections for flexure, shear, bond and bearing; analysis of end block and composite sections

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3	√	√										
CLO4	√	√	√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Multimedia Demonstration	Examination, Class Test, Assignment
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment
CLO3	Lecture, Exercise, Assignment	Examination, Assignment
CLO4	Lecture, Multimedia Demonstration	Examination, Class Test

Course Code: CE 0732457	Course Title: Design of Concrete Structures III	Credits: 2.0
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Rationale of the Course:

This course has been designed to discuss some advanced topics of concrete structures which will make a student to strengthen his/her analytic and design capability.

Course Learning Outcomes:

CLO1	Analyze structures for torsion.
CLO2	Design one way and two-way joist slabs.
CLO3	Assess lateral load resisting components of a structure.
CLO4	Design different RCC structural joints.

Course Content:

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.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√	√										
CLO2			√									
CLO3		√										
CLO4		√	√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Quiz
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Quiz
CLO4	Lecture, Group Discussion	Examination, Class Test

Course Code: CE 0732459	Course Title: Dynamics of Structures	Credits: 2.0
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Rationale of the Course:

This course has been designed to discuss the dynamic effects of structures.

Course Learning Outcomes:

CLO1	Explain the dynamics of single and two degree of freedom systems.
CLO2	Apply different principles of structural dynamics to enumerate the effects of dynamic loads on structural component.
CLO3	Analyze structural vibration.
CLO4	Analyze response of the structure under seismic loading.

Course Content:

Single degree of freedom system, two degrees of freedom system; Formulation of equation of motion; Free vibration response, response to harmonic, impulse and general dynamic loading, and vibration analysis by Rayleigh’s method, response spectra, two degrees of freedom system and seismic analysis of structures.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)												
	1	2	3	4	5	6	7	8	9	10	11	12	
CLO1	√												
CLO2	√	√											
CLO3		√											
CLO4		√											

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Active learning	Class Tests, Assignment, Final Exam
CLO2	Lecture, Active learning	Class Tests, Assignment, Final Exam
CLO3	Lecture, Active learning	Class Tests, Assignment, Final Exam
CLO4	Lecture, Active learning	Class Tests, Assignment, Final Exam

Course Code: CE 0732461	Course Title: Introduction to Steel Concrete Composite Structures	Credits: 2.0
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Rationale of the Course:

This course has been designed to discuss the basic concepts of steel concrete composite structures as well as design of composite column and floor system. Introduction to composite structures; advantages of composite construction; interaction between steel and concrete, shear connectors, elastic analysis of composite beams, beam- column connections, behavior of different types of composite columns, axial load capacity and interaction diagrams for composite columns.

Course Learning Outcomes:

CLO1	Develop knowledge on the fundamental concept of steel concrete composite structures and their advantages.
CLO2	Compute axial load capacity and interaction diagrams for composite columns
CLO3	Analyze composite beams and beam-column connections
CLO4	Design composite beams and beam-column connections.

Course Content:

Introduction to Steel Concrete Composite Structures; Types of Composite Columns & Floor Beam systems; Introduction to FEC Column; Design Problem solving of an FEC Column; Introduction to CFT Columns; Design Problem solving of a CFT Column; FEC Column & CFT Column; Introduction to PEC Columns; Design Problem solving of a PEC Column; PEC Column; Discussion on the Most Efficient type o Composite Columns; Design problem on concrete mix design; Introduction to Floor Beam Systems; Design of Floor Beam Systems; Problems related to Floor Beam System; AISC provisions for floor beam systems; Shored & Un-shored Method of Floor Beam System; Floor Beam System; Design of Composite Beam systems; Problems related to Composite Beam System; Composite Beam Systems; Future Recommendations and Scopes for Composite Structures in Bangladesh; Current uses of Steel Concrete Composite Systems in Bangladesh.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√										
CLO3		√										
CLO4		√	√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Class Lecture, Hand/Multimedia Demonstration	Class test, assignment, final exam
CLO2	Class Lecture, Hand/Multimedia Demonstration	Assignment, final exam
CLO3	Class Lecture, Hand/Multimedia Demonstration	Class test, assignment, final exam
CLO4	Class Lecture, Hand/Multimedia Demonstration, Practical example	Class test, assignment, final exam

Course Code: CE 0732454	Course Title: Computer Aided Analysis and Design Sessional	Credits: 1.5
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Rationale of the Course:

This course has been designed to perform software-based analysis and design of various reinforced concrete structures and steel structures according to different building codes.

