

DEPARTMENT OF CIVIL ENGINEERING

The Department of Civil Engineering is dedicated to produce quality professional engineers with abilities to design, manage and operate Civil Engineering based fields. These objectives are achieved through OBE (Outcome Based Education) system as per Washington Accord. The Department of Civil Engineering through outstanding faculty and state of the art lab facilities ensures that the engineers of tomorrow are not only well equipped theoretically but also have hands-on training of modern engineering tools, e.g. European made 2,000 kN Servo-Hydraulic Machine (UTM), European made flow channel, Italian made 50 kN tension/compression

tri-axial machine, etc. A highly conducive environment including not only class and lab learning but also co-curricular activities, enables the student to grow professionally as well as personally & ethically.

The department is also offering graduate program in four specializations areas. There are three major research groups where the faculty is actively involved in research activities. The MS/PhD students are associated with these research groups that give them the practical experience and flavor of modern technological research.





BS Civil Engineering

■ Program Educational Objectives (PEOs)

The graduates of BS Civil Engineering program will become professionals who will:

- (i) Ensure quality while applying civil engineering practices and will exhibit professional expertise at national and international level.
- (ii) Enhance and improve their knowledge and skills through professional growth and development activities.
- (iii) Serve the society and engineering profession in an ethical manner, considering social, environmental, national and global concerns.

■ Program Learning Outcomes (PLOs)

At the time of graduation, the graduates of BS(CE) program will possess the following attributes:

- (i) **Engineering Knowledge:** An ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- (ii) **Problem Analysis:** An ability to identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- (iii) **Design/Development of Solutions:** An ability to 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.

- (iv) **Investigation:** An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.
- (v) **Modern Tool Usage:** An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations.
- (vi) **The Engineer and Society:** An ability to 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 solution to complex engineering problems.
- (vii) **Environment and Sustainability:** An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
- (viii) **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- (ix) **Individual and Team Work:** An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.
- (x) **Communication:** An ability to communicate effectively, orally as well as in writing, 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.

(xi) **Project Management:** An ability to demonstrate management skills and apply engineering principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.

(xii) **Lifelong Learning:** An ability to recognize importance of, and pursue lifelong learning in the broader context of innovation and technological developments.

■ Admission Requirements

(i) Higher Secondary School Certificate (F.Sc. Pre-Engineering) or Equivalent with Physics, Chemistry and Mathematics securing at least 60% marks in aggregate.

OR

Intermediate of Computer Science (ICS) or Equivalent with Physics, Computer Science and Mathematics securing at least 60% marks in aggregate.

OR

Diploma of Associate Engineering in relevant disciplines securing at least 60% marks in aggregate.

(ii) CUST Admission Test/HEC Approved Test

■ Degree Requirements

Each candidate for the BS Civil Engineering degree is required to complete successfully 136 credit hours (Cr. Hrs.) as per the following details:

Area	Cr. Hrs.
a) General Education Courses	38
b) Disciplinary or Major Courses	74
c) Interdisciplinary / Allied Courses	15
d) Field Experience / Internship	03
e) Capstone / Design Project	06
f) Community Service	00
g) Survey Camp	00
Total	136

■ General Education Courses (38 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Personal Grooming	CEG1212	02
Applied Physics	CEG1312	02

Sociology	CEG1412	02
Functional English	CEG1113	03
Expository Writing	CEG1123	03
Calculus and Analytical Geometry	CEG1513	03
Probability and Statistics	CEG2523	03
Islamic Studies/Ethics	CEG1012	02
Ideology and Constitution of Pakistan	CEG1022	02
Applications of Information and Communication Technologies	CEG1612	02
Entrepreneurship	CEG2712	02
Civics and Professional Ethics	CEG2812	02
Applied Physics Lab	CEG1311	01
Applications of Information and Communication Technologies Lab	CEG1611	01
Applied Differential Equations	MTCE1043	03
Linear Algebra and Numerical Analysis	MTCE2063	03
Project Management	CE4812	02

■ Disciplinary or Major Courses (74 Cr. Hrs.)

a) Foundation Courses (22 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Civil Engineering Materials	CE1412	02
Engineering Drawing	CE1011	01
Engineering Surveying	CE1112	02
Fluid Mechanics	CE2512	02
Mechanics of Solids	CE2223	03
Soil Mechanics	CE3322	02
Construction Engineering	CE3811	01
Structural Analysis-I	CE2422	02
Civil Engineering Materials Lab	CE1411	01
Engineering Drawing Lab	CE1012	02

