

Curriculum Structure & Syllabi
Of

B. Tech
In
Civil Engineering

(2021-22)

Vision

Mission

Program Objectives

Course Objective

Course Specific Objective



Offered By

DEPARTMENT OF CIVIL ENGINEERING
GAUTAM BUDDHA UNIVERSITY, GREATER NOIDA

GAUTAM BUDH NAGAR, 201308

UTTAR PRADESH

AUGUST 2021

ABOUT THE DEPARTMENT

The Civil Engineering was established in 2010, since the inception of erstwhile Gautam Buddha University, Greater Noida, Gautam Budh Nagar. The department has, over the years, established its status as a centre for imparting high quality technical education to Undergraduate and Postgraduate students and extending consultancy services to industries and various government departments located in Western UP. Besides undergraduate course of (B.TECH-Civil Engineering), the department offers 2 regular M. Tech. courses in Civil Engineering respectively in Environmental Engineering and Structural Engineering domains. The facilities of doctoral research are also available in the department in the field of Environment, Structure and Hydrology/ Irrigation Engineering.

The department has experienced and highly qualified faculty members. Further, the strength of the department also lies in the strong linkages, and are in close contact with the department. The department is continuously interacting with the various government and private organization in the form of consultancy work, expert advice, design projects etc. the department also has various well equipped laboratories like Advanced environment engineering lab, Structural engineering lab, soil mechanics lab, concrete technology lab, transportation engineering lab, hydraulics engineering, engineering graphics/ Auto CAD lab. These labs are helpful in providing field knowledge of various civil engineering works like, building construction, road/highways, bridges, and irrigation canal construction etc for the civil engineering students and research scholars.

VISION:

To produce a new generation of Civil Engineers by providing state-of-the-art education in Civil Engineering recognized worldwide for excellence. This would be guided by extensive research in technology for industrial and social needs for sustainable development

Being a premier department of Civil Engineering, it has with its alumni and various governments/private organizations located in the region. The alumni of the department are well placed in various government/private organizations, center of learning and research in Civil Engineering, nurturing sustainable development by the year 2030.

MISSION:

1. To provide the quality education in the area of Civil Engineering to transform students into graduates with high professional values.
2. To enhance the knowledge in the field of research and development in the area of civil engineering domain.
3. To share and disseminate expertise for use in the solution of problems faced by Civil engineering industry and by society.
4. To ensure the continuous improvement in the quality of life of people in the society.
5. To conduct need based research projects giving priority to the needs of industry.

PROGRAMME OBJECTIVES (P.Os) of Integrated B.TECH+M.TECH/MBA PROGRAMME

1. To enrich the students with state of the art knowledge in the field of Civil Engineering.
2. To keep abreast the students with the use of modern tools, equipment and software and inculcating the habit of life-long learning.
3. To foster team work and professional ethics among students towards devising feasible solutions to problems and project work.

COURSE OBJECTIVE (C.Os) of Integrated B.TECH+M.TECH/MBA PROGRAMME

1. To Increase the ability of students to identify, formulate and solve problems in a systematic way by appropriate collection, analysis, and interpretation of data.
2. To Increase their ability to design a system, component or process to meet the desired needs in an environment friendly and socially acceptable way.
3. To enhance their skills to analyze complex Civil Engineering problems and obtain the solution by synthesizing simple components.
4. To Increase their ability to use the techniques, skills and modern engineering and Information Technology based tools (such as web-based applications and open source software etc.) to increase the creativity of students.
5. To enhance awareness of students about the impact of civil engineering projects in a global and societal context (social, economic, legal and/or environmental implications).
6. Enhancing their ability to practice environmental concerns and related sustainable measures and be capable of carrying out environmental impact of a civil engineering project.
7. Inculcating engineering ethics and professional responsibilities among students.
8. Increasing their decision-making skills and innovative capability not only individually but also in a team manner.
9. Increasing the ability to communicate effectively by enhancing their drawing and report writing skills and oral presentation skills.
10. Increasing awareness of students about cost, time and quality issues in construction helping them to develop social and leadership skills.

COURSE SPECIFIC OBJECTIVES (C.S.Os)

CSO1: Graduates/post graduate students will be able to apply technical skills and modern engineering tools for civil engineering works in their day to day practice.

CSO2: Graduates/post graduate students will be able to participate in critical thinking and problem solving of civil engineering field that requires analytical and design requirements.

CSO3: Graduates/post graduate students will be able to pursue of lifelong learning and professional development to face the challenging and emerging needs of our society.