Course Learning Outcomes:

CLO1	Generate software model for various RCC and steel structure.
CLO2	Assess the performance of an existing reinforced concrete building and steel structure according to BNBC and other building codes.
CLO3	Design the reinforced concrete buildings and steel structures according to BNBC, ACI and related building codes.
CLO4	Revise an existing structure.

Course Content:

Software-based modeling of various reinforced concrete structures and steel structures according to different building codes; Software-based performance analysis of various reinforced concrete structures and steel structures according to different building codes; Software-based analysis and design of various reinforced concrete structures and steel structures according to different building codes; Software-based analysis of Existing structural components.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1		√			√							
CLO2		√			√							
CLO3			√		√				√	√		
CLO4		√			√					√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Multimedia & Software Demonstration	Assignments, Lab Report, Class Performance, Final Quiz, Viva
CLO2	Lecture, Multimedia & Software Demonstration	Assignments, Lab Report, Class Performance, Final Quiz, Viva
CLO3	Lecture, Multimedia & Software Demonstration	Assignments, Lab Report, Class Performance, Final Quiz, Viva
CLO4	Lecture, Multimedia & Software Demonstration	Assignments, Lab Report, Class Performance, Final Quiz, Viva

Environmental Engineering:

Course Code: CE 0732411	Course Title: Solid and Hazardous Waste Management	Credits: 2
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Rationale of the Course:

After completing this course, students will be able to learn the physical and chemical properties of solid and hazardous waste, waste collection process and also the procedure of solid waste management.

Course Learning Outcomes:

CLO1	Differentiate between solid waste and hazardous waste.
CLO2	Explain properties of solid waste and its management process.
CLO3	Develop fundamental knowledge about hazardous waste and its treatment and disposal.

Course Content:

Solid Waste Management: sources and types of solid wastes. Hazardous Waste Management: identification, sources and characteristics of hazardous wastes; Physical and chemical properties of solid wastes, solid waste generation, onsite handling, storage and processing, collection of solid wastes, transfer stations and transport, ultimate disposal methods, resources and energy recovery and recycling, soil pollution, industrial solid waste collection and disposal; 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.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√						√					
CLO2	√											
CLO3	√						√					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam and Presentation
CLO2	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam and Presentation

Course Code: CE 0732413	Course Title: Environmental Pollution Management	Credits: 2
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Rationale of the Course:

This course has been designed to discuss the major topics of water pollution and air pollution.

Course Learning Outcomes:

CLO1	Explain sources of water pollution and its control.
CLO2	Develop fundamental knowledge about air pollution and its effect on health.
CLO3	Identify causes and effects of water and air pollution.

Course Content:

Water pollution: sources and types of pollutants, waste assimilation capacity of streams, dissolved oxygen modeling, ecological balance of streams, industrial pollution, heavy metal contamination, detergent pollution and eutrophication, groundwater pollution, marine pollution, pollution control measures: water quality monitoring and management; Air pollution: sources and types of pollutants, effects of various pollutants on human health, materials and plants, air pollution meteorology; Global warming, climate change and ozone layer depletion, acid rain, air pollution monitoring and control measures, introduction to air quality models.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√				√						
CLO3	√						√					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO2	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam and Presentation

Course Code: CE 0732414	Course Title: Environmental Engineering Lab II	Credits: 1.5
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Rationale of the Course:

This course has been designed to discuss the major topics of the design of water supply and sewerage system.

Course Learning Outcomes:

CLO1	Evaluate water demands of an industrial area.
CLO2	Design water and wastewater network.
CLO3	Apply techniques of water treatment.
CLO4	Develop technical report on water treatment techniques.

Course Content:

Design of water supply and sewerage system: estimation of industrial, domestic and fire demands, designing deep tube well and water distribution network, estimation of industrial, domestic and commercial wastewater generation; Wastewater network design, household plumbing system design, design of water and wastewater treatment plant; Computer application in environmental engineering, field visits and reporting.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1		√										
CLO2			√									
CLO3		√			√							
CLO4										√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Calculation, Handouts	Assignments, Report, Viva, Final Quiz
CLO2	Lecture, Calculation, Handouts	Assignments, Report, Viva, Final Quiz
CLO3	Lecture, Calculation, Handouts	Assignments, Report, Viva, Final Quiz
CLO4	Lecture, Calculation, Handouts	Report, Viva

Course Code: CE 0732415	Course Title: Environmental and Sustainable Management	Credits: 2
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Rationale of the Course:

This course has been designed to discuss the major topics of water pollution and air pollution.

