

# **DEPARTMENT OF CIVIL ENGINEERING**



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HoD Civil Engineering

## Department of Civil Engineering

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### BS Civil Engineering

#### **Program Educational Objectives**

- i. Graduates will play an effective role with quality assurance while practicing civil engineering and will become experts at national and international level.
- ii. Graduates will enhance and improve their skills through professional growth and development activities.
- iii. Graduates will serve the society and engineering profession with ethics considering social, environmental, national and global concerns.

#### **CE Graduate 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.



# BS Civil Engineering

## 1. Admission Requirements

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

In case of foreign qualification, equivalence from IBCC will be required.  
OR

Diploma of Associate Engineer Examination in relevant discipline securing at least 60% marks in aggregate (upto 2% of maximum allowed seats).

- b) CUST Admission Test or NTS Engineering test.

## 2. Degree Requirements

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

Area	Cr. Hrs.
(a) Natural Sciences Courses	21
(b) Humanities Courses	15
(c) Management Sciences	08
(d) Computing Courses	09
(e) Engineering Foundation Courses	27
(f) Breadth Courses	20
(g) Depth Courses	23
(h) Interdisciplinary Courses	07
(i) Civil Engineering Project (Part-I and Part-II)	06
(j) Industrial Internship	00
(k) Survey Camp	00
<b>Total</b>	<b>136</b>

### (a) Natural Sciences Courses

Course Title	Code	Cr. Hrs.
Calculus and Analytical Geometry	MTCE 1013	03
Engineering Geology	CE 1313	03

Applied Differential Equation	MTCE 1043	03
Engineering Mechanics	CE 1213	03
Engineering Economics	MTCE 1111	01
Statistics and Probability	MTCE 2072	02
Numerical Analysis	MTCE 2063	03
Geo Informatics	CE 4131	01
Engineering Mechanics Lab	CE 1211	01
Geo Informatics Lab	CE 4191	01

### **(b) Humanities Courses**

<b>Course Title</b>	<b>Code</b>	<b>Cr. Hrs.</b>
Pakistan Studies	HMCE1 002	02
Islamic Studies	HMCE 1012	02
Functional English	HMCE 1113	03
Communication Skills	HMCE 2123	03
Technical Report Writing	HMCE 3133	03
Professional Ethics	HMCE 3032	02

### **(c) Management Sciences Courses**

<b>Course Title</b>	<b>Code</b>	<b>Cr. Hrs.</b>
Construction Management	CE 3833	03
Hydrology and Water Resource Management	CE 3543	03
Hazards and Disaster Management	CE 4831	01
Hydrology and Water Resource Management Lab	CE 3541	01

### **(d) Computing Courses**

<b>Course Title</b>	<b>Code</b>	<b>Cr. Hrs.</b>
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Computer Programming	CSCE 1012	02
Civil Engineering Drawing and Graphics	CE 2021	01
Quantity Surveying and Estimation	CE 3033	03
Computer Programming Lab	CSCE 1011	01
Civil Engineering Drawing and Graphics Lab	CE 2022	02

### (e) Engineering Foundation Courses

Course Title	Code	Cr. Hrs.
Civil Engineering Materials	CE 1412	02
Engineering Drawing	CE 1011	01
Engineering Surveying	CE 1112	02
Fluid Mechanics-I	CE 2513	03
Mechanics of Solids	CE 2223	03
Construction Engineering	CE 2891	01
Soil Mechanics	CE 2323	03
Structural Analysis-I	CE 2423	03
Civil Engineering Materials Lab	CE 1411	01
Engineering Drawing Lab	CE 1012	02
Engineering Surveying Lab	CE 1182	02
Fluid Mechanics-I Lab	CE 2511	01
Mechanics of Solids Lab	CE 2221	01
Construction Engineering Lab	CE 2811	01
Soil Mechanics Lab	CE 2321	01

### (f) Breadth Courses

Course Title	Code	Cr. Hrs.
Advanced Engineering Survey	CE 2122	02

Structural Analysis-II	CE 3433	03
Advanced Fluid Mechanics	CE 3523	03
Transportation Planning Engineering	CE 3613	03
Plain and Reinforced Concrete-I	CE 3443	03
Environmental Engineering-I	CE 4712	02
Advanced Engineering Survey Lab	CE 2121	01
Advanced Fluid Mechanics Lab	CE 3521	01
Plain and Reinforced Concrete-I Lab	CE 3441	01
Environmental Engineering-I Lab	CE 4711	01