Engineering Surveying Lab	CE1181	01
Fluid Mechanics Lab	CE2511	01
Mechanics of Solids Lab	CE2221	01
Soil Mechanics Lab	CE3321	01

b) Breadth Courses (23 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Advanced Engineering Surveying	CE2122	02
Structural Analysis-II	CE3432	02
Advanced Fluid Mechanics	CE2523	03
Transportation Engineering-I	CE3613	03
Plain and Reinforced Concrete-I	CE3443	03
Environmental Engineering-I	CE3712	02
Engineering Hydrology	CE3542	02
Quantity Surveying & Estimation	CE3032	02
Advanced Engineering Surveying Lab	CE2121	01
Advanced Fluid Mechanics Lab	CE2521	01
Plain and Reinforced Concrete-I Lab	CE3441	01
Engineering Hydrology Lab	CE3541	01

c) Depth Courses (23 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Engineering Drawing and Graphics	CE2021	01
Geotechnical and Foundation Engineering	CE3333	03
Plain and Reinforced Concrete-II	CE3453	03
Environmental Engineering-II	CE4721	01
Steel Structures	CE4473	03
Hydraulics and Irrigation Engineering	CE4533	03
Transportation Engineering-II	CE4623	03
Geotechnical and Foundation Engineering Lab	CE3331	01

Plain and Reinforced Concrete-II Lab	CE3451	01
Transportation Engineering-II Lab	CE4621	01
Hydraulics and Irrigation Engineering Lab	CE4531	01
Environmental Engineering-II Lab	CE4791	01
Engineering Drawing and Graphics Lab	CE2041	01

d) Computer and Information Sciences (C&I) - 06 Cr. Hrs.

Course Title	Code	Cr. Hrs.
Geo Informatics	CE4131	01
Introduction to Artificial Intelligence	CE4013	03
Geo Informatics Lab	CE4191	01
Introduction to Artificial Intelligence Lab	CE4011	01

■ Interdisciplinary / Allied Courses (IDC) - 15 Cr. Hrs.

Course Title	Code	Cr. Hrs.
Basic Mechanical Engineering	MECE2011	01
Basic Electrical Engineering	EECE1011	01
Economics	MTCE3111	01
Occupational Health and Safety	CE3051	01
Basic Mechanical Engineering Lab	MECE2091	01
Basic Electrical Engineering Lab	EECE1091	01
Architecture and Town Planning	ARCE4012	02
Geology	CE1312	02
Construction Management	CE3832	02
Computer-Aided Analysis and Design of Concrete Structures	CE4461	01
Computer-Aided Analysis and Design of Concrete Structures Lab	CE4491	01
Construction Management Lab	CE3831	01

■ Design Project (06 Cr. Hrs.)

After the completion of 90 Cr. Hrs., the students are required to register for Design Project (Part-I) of 2 Cr. Hrs. in the 7th semester of their degree program. Design Project (Part-II) of 4 Cr. Hrs. can be taken in the next i.e.

8th semester provided Design Project (Part-I) is passed.

Course Title	Code	Cr. Hrs.
Design Project (Part-I)	CE4912	02
Design Project (Part-II)	CE4924	04

■ Field Experience/Internship (03 Cr. Hrs.)

Each student is required to complete 8 weeks industrial internship training usually after 6th semesters or on the completion of 90 Cr. Hrs.

Course Title	Code	Cr. Hrs.
Field Experience / Internship	CE4003	03

■ Survey Camp (CE4930)

Students are required to register, attend and successfully complete a minimum of 2 weeks (10 working days) Survey Camp following the fourth semester of their degree program. Course CE2122 is a pre-requisite for Survey Camp. A formal evaluation will be carried out and Pass / Fail grade will be awarded to the students.

■ Community Service (VIS3000)

Each student is required to complete 65 hours community work, usually after 1st semester which would be a prerequisite for the award of degree. It will be assessed as satisfactory (S) / unsatisfactory (US). In case of unsatisfactory, it will be done from scratch.

■ CGPA Requirement

A student is required to earn a minimum 2.00/4.00 CGPA on the completion of his/her degree requirements.

■ Program Duration

This is a four year degree program comprising of 8 semesters. There will be a Fall and a Spring semester in each year. The summer semester will be utilized for internship,survey camp or deficiency courses. The maximum duration to complete BS Civil Engineering degree is 07 years.

SCHEME OF STUDIES

BS Civil Engineering Program

□ Semester-I (17 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CEG1022	Ideology and Constitution of Pakistan	2
CEG1212	Personal Grooming	2
CEG1513	Calculus and Analytical Geometry	3
CEG1412	Sociology	2
CE1312	Geology	2
CE1412	Civil Engineering Materials	2
CE1011	Engineering Drawing	1
CE1411	Civil Engineering Materials Lab	1
CE1012	Engineering Drawing Lab	2

□ Semester-II (17 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
EECE1011	Basic Electrical Engineering	1
CEG1612	Applications of Information and Communication Technologies	2
CEG1113	Functional English	3
MTCE1043	Applied Differential Equations	3
CEG1312	Applied Physics	2
CE1112	Engineering Surveying	2
EECE1091	Basic Electrical Engineering Lab	1
CEG1611	Applications of Information and Communication Technologies Lab	1
CEG1311	Applied Physics Lab	1
CE1181	Engineering Surveying Lab	1