Course Learning Outcomes:

CLO1	Explain environment and sustainable development.
CLO2	Develop fundamental knowledge about environmental impact assessment of development.
CLO3	Identify issues of economics of environmental management.

Course Content:

Environment and development projects, environment and sustainable development, environmental policies and legislation, environmental implication of sectorial development; Environmental quality standards, environmental issues and priorities, environmental impact assessment of development schemes-baseline studies, assessment methodologies; Economics of environmental management, contemporary issues; case studies.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√							√				
CLO2	√					√						
CLO3							√					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO2	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam

Geotechnical Engineering:

Course Code: CE 0732421	Course Title: Earth Retaining Structures	Credits: 2.0
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Rationale of the Course:

This course has been planned to design earth retaining structures such as dam, embankment, retaining wall, sheet piles etc. as well as construction methods of the retaining structures. This course also covers the 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 and caissons.

Course Learning Outcomes:

CLO1	Develop knowledge on the fundamental concept of lateral loads exerted by soil.
CLO2	Compute the soil parameters and loads on earth retaining structures.
CLO3	Develop knowledge of the stresses and the deformations of materials under loading. Analyze the different types of earth retaining structures and their applications.
CLO4	Design the different types of earth retaining structures.

Course Content:

Introduction to earth retaining structure; Foundation of structures subjected to lateral loads; Method of Construction Dewatering; Slurry Wall Construction; Rigid and flexible earth retaining structures; Introduction to Sheet Piles; Load Calculation of Sheet Piles; Design of Sheet Piles; Design of Anchored Sheet Piles; Introduction to Laterally Loaded Piles; Design of Laterally Loaded Piles; Braced Excavation Design; Introduction of Cofferdam construction; Design of Caisson construction.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√	√									
CLO3		√	√									
CLO4		√	√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Class Lecture, Hand/Multimedia Demonstration	Class test, Final Exam
CLO2	Class Lecture, Hand/Multimedia Demonstration	Class test, Final Exam
CLO3	Class Lecture, Hand/Multimedia Demonstration	Class test, Final Exam
CLO4	Class Lecture, Hand/Multimedia Demonstration	Class test, Final Exam

Course Code: CE 0732423	Course Title: Elementary Soil Dynamics	Credits: 2.0
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Rationale of the Course:

This course has been designed to discuss the major topics of elementary vibrations; dynamic properties of soil, seismic response of soils, site effects, site amplification, liquefaction problems, remedial measures and earthquake hazards.

Course Learning Outcomes:

CLO1	Explain dynamic properties of soil.
CLO2	Depict seismic response of soils.
CLO3	Calculate liquefaction problems.
CLO4	Develop knowledge of earthquake hazards.

Course Content:

Elementary vibrations, dynamic properties of soil; Seismic response of soils: site effects, site amplification; Liquefaction problems, remedial measures; Earthquake hazards.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√											
CLO3		√										
CLO4	√											

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO2	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO4	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam

Course Code: CE 0732425	Course Title: Soil Water interaction	Credits: 2.0
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Rationale of the Course:

This course has been designed to discuss the major topics of soil-water interaction issues such as permeability, capillarity, and soil suction. This is followed by the analysis of slopes subjected to water current, wave action etc. This course also covers the theories of filters and revetment design. Finally, different geotechnical aspects of landfills design are introduced to provide students a good understanding.

Course Learning Outcomes:

CLO1	Identify water related problems on earthen structures and foundation soil.
CLO2	Analyze the stability of earth slope subjected to water current and water wave.
CLO3	Design earth slope protection system and can design revetment and filter (the granular and textile filter).
CLO4	Explain landfills and can design landfills (geotechnical part).

Course Content:

Introduction to soil-water interaction, permeability, capillarity, and soil suction. Earth slopes subjected to water current, wave action etc. Theories of filters and revetment design, design of revetment components. Geotechnical design of landfills.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3		√	√									
CLO4		√	√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion, Exercise	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment
CLO3	Lecture, Exercise, Assignment	Examination, Assignment
CLO4	Lecture, Multimedia Presentation	Examination, Class Test

Course Code: CE 0732424	Course Title: Geotechnical Engineering Lab. II	Credits: 1.5
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Rationale of the Course:

This subject is intended to provide students with a clear and thorough understanding of how to design building foundations (footing, pile and pile cap, pier, raft/mat foundations and caisson) with modern computer tools. This course also covers the major topics of Computer aided design of retaining structures (shore pile, abutment and retaining walls) and reinforced soils. This course provides the participants with an opportunity to apply the design procedures to a "real life" challenging foundation design projects.