B.TECH 2nd, Year (III-Semester)

Building Material & Construction [CE 201]

L:T:P (3 1 0)

Credits: 4

Course Objective: The students will be able to obtain the following knowledge and skills after completing this course:

1. To Study the properties and manufacturing processes of all the building materials like- stones, bricks, cement, tiles, woods & timber and finishing materials used in civil construction work.
2. To Understand different types of brick and stone masonry in building construction
3. To Gain knowledge of different building components through drawing works.
4. To gain knowledge of various steps of building construction starting from foundation to finishing works,

Course specific Objective: Students can learn about the Building Construction material, properties, manufacturing process of all building construction materials. Students may also learn about use of materials and different building components of works.

Fluid Mechanics [CE 203]

L:T:P (3 1 0)

Credits: 4

Course Objective: The student will be able to:

1. Identify and get the values of fluid characteristics and their relationships, as well as grasp the principles of continuity, momentum, and energy as they apply to fluid motions, after successfully completing the course.
2. Recognize these mathematical equations expressed in the form of principles.
3. In fluid mechanics, use dimensional analysis to anticipate physical characteristics that influence flow.
4. To understand the concept of boundary layer theory and flow separation.

Course specific Objective:

1. Students will be able to grasp fluid characteristics, different forms of flow, and the effects of hydrostatic pressure on fluids.
2. To become familiar with fluid characteristics and fluid mechanics applications.
3. Formulate and analyse problems involving force calculations in fluid-structure interactions.
4. To grasp the concepts of fluid measurement, flow kinds, and dimensional analysis.

Mechanics of Material [CE 205]

L:T:P (3 1 0)

Credits: 4

Course Objectives:

1. To develop in the engineering students the ability to analyze a given problem in simple and logistic manner and to apply its solutions to a few fundamental and well understood principles.
2. To emphasize developments and the example which are firmly built around are, on three pillars of the mechanics namely equilibrium, constitutive laws and compatibility.

Course Specific objectives:

1. To understand the stress mechanism of material and components of structure
2. Evaluate force – displacement relationship of structural element.
3. Strength, stiffness and stability of various load carrying Structural members.
4. To understand the principles of mechanics of materials.

Surveying [CE 207]

L:T:P (3 1 0)

Credits: 4

Course Objective: The students will be able to obtain the following knowledge and skills after completing this course:

1. Understand the principles and practices of taking linear measurements.
2. Understand the angular measurements using chain and compass.
3. Plot a given area using plane table in the field
4. Understand and plot the elevations of different points in the field
5. Perform the calculations for computing the area and volume of survey works using fundamental principles.

Course specific Objective: Students can study about the basic idea of surveying and also can understand the fundamental of field works of civil engineering. After completion of subject students can understand the field construction works measurements and use of instruments. Students become able to layout building plans, pathways of canals, railway lines, highways and bridges etc.

Engineering Geology [CE 209]

L:T:P (3 1 0)

Credits: 4

Course Objectives: After completion of this course, students are anticipated to exhibit the information, skills, and attributes listed below

1. Study the Different types of various rocks based on their distinguishing characteristics.
2. To understand the processes of the agents in modifying the earth's surface, origin of landforms of the earth's crust and origin of various rock types
3. Recognize the differences between geological formations.
4. Implement geological concepts to natural disaster mitigation, and identifying site for dam, bridge, reservoir and tunnel.

Course specific Objectives:

1. To investigate and classify various natural materials, such as rocks, minerals, and soil.
2. To comprehend the effects of various natural dynamic processes on surficial features, natural materials, and their consequences.
3. To be familiar with the physical characteristics of rocks and minerals.
4. To understand the significance of geological maps and the terminology used in Civil Engineering projects.

COURSE SPECIFIC OBJECTIVES (C.S.Os)**B.TECH 3rd, Year (V-Semester)****Design of R. C. Structure -1 [CE 301]****L:T:P (3 1 0)****Credits: 4**

Course Objective: The students will be able to demonstrate the following knowledge and skills after completing this course:

1. They will be able to determine the properties of materials, grades of concrete and reinforcing steel, stress-strain curves and will get a basic about different design philosophies from IS 456 code by the end of Unit 1.
2. Understand working state method and its application in design of singly and doubly reinforced beam sections. Also how bond stress and development length is applied when resisting transverse forces.
3. Understand and apply Limit state design method (flexure, shear and bond) in designing reinforcing beam sections.
4. Able to design columns using limit state method.
5. Able to design one way and two way slab using limit state method.
6. Able to design different types of staircases.