□ Semester-III (17 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CEG1012	Islamic Studies/Ethics	2
MTCE2063	Linear Algebra and Numerical Analysis	3

CE2223	Mechanics of Solids	3
CE2512	Fluid Mechanics	2
CE2122	Advanced Engineering Surveying	2
MECE2011	Basic Mechanical Engineering	1
CE2221	Mechanics of Solids Lab	1
CE2511	Fluid Mechanics Lab	1
CE2121	Advanced Engineering Surveying Lab	1
MECE2091	Basic Mechanical Engineering Lab	1

□ Semester-IV (18 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CEG2523	Probability and Statistics	3
CE2021	Engineering Drawing and Graphics	1
CEG2812	Civics and Professional Ethics	2
CEG2712	Entrepreneurship	2
CE2422	Structural Analysis-I	2
CE2523	Advanced Fluid Mechanics	3
CEG1123	Expository Writing	3
CE2041	Engineering Drawing & Graphics Lab	1
CE2521	Advanced Fluid Mechanics Lab	1

□ Semester-V (15 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CE3032	Quantity Surveying & Estimation	2
CE3811	Construction Engineering	1
CE3712	Environmental Engineering-I	2
CE3432	Structural Analysis-II	2
CE3322	Soil Mechanics	2
CE3443	Plain and Reinforced Concrete-I	3
MTCE3111	Economics	1
CE3321	Soil Mechanics Lab	1
CE3441	Plain and Reinforced Concrete-I Lab	1

□ **Semester-VI (18 Cr. Hrs.)**

Course Code	Course Title	Cr. Hrs.
CE3832	Construction Management	2
CE3542	Engineering Hydrology	2
CE3613	Transportation Engineering-I	3
CE3453	Plain and Reinforced Concrete-II	3
CE3333	Geotechnical and Foundation Engineering	3
CE3051	Occupational Health and Safety	1
CE3541	Engineering Hydrology Lab	1
CE3451	Plain & Reinforced Concrete-II Lab	1
CE3831	Construction Management Lab	1
CE3331	Geotechnical & Foundation Engineering Lab	1

□ **Semester-VII (16 Cr. Hrs.)**

Course Code	Course Title	Cr. Hrs.
ARCE4012	Architecture and Town Planning	2
CE4461	Computer-Aided Analysis and Design of Concrete Structures	1
CE4623	Transportation Engineering-II	3
CE4812	Project Management	2
CE4013	Introduction to Artificial Intelligence	3
CE4491	Computer-Aided Analysis and Design of Concrete Structures Lab	1
CE4621	Transportation Engineering-II Lab	1
CE4011	Introduction to Artificial Intelligence Lab	1
CE4912	Design Project (Part-I)	2

□ **Semester-VIII (15 Cr. Hrs.)**

Course Code	Course Title	Cr. Hrs.
CE4131	Geo Informatics	1
CE4721	Environmental Engineering-II	1
CE4473	Steel Structures	3
CE4533	Hydraulics and Irrigation Engineering	3
CE4531	Hydraulics & Irrigation Engineering Lab	1
CE4791	Environmental Engineering-II Lab	1
CE4191	Geo Informatics Lab	1
CE4924	Design Project (Part-II)	4



MS Civil Engineering

■ Admission Requirements

- (i) A minimum of 16 years of education leading to BS/BE/BSc in Civil Engineering or equivalent in a relevant area.
- (ii) Minimum 2.00/4.00 CGPA or 50% marks
- (iii) Admission Test/HEC Approved Test

Note: Applicants with undergraduate degree from non-civil engineering areas may be required to take some undergraduate courses to fulfill pre-requisite deficiencies as

determined by the Graduate Admission Committee. The deficiency Cr. Hrs. will not be counted towards the minimum Cr. Hrs. requirement for the award of the MS degree.

■ Degree Requirements

A student admitted in this program will have to complete the degree requirements by following any one of the options given below:

- (i) 24 Cr. Hrs. course work with 6 Cr. Hrs Thesis
- (ii) 30 Cr. Hrs. course work only (10 Courses)

The students are required to register courses offered by the department from the list appended below:

■ Water Resource Engineering and Management

Course Title	Code	Cr. Hrs.
Advanced Open Channel Hydraulics	CE5103	3
Advanced Hydrology	CE5113	3
River Engineering	CE6123	3
Design of Hydraulic Structures	CE6133	3
Advanced Hydraulics	CE5143	3
Drainage and Irrigation Engineering	CE5153	3
Flood Risk Assessment	CE6203	3
Sediment Transport	CE5163	3
Stochastic Hydrology	CE5173	3
Ground Water Development/Exploration	CE5183	3
Hydro Power Development	CE6193	3
Water Management Computations	CE6213	3