Course Learning Outcomes:

CLO1	Comprehend and utilize the geotechnical literature to establish the frame work for foundation design.
CLO2	Assess site specific contextual factors and constraints to select appropriate geotechnical solutions to complex problems.
CLO3	Analyze the role of a geotechnical engineer in civil engineering projects.

Course Content:

Computer aided design of foundations: footing, pile and pile cap, pier, raft/mat foundations and caisson; retaining structures: shore pile, abutment, retaining walls; reinforced soils.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1		√	√									
CLO2					√					√		
CLO3									√	√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom instruction, Active learning, peer group discussion.	Quiz, Assignment
CLO2	Interactive teaching, Problem based exercise	Report writing, Demonstration, Viva
CLO3	Classroom instruction, Active learning, Practical example, team work	Report writing, Demonstration, Viva

Course Code: CE0732427	Course Title: Geotechnical Earthquake Engineering	Credits: 2.0
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Rationale of the Course:

This course has been designed to discuss the advanced topics in earthquake effects on geotechnical structures, including: dynamic properties of soils; earthquake-induced ground response; seismic stability of slopes, embankments; earth-retaining structures; soil liquefaction; ground deformations; remediation and mitigation techniques. The course focuses on the state-of-the-art of knowledge and practice on the geotechnical aspects of earthquake engineering.

Course Learning Outcomes:

CLO1	Understand the fundamental principles and practical methods associated with Earthquake engineering
CLO2	Evaluate dynamic soil properties and the strength of cyclically loaded soils
CLO3	Evaluate the effects of soil-structure interaction during earthquake loading
CLO4	Design foundations to withstand earthquake loading
CLO5	Assess the suitability and applicability of various ground improvement techniques for remediation of seismic hazards

Course Content:

Cyclic response of soils; local site effects; wave propagation through soil; site response analysis; liquefaction and post liquefaction behavior; seismic hazard analysis; seismic soil-structure interaction of foundations.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3	√	√										
CLO4			√									
CLO5		√										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom instruction, Active learning, peer group discussion.	Examination, Class Test
CLO2	Classroom instruction, Active learning, Practical example	Examination, Class test
CLO3	Classroom instruction, Active learning, Practical example	Examination, Class Test
CLO4	Classroom instruction, Active learning, Practical example	Examination, Class Test
CLO5	Classroom instruction, Active learning	Examination, Class Test, Assignment

Transportation Engineering:

Course Code: CE 0732431	Course Title: Traffic Planning and Management	Credits: 2.0
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Rationale of the Course:

This course demonstrates how to conduct a transport planning study, develop understanding of transport systems. Also enables to develop decision and policy making aids for large-scale, complex transportation systems. Upon completion of this course, students should have basic understanding of transportation planning, its theoretical backgrounds, applications; details of the public transportation system, travel demand forecasting and mitigate road accidents.

Course Learning Outcomes:

CLO1	Determine transportation planning framework and basic principles
CLO2	Explain transportation planning phases and transport demand analysis
CLO3	Design sustainable strategies for pedestrian and bicycle facilities.
CLO4	Apply different road safety techniques suitable for Bangladesh to investigate and mitigate road accidents.

Course Content:

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

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3			√									
CLO4	√	√				√						

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom instruction, Active learning, Practical example.	Examination, Class Test, Assignment.
CLO2	Classroom instruction, Active learning, Practical example.	Examination, Class Test, Assignment.
CLO3	Classroom instruction, Active learning, Practical example.	Examination, Class Test, Assignment.
CLO4	Classroom instruction, Active learning, Practical example.	Examination, Class Test, Assignment.

Course Code: CE 0732433	Course Title: Pavement Management, Drainage and Airport	Credits: 2.0
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Rationale of the Course:

This course has been designed in such a way that students will be able to learn the major topics of transportation and traffic engineering such as study of pavement management system, design highway drainage system and different components of airport pavement and its design methodology.

Course Learning Outcomes:

CLO1	Develop knowledge on the fundamental concept of airport system and highway management.
CLO2	Compute volume and highway distress level.
CLO3	Analyze different technologies to provide treatment for highway distress and properly manage.
CLO4	Design of airport runway system and highway drainage structures.