#### **(g) Depth Courses**

<b>Course Title</b>	<b>Code</b>	<b>Cr. Hrs.</b>
Earthquake-resistant Design of Concrete Structures	CE4461	01
Geotechnical and Foundation Engineering	CE3333	03
Plain and Reinforced Concrete-II	CE3453	03
Highway and Traffic Engineering	CE4623	03
Environmental Engineering-II	CE4722	02
Steel Structures	CE4473	03
Hydraulics and Irrigation Engineering	CE4533	03
Earthquake-resistant Design of Concrete Structures Lab	CE4491	01
Geotechnical and Foundation Engineering Lab	CE3331	01
Plain and Reinforced Concrete-II Lab	CE3451	01
Highway and Traffic Engineering Lab	CE4621	01
Hydraulics and Irrigation Engineering Lab	CE4531	01

### (h) Interdisciplinary

Courses	Code	Cr. Hrs.
Basic Electro Mechanical Engineering	EECE 2013	03
Architectural and Town Planning	CE 4823	03
Basic Electro Mechanical Engineering Lab	EECE 2011	01

### (i) Civil Engineering Design Project

After the completion of 90 Cr. Hrs. the students are required to register for Civil engineering design project (Part-I) of 2 Cr. Hrs. in the

7th semester of their degree program. Civil Engineering design project (Part-II) of 4 Cr. Hrs. Can be taken in next semester provided Civil Engineering design project (Part-I) is passed.

Course Title	Code	Cr. Hrs.
Civil Engineering Design Project-I	CE 4912	2
Civil Engineering Design Project-II	CE 4924	4

### (j) Industrial Internship (CE4000)

Each student is required to complete an 8-week industrial internship training usually after 6 semesters or on the completion of 90 Cr. Hrs. The internship shall be graded as pass/fail.

### (l) Community Work (CE3000)

Each student is required to complete 60 hours community work, usually after 4th semester which would be a prerequisite for the award of degree.

### (k) Survey Camp (CE4930)

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

### 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 or deficiency courses. The maximum duration to complete BS Civil Engineering degree is 07 years.



# Scheme of Study

## BS Civil Engineering Program

### Semester - 1 (17Cr. Hrs.)

Course Code	Course Title	Course Category	Lec Hrs.	Lab. Hrs.	Cr. Hrs.
HMCE 1002	Pakistan Studies	Humanities	2	0	2
MTCE 1013	Calculus and Analytical Geometry	Natural Sciences	3	0	3
CE 1313	Engineering Geology	Natural Sciences	3	0	3
CE 1412	Civil Engineering Materials	CE Foundation	2	0	2
CE 1011	Engineering Drawing	CE Foundation	1	0	1
CE 1411	Civil Engineering Materials Lab	CE Foundation	0	3	1
CE 1012	Engineering Drawing Lab	CE Foundation	0	6	2
HMCE 1113	Functional English	Humanities	3	0	3

### Semester - 2 (17Cr. Hrs.)

Course Code	Course Title	Course Category	Lec Hrs.	Lab. Hrs.	Cr. Hrs.
HMCE 1012	Islamic Studies	Humanities	2	0	2
CSCE 1012	Computer Programming	Computing	2	0	2
MTCE 1043	Applied Differential Equation	Natural Sciences	3	0	3
CE 1213	Engineering Mechanics	Natural Sciences	3	0	3
CE 1112	Engineering Surveying	CE Foundation	2	0	2
MTCE 1111	Engineering Economics	Natural Sciences	1	0	1
CSCE 1011	Computer Programming Lab	Computing	0	3	1
CE 1211	Engineering Mechanics Lab	Natural Sciences	0	3	1
CE 1182	Engineering Surveying Lab	CE Foundation	0	6	2

**Semester - 3 (17 Cr. Hrs.)**

<b>Course Code</b>	<b>Course Title</b>	<b>Course Category</b>	<b>Lec Hrs.</b>	<b>Lab. Hrs.</b>	<b>Cr. Hrs.</b>
MTCE 2072	Statistics and Probability	Natural Sciences	2	0	2
EECE 2013	Basic Electro-Mechanical Engineering	IDEE	3	0	3
CE 2223	Mechanics of Solids	CE Foundation	3	0	3
CE 2513	Fluid Mechanics	CE Foundation	3	0	3
CE 2122	Advanced Engineering Surveying	Breadth	2	0	2
EECE 2011	Basic Electro-Mechanical Engineering Lab	IDEE	0	3	1
CE 2221	Mechanics of Solids Lab	CE Foundation	0	3	1
CE 2511	Fluid Mechanics Lab	CE Foundation	0	3	1
CE 2121	Advanced Engineering Surveying Lab	Breadth	0	3	1