Course specific Objective: Students are expected to know the different aspects of the behavior of reinforced concrete members. Design in reinforced concrete implies an understanding of the behavior of plain concrete and reinforced concrete.

Transportation Engineering [CE 303]**L:T:P (3 1 0)****Credits: 4**

Course Objectives: Students after completing this course will be able to:

1. Understand the factors influencing road and highways performance characteristics and design.
2. Apply basic science principles in estimating stopping and passing sight distance requirements.
3. Design basic traffic signal phasing and timing plan.
4. Design basic horizontal and vertical alignment of the highway, and design of flexible, rigid pavement and flyovers.

Course specific Objectives:

1. To introduce the students with the principles and practice of transportation engineering with focus on Highway Engineering.
2. To enable the students to have a strong analytical and practical knowledge of Planning, designing and solving the transportation problems.
3. To understand the principles of geometric design for various transportation facilities.
4. To know the design of at-grade and grade separated intersections along with design of drainage facilities.

SOIL MECHANICS [CE 305]**L:T:P (3 1 0)****Credits: 4**

Course Objectives: : To provide students with basic understanding of physical and mechanical properties of soil, together with knowledge of basic engineering procedures to identify factors controlling soil behavior and methods to determine soil properties. Students will acquire basic knowledge in engineering design of geotechnical systems. The knowledge of this subject is applicable to various fields of civil engineering works like construction of embankments of roads, irrigation canals and foundation works etc.

Course specific Objectives:

1. Identify the fundamental differences in engineering behavior between cohesive and cohesion less soils.
2. Compute the groundwater seepage and distribution of groundwater pressure.
3. Calculate the applied stress beneath the ground surface.
4. Demonstrate that you know the fundamental difference in the strength and deformation characteristics of cohesive and cohesion less soils.
5. Analyze field and laboratory data to determine the strength and deformation properties of cohesive and cohesion less soils.
6. Determine settlements due to consolidation of soil.

Structural Analysis – II [CE 307]**L:T:P (3 1 0)****Credits: 4**

Course Objectives: After completion of this course, students are expected to exhibit the information, skills, and attributes listed below

1. Recall basic fundamentals of Theory of Structures-I for different force/displacement methods.
2. Calculate the internal forces of two hinged arches, cables and suspension bridges.
3. Determine the responses of structures by flexibility and stiffness matrix method.
4. Understanding the plastic analysis, and determine the ultimate strength and collapse load of beam and frames.

Course specific Objectives:

1. To understand the performance of the structure before and after loads are applied.
2. To impart knowledge about different methodologies for analyzing the various structures.
3. To explain the plastic method concept.
4. To familiarize the learner with the most up-to-date computational approaches

Advanced Environmental Engineering [CE309]

L:T:P (3 1 0)

Credits: 4

Course Objective:

The objective is to prepare students to learn the fundamentals related to the design of biological treatment systems applied in wastewater treatment.

Course Specific Objective:

Upon successful completion of this course, it is expected that students will be able to:

1. To understand the principles of behaviour of microorganisms in the treatment of municipal and industrial wastewaters.
2. To apply the concepts of kinetics and mass balance in the design of biological treatment systems for wastewater.
3. To analyse the problems related to troubleshooting of the wastewater treatment plant and to apply the corrective measures for the same.
4. To evaluate the effect of various factors responsible for the biodegradation of organics including toxicants.

COURSE SPECIFIC OBJECTIVES (C.S.Os)

(B.TECH 4th, Year VII-Semester)

Estimation & costing and Engineering economics [CE 403]

L:T:P (3 0 0)

Credits: 3

Course Objectives: Students after successfully completion of this course will be able to:

1. Prepare quantity estimates for all civil works like, Buildings, roads & rails and canal structures etc. as per specifications.
2. Ascertain the quantity of materials required for Civil engineering works as per specifications.
3. Prepare cost estimate and valuation of civil engineering works.
4. Solve economic problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio.

Course specific Objectives:

1. Impart the knowledge of Estimating, Costing and Valuation for Civil Engineering Structures.
2. To equip the student with the ability to estimate the quantities of various items of work in structures, water supply and sanitary works, road works, and irrigation works.
3. To develop an awareness of those factors that affect the cost of construction work and to analyse the influences that effect change in these factors.
4. Acquire knowledge on basic financial management aspects.