Course Content:

Introduction to Pavement management systems. Evaluation of highway pavement and different methodology and their using. Introduction to airport and air traffic system; Strengthening of highway pavements and repairing techniques; Strengthening of highway pavements and repairing techniques. highway drainage and drainage structures; Importance, advantages and trends in air transportation. Planning and design of airports. Aircraft characteristics related to airport design. Airport configuration, geometric design of the landing area, terminal area, heliports. Design of airport pavements, lighting, marking and signing, airport drainage

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3		√										
CLO4		√	√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO2	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO3	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam
CLO4	Lecture, Hand/Multimedia Demonstration	Class Tests, Assignment, Final Exam

Course Code: CE 0732434	Course Title: Transportation Engineering Lab II	Credits: 1.5
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Rationale of the Course:

After completing this course, students will be able to learn the major topics of Transportation Engineering such as—Design of rigid and flexible highway and air field pavements; geometric design: road intersections and interchanges; capacity calculations; traffic studies and design.

Course Learning Outcomes:

CLO1	Determine spot mean speed and time mean speed from field survey data
CLO2	Design of airport pavement using AC 150/5320-6E.
CLO3	Calculate traffic volume by manual and video survey method
CLO4	Design of flexible pavement using RHD method and rigid pavement using PCA method.
CLO5	Apply field data obtained from traffic survey to plan a signalized intersection and traffic control project.

Course Content:

Speed Studies - Spot Speed Studies (Time-Mean Speed), Speed Studies – Space-Mean Speed; Airfield pavement design using FAA, AC-150; Traffic Volume - Vehicle Classification Studies – Manual, Traffic Volume Studies – Intersections Manually; Highway pavement design, Parking Study; Traffic Volume Studies – Intersections Manually, Pedestrian Volume Count Study, Intersection Delay Study, Intersection Design and Control Project.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1		√										
CLO2			√									
CLO3		√										
CLO4			√									
CLO5				√	√							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Multimedia, Hand Note & Reference Books	Assignments, Lab Report, Final Quiz, Viva
CLO2	Lecture, Multimedia Lab Manual & Reference Books	Assignments, Lab Report, Final Quiz, Viva
CLO3	Lecture, Multimedia, Hand Note & Reference Books	Assignments, Lab Report, Final Quiz, Viva
CLO4	Lecture, Multimedia Lab Manual & Reference Books	Assignments, Lab Report, Final Quiz, Viva
CLO5	Lecture, Multimedia, Hand Note & Reference Books	Assignments, Lab Report, Final Quiz, Viva

Course Code: CE 0732435	Course Title: Urban Transportation Planning and Management	Credits: 2.0
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Rationale of the Course:

This course has been designed to give basic knowledge to discuss urban planning and management regarding the Transportation sector.

Course Learning Outcomes:

CLO1	Explain characteristics of urban transport, paratransit modes.
CLO2	Determine causes and remedies of urban congestion.
CLO3	Evaluate cost benefits of transportation projects.
CLO4	Explain sustainable transportation systems and environmental issues.

Course Content:

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.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√											
CLO3		√										
CLO4	√						√					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Interactive learning	Examination, Assignment, Class Test
CLO2	Lecture, Interactive learning	Examination, Assignment, Class Test
CLO3	Lecture, Interactive learning	Examination, Assignment, Class Test
CLO4	Lecture, Interactive learning	Examination, Assignment, Class Test
CLO5	Lecture, Interactive learning	Examination, Assignment, Class Test

Water Resources Engineering:

Course Code: CE 0732443	Course Title: Ground Water Engineering	Credits: 2.0
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Rationale of the Course:

The course has been designed to discuss the basic knowledge of - properties of ground water flow, problem solving of different types aquifers and assessing ground water quality.

Course Learning Outcomes:

CLO1	Explain the terminology associated with Ground Water Engineering.
CLO2	Develop knowledge about the porous medium properties that control groundwater flow.
CLO3	Apply groundwater flow equations for solving confined and unconfined aquifers related problems.
CLO4	Evaluate the ground water quality and contamination in order to ensure environmental sustainability.

Course Content:

This course has been designed to discuss the Physical properties of groundwater and aquifers, principles and fundamental equations of porous media flow and mass transport, well hydraulics and pumping test analysis, role of groundwater in the hydrologic cycle, groundwater quality and contamination.

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√											
CLO3		√										
CLO4		√					√					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Class Test
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Class Test
CLO4	Lecture, Group Discussion	Examination, Assignment

Course Code: CE 0732447	Course Title: Hydraulic Structure	Credits: 2.0
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Rationale of the Course:

The course has been designed to discuss the basic knowledge of different hydraulic structure design and assessing seepage loss of this structure & protection methods.