■ Structural Engineering

Course Title	Code	Cr. Hrs.
Dynamics of Structures	CE5303	3
Fiber Reinforced Composites	CE5313	3

Computer Aided Analysis and Design of Structures	CE6323	3
Earthquake Engineering	CE6333	3
Matrix Analysis of Structures	CE5353	3
Pre-stressed Concrete theory and Practice	CE6373	3
Advanced Steel Structures	CE6403	3
Structural Fire Engineering	CE6423	3
Performance Based Seismic Design	CE6453	3
Design of Tall Structures	CE6463	3
Domes, Shells and Space Structures	CE5383	3
Properties of Concrete and its Constituents	CE5393	3
Bridge Engineering	CE5363	3
Finite Element Methods for Structural Analysis	CE5413	3
Instability of Structures	CE6433	3
Seismic Design of Structures	CE6443	3
Structural Design Practice	CE5343	3

■ Construction Engineering and Management

Course Title	Code	Cr. Hrs.
Advanced Construction Management	CE5803	3
Project Planning and Control	CE5813	3
Advanced Project Management for Construction Projects	CE5823	3
Construction and Safety Management	CE5833	3
Construction Contracts for Civil Engineers	CE6863	3
Sustainability in Construction Projects	CE6873	3
Construction Economics and Financial Management	CE6853	3
Advanced Civil Engineering Practices	CE5843	3
Engineering Management Techniques	CE6883	3
Project Risk Assessment and Decision Analysis	CE6893	3

■ **Environmental Engineering**

Course Title	Code	Cr. Hrs.
Solid Waste Management	CE5703	3
Environmental Impact Assessment (EIA)	CE6723	3
Water Supply & Wastewater Engineering	CE6733	3
Water Quality Management	CE6743	3
Environmental Hydrology	CE6713	3

■ **Elective Courses**

Course Title	Code	Cr. Hrs.
Advanced Topics in Civil Engineering	CE5003	3
Research Methods in Civil Engineering	CE6053	3
Disaster Risk Assessment and Evaluation	CE6063	3
Advanced Geotechnical Engineering	CE6503	3
Foundation Engineering	CE6523	3
Infrastructure Design and Development	CE6603	3
Pavement Evaluation and Rehabilitation	CE6613	3
Traffic Engineering	CE6623	3
Principles of Pavement Engineering	CE6633	3
Highway Planning and Design	CE6643	3
Transportation Planning and Policy Making	CE6653	3
Application of Modern Tools in Civil Engineering	CE5013	3
Data Analysis and Quality Control	CE5023	3
Dam Engineering	CE5033	3
Advanced Geo-Informatics	CE5043	3
Deep Foundations	CE6513	3
Rock Mechanics	CE6533	3

■ **Research Thesis**

Course Title	Code	Cr. Hrs.
Research Thesis	CE6916	6

■ **CGPA Requirement**

A student is required to earn a minimum 3.00/4.00 CGPA on the completion of his/her degree requirements.

■ **Program Duration**

This is normally a two years program comprising of 4 semesters. There will be a Fall and a Spring semester in each year. The maximum duration to complete MS in Civil Engineering is 4 years.



PhD Civil Engineering

Civil Engineering is the profession that dates back with the old civilizations. It always kept on growing and developed exciting outcomes all over the world. The new trends in Civil Engineering have played a pivotal role in the new era of construction, intelligent building systems, urban development, irrigation systems, highway construction, infrastructure planning etc. All these technological advancements would not have been possible without the research in several offshoots of the Civil Engineering.

The PhD program of Civil Engineering Department, through a close liaison with industry and R&D organizations, is designed to provide excellent research environment to its PhD Scholars.

■ Admission Requirements

- (i) MS degree in relevant discipline
- (ii) Minimum CGPA 3.0/4.0 (Semester System) or 60% marks (Annual System)

- (iii) Admission Test/GAT General/HEC Test
- (iv) Interview

■ Degree Requirements

A PhD candidate shall be awarded degree on successful completion of the following requirements:

- (i) 18 Cr. Hrs. Course Work with minimum CGPA 3.00/4.00
- (ii) Comprehensive Examination
- (iii) 30 Cr. Hrs. Research Work
- (iv) Synopsis Defense
- (v) Dissertation Foreign Reviews
- (vi) Publication of at least one research paper in HEC approved journal.
- (vii) Dissertation Final Defense

Note: PhD scholars are required to comply with the following timeline:

Activity	Preferred Time	Maximum
Course Work	2 Semesters	3 Semesters
Comprehensive Exam	3 Semesters	5 Semesters
Synopsis Qualification	4 Semesters	6 Semesters
Thesis Submission	6 Semesters	12 Semesters