CE 406: Advanced Geotechnical Engg. (E-1)
(L:T:P: 3 1 0)

OBJECTIVE

Objective of introducing this subject

- [1] To understand the interaction between the soil structure interaction.
- [2] Different types of beams designed on elastic foundation, elastic analysis of piles etc.
- [3] Through theorems of plastic collapses, get information for computing stress and settlement at any location in the semi infinite elastic soil medium, anisotropic medium, and evaluating the stability of foundations, slopes, cuts, and retaining structures for both undrained and drained loading circumstances.

Course outcome

- [1] Ability to choose appropriate soils for varied geotechnical applications based on the parameters that affect soil engineering behaviour.
- [2] Students can choose from a variety of shear strength and compressibility characteristics to build various structures for various loading, drainage, and failure criteria.
- [3] Capable of estimating stresses in any type of soil medium due to foundation load, foundation settlement, and evaluating bound and true collapse loads of soil structures.
- [4] Analysis of piles in elastic medium and laterally loaded.

Solid waste management and Air pollution control [CE 407]

L:T:P (3 0 0)

Credits: 3

Course Objectives: Students after successfully completion of this course will be able to:

1. Select the appropriate method for solid waste collection, transportation, redistribution and disposal.
2. Outline the design, operation, and maintenance of different methods of treatment.
3. Acquired knowledge and understanding to evaluate air quality management and analyse the causes and effects of air pollution.

Course specific Objectives:

1. To understand various aspects of solid waste management (starting from its generation to processing with options for reuse and recycle, transport, and disposal) practiced in different municipalities.
2. To recover biological conversion products from solid waste to compost and biogas, incineration and energy recovery, hazardous waste management and treatment, and integrated waste management.
3. To get an insight into the dispersion of air pollution in the atmosphere.

COURSE SPECIFIC OBJECTIVES (C.S.Os)
M.TECH 1st & 22nd year (I & III Semester)

CE 541: Advanced construction Materials

L:T:P (3 1 0)

Credits: 4

Course specific Objectives:

Students will be able to understand the properties of concrete, its types and reinforced concrete properties at the time of testing and construction.

Course Objectives: The students will be able to demonstrate the following knowledge and skills after completing this course:

1. Understand concrete as a composite material, its properties and techniques.
2. Understand reinforcement corrosion, how concrete can be protected from corrosion and different techniques for monitoring it.
3. Get knowledge of use of industrial waste and use of fiber reinforced concrete and its properties.
4. Able to understand uses of high strength concrete, mix proportioning. How self compacting concrete works, testing of concrete.
5. Understand non destructive evaluation of reinforced concrete by different techniques.

(Applied Elasticity and Plasticity (CE 543))

L:T:P (3 1 0)

Credits: 4

Course Objectives:

1. Understand different methods that used to analyse stress and strain in solid body.
2. Understand the theoretical concepts of material behaviour with particular emphasis on their elastic and plastic properties.

Course Specific Outcome:

1. Define state of stress and strains, equilibrium and compatibility.
2. Relates the basic theory of elasticity and plasticity with application of solid mechanics.
3. Apply various principles to solve problems in a practical situation and compare its solution with that obtained by solid mechanics approach.
4. To analyze the basic elasto-plastic problems associated with different processes practiced in the present day industries.
5. Examine different yield criteria in diverse failure situations.

CE 545: Structural Dynamics

L: T: P (2 1 0)

Credits: 3

Objective: Students will get an introduction to the phenomena of earthquake load, the process, measurements, analyse the dynamic loads and factors that affect the design of structures in seismic area.

Course outcome: The students will be able to demonstrate the following knowledge and skills after completing this course:

1. Students will learn about different types of vibrations and ground motions, free and forced vibrations of single degree of freedom systems.
2. Understand and analyse multi degree of freedom systems method for different mode shapes.
3. Understand time domain analysis using numerical integration scheme.
4. Able to analyse free and forced vibrations of continuous system.
5. Understand dynamic analysis of tall and massive structures.

Finite Element Method (CE 547)

L: T: P (3 1 0)

Credits: 4

Course Objectives:

1. To understand the principles and characteristics of finite elements that represent engineering structures.
2. Learning tool to effectively use finite element solutions to structural, dynamic, aeronautical and Mechanical engineering problems to develop the knowledge and skills needed to effectively evaluate finite element analyses.

Course Specific Objectives:

1. Apply Weighted residual (Rayleigh-Ritz), Galerkin method to solve engineering problems and outline the requirements for convergence.
2. Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
3. Analyze linear 1D problems like bars and trusses; 2D structural problems and analyse the axi-symmetric problems with quadrilateral and triangular elements.
4. Solve 1 D, 2 D and dynamic problems using Finite Element Analysis approach based on numerical integration techniques.