Course Learning Outcomes:

CLO1	Explain basic theories of hydraulic structures.
CLO2	Analyze seepage under hydraulic structures.
CLO3	Design different hydraulic structures.

Course Content:

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

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2	√	√										
CLO3			√									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Group Discussion	Examination, Class Test
CLO2	Lecture, Group Discussion, Assignment	Examination, Assignment, Class Test
CLO3	Lecture, Exercise, Assignment	Examination, Assignment, Class Test

Course Code: CE 0732445	Course Title: River Engineering	Credits: 2.0
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Rationale of the Course:

This course has been designed to discuss the major topics of River Engineering for enabling students to achieve a comprehensive knowledge and solve practical problems.

Course Learning Outcomes:

CLO1	Develop knowledge about river dynamics and fluvial processes.
CLO2	Estimate different types of scour due to river intervention.
CLO3	Analyze river engineering related problems.
CLO4	Design river training and bank protection works.
CLO5	Explain types and principles of navigation and dredging.

Course Content:

Scope of River Engineering; Classification and use of rivers; Hydraulic characteristics of alluvial rivers; Classification of river flow; River channel pattern and fluvial processes; Fundamental aspects of sediment transport; Morphological characteristics of rivers; River stabilization/improvement; Bank and bed protection facilities; Scour analysis; Navigation and dredging.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs) :

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√										
CLO3			√									
CLO4				√								
CLO5	√											

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture	Class Test
CLO2	Lecture, Group Discussion, Exercise, Assignment	Class Assessment, Assignment, Final Examination
CLO3	Lecture, Exercise, Assignment	Class Test, Class Assessment, Assignment, Final Examination
CLO4	Lecture, Exercise, Assignment	Class Assessment, Assignment, Final Examination
CLO5	Lecture, Group Discussion	Class Assessment, Final Examination

Course Code: CE 0732449	Course Title: Coastal Engineering	Credits: 2.0
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Rationale of the Course:

This course has been designed to discuss the major topics of Coastal Engineering for enabling students to achieve a comprehensive knowledge and solve practical problems.

Course Learning Outcomes:

CLO1	Explain coast and coastal features, forces of waves and tides in the design of coastal and harbor structures.
CLO2	Estimate the values of wave parameters at different conditions.
CLO3	Develop knowledge about the harbor planning and coastal sediment transport processes.
CLO4	Develop knowledge about different types of shore protection works.
CLO5	Design different types of shore protection works to ensure sustainability of coastal area.

Course Content:

Coastal zone of Bangladesh and its management; Tides and currents; Tidal characteristics of Bangladesh; Wave parameters; Docks and harbors; Storm surge; Tsunami; Different types of Shore protection works; Design of shore protection works.

Mapping Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs) :

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1	√											
CLO2		√										
CLO3	√											
CLO4	√											
CLO5			√				√					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture	Class Test, Final Examination
CLO2	Lecture, Exercise, Assignment	Class Assessment, Assignment, Final Examination
CLO3	Lecture, Assignment	Class Test, Assignment, Final Examination
CLO4	Lecture, Group Discussion, Assignment	Class Assessment, Assignment, Final Examination
CLO5	Lecture, Exercise, Assignment	Class Test, Assignment, Final Examination

Course Code: CE 0732448	Course Title: Water Resources Engineering Lab	Credits: 1.5
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Rationale of the Course:

The course has been designed to discuss the basic knowledge of - properties of ground water flow, problem solving of different types aquifers and assessing ground water quality.

Course Learning Outcomes:

CLO1	Design hydraulic structures including its stability and maintenance.
CLO2	Explain the river training works and techniques for bank stabilization.
CLO3	Analyze groundwater data and understand groundwater quality, availability, etc.
CLO4	Apply the techniques for bank stabilization.
CLO5	Develop technical report on hydraulic structure design and water resources assessment.

Course Content:

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

Mapping Course Learning Outcomes (CLOs) with the PLOs:

Course Learning Outcomes (CLOs)	Program Learning Outcomes (PLOs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO1			√						√			
CLO2		√							√			
CLO3		√							√			
CLO4		√							√			
CLO5										√		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Lecture, Interactive instruction	Reporting, class assessment, Viva
CLO2	Lecture, Group Discussion	Reporting, class assessment, Viva
CLO3	Lecture, Interactive instruction, Group Discussion	Reporting, class assessment, Viva
CLO4	Lecture, Interactive instruction, Group Discussion	Reporting, class assessment, Viva
CLO5	Lecture, Group Discussion	Reporting, class assessment, Viva