SOIL & GROUND WATER CONTAMINATION [CE603]

L: T: P (3 1 0)

Credits: 4

Course Objectives: Students after completing this course will be able to:

1. Students will be able to understand the basic knowledge of soil properties, soil formation, soil structure, types of soils and analysis of soil.
2. Study of various field and laboratory methods to recognize the soil.
3. Study and analysis of saturated and unsaturated zone.
4. Study of different groundwater aquifer system and their types of formation.
5. Study of subsurface and surface water flow and movement.
6. Study of contaminant transport methods.

Course Outcomes:

1. Study of soil as well as water properties like intrinsic permeability, hydraulic conductivity, storativity.
2. Solve problems of groundwater flow and solute transport
3. Application of knowledge to solve problems of contaminant transport by modeling techniques.

Environment Impact Assessment [CE605]

L: T: P (2 1 0)

Credits: 3

Course Objective

The object of this course is to provide a working knowledge of current environmental impact assessment regulations, methods and practice.

Course Outcome

Upon successful completion of this course, it is expected that students will be able to:

1. Understand the different tools used for the evaluation of EIA of different projects.
2. Apply the methods involved in the assessment and analysis of tools required for impact assessment.
3. Evaluate the suitability of different tools and models of EIA.
4. Prepare EIA reports and environmental management plans.

Industrial Wastewater Treatment [CE613]

L: T: P (2 1 0)

Credits: 4

Course Objective

To provide knowledge on sources, characteristics and treatment options for specific pollutants in wastewater arising out of industrial processes.

Course Outcome

Upon successful completion of this course, it is expected that students will be able to:

1. Understand about sampling, quantification and analysis of industrial wastewater.
2. Identify and apply basic concepts of wastewater treatment for handling industrial wastewater.
3. Understand processes in industries and pollutional effects of industrial waste on environment.
4. Demonstrate the process of developing an overall treatment strategy for an industrial waste stream through case studies

Plate and Shell [CE641]

L: T: P (2 1 0)

Credits: 3

Course specific Objectives:

1. To introduce the concept of plate theory.
2. To study the behaviour and analysis of thin plates.
3. To study the behaviour and analysis of rectangular plates and circular plates.
4. To present the foundations of the classical theory of shells based on the Kirchhoff law assumptions.
5. To study the classification of shell surfaces

Course Objectives: After completion of this course, students are expected to exhibit the information, skills, and attributes listed below

1. To assess the strength of plate panels under point, linearly varying and uniformly distributed loads.
2. To analyse plates under different boundary conditions by various classical methods and approximate methods.
3. To be familiar with classification of shells and classical shell theories and apply them in engineering design
4. To be exposed to singly curved shells, doubly curved shells and cylindrical shells.

Advanced Steel Design [CE643]

L: T: P (2 1 0)

Credits: 4

Course specific Objectives:

1. To recognize limit states and failure modes in structural steel members and systems.
2. To become familiar with design specification and codes for steel structures, and understand their basis in mechanics, testing, and analysis.
3. To design steel and composite members and connections with an understanding of their limit states / failure modes and current design specifications / codes
4. Introductory undergraduate courses in mechanics of materials and steel design.
5. This course will cover fundamental concepts and applications of advanced concepts in the design of steel buildings and bridges

Course Objectives: After completion of this course, students are expected to exhibit the information, skills, and attributes listed below:

1. Students should have some background in the design of steel structures including beams, columns, and frames.
2. simple shear and moment connections between steel beams and columns in frame systems
3. The students will have some experience in solving design examples and looking at applications of the fundamental concepts learned in the course.

Hydraulic Structure [CE 647]

L: T: P (3 1 0)

Credits: 4

Course specific Objectives:

1. Introduce the students to professional practice and design codes.
2. Integrate the hydraulics and water resources background by involving the student
3. in water structures design applications.
4. To develop understanding of the basic principles and concepts of analysis and design of hydraulic structures.

Course Objectives: After completion of this course, students are expected to exhibit the information, skills, and attributes listed below:

1. Design of canals and drains.
2. Design of culverts, head works and outlet works
3. Understanding the different methods of canals and drains design.
4. Principles of flow in culverts, head works and outlet works.
5. Types of dams and its design.
6. Usefulness of cross drainage works and its design.
7. Methods of structures of dissipation flow energy.