**Semester - 4 (18 Cr. Hrs.)**

<b>Course Code</b>	<b>Course Title</b>	<b>Course Category</b>	<b>Lec Hrs.</b>	<b>Lab. Hrs.</b>	<b>Cr. Hrs.</b>
HMCE 2123	Communication Skills	Humanities	3	0	3
CE 2021	Civil Engineering Drawing and Graphics	Computing	1	0	1
MTCE 2063	Numerical Analysis	Natural Sciences	3	0	3
CE 2811	Construction Engineering	CE Foundation	1	0	1
CE 2423	Structural Analysis-I	CE Foundation	3	0	3
CE 2323	Soil Mechanics	CE Foundation	3	0	3
CE 2022	Civil Engineering Drawing and Graphics Lab	Computing	0	6	2
CE 2891	Construction Engineering Lab	CE Foundation	0	3	1
CE 2321	Soil Mechanics Lab	CE Foundation	0	3	1

**Semester - 5 (19 Cr. Hrs.)**

<b>Course Code</b>	<b>Course Title</b>	<b>Course Category</b>	<b>Lec Hrs.</b>	<b>Lab. Hrs.</b>	<b>Cr. Hrs.</b>
HMCE 3133	Technical Report Writing	Humanities	3	0	3
HMCE 3032	Professional Ethics	Humanities	2	0	2
CE 3033	Quantity Surveying and Estimation	Computing	3	0	3
CE 3433	Structural Analysis-II	Breadth	3	0	3
CE 3523	Advanced Fluid Mechanics	Breadth	3	0	3
CE 3443	Plain and Reinforced Concrete-I	Breadth	3	0	3
CE 3521	Advanced Fluid Mechanics Lab	Breadth	0	3	1
CE 3441	Plain and Reinforced Concrete-I Lab	Breadth	0	3	1

**Semester - 6 (18 Cr. Hrs.)**

<b>Course Code</b>	<b>Course Title</b>	<b>Course Category</b>	<b>Lec Hrs.</b>	<b>Lab. Hrs.</b>	<b>Cr. Hrs.</b>
CE 3833	Construction Management	Management	3	0	3
CE 3543	Hydrology and Water Resources Mgmt.	Management	3	0	3
CE 3613	Transportation Planning & Engineering	Breadth	3	0	3
CE 3453	Plain & Reinforced Concrete-II	Depth	3	0	3
CE 3333	Geotechnical & Foundation Engineering	Depth	3	0	3
CE 3541	Hydrology and Water Resources Mgmt. Lab	Management	0	3	1
CE 3451	Plain & Reinforced Concrete-II Lab	Depth	0	3	1
CE 3331	Geotechnical & Foundation Engineering Lab	Depth	0	3	1

**Semester - 7 (15 Cr. Hrs.)**

<b>Course Code</b>	<b>Course Title</b>	<b>Course Category</b>	<b>Lec Hrs.</b>	<b>Lab. Hrs.</b>	<b>Cr. Hrs.</b>
CE 4823	Architecture & Town Planning	IDEE	3	0	3
CE 4712	Environmental Engineering-I	Breadth	2	0	2
CE 4461	Earthquake-resistant Design of Concrete Structures	Depth	1	0	1
CE 4623	Highway & Traffic Engineering	Depth	3	0	3
CE 4831	Hazards and Disaster Management	Management	1	0	1
CE 4711	Environmental Engineering-I Lab	Breadth	0	3	1
CE 4491	Earthquake-resistant Design of Concrete Structures Lab	Depth	0	3	1
CE 4621	Highway & Traffic Engineering Lab	Depth	0	3	1
CE 4912	Civil Engineering Design Project (Part-1)	Design Project	0	6	2

**Semester – 8 (15 Cr. Hrs.)**

<b>Course Code</b>	<b>Course Title</b>	<b>Course Category</b>	<b>Lec Hrs.</b>	<b>Lab. Hrs.</b>	<b>Cr. Hrs.</b>
CE 4131	Geo Informatics	Natural Sciences	1	0	1
CE 4722	Environmental Engineering-II	Depth	2	0	2
CE 4473	Steel Structures	Depth	3	0	3
CE 4533	Hydraulics & Irrigation Engineering	Depth	3	0	3
CE 4191	Geo Informatics Lab	Natural Sciences	0	3	1
CE 4531	Hydraulics & Irrigation Engineering Lab	Depth	0	3	1
CE 4924	Civil Engineering Design Project (Part-2)	Design Project	0	12	4

# MS Civil Engineering

- b) Minimum 2.00/4.00 CGPA or 50% marks
- c) Admission Test / HEC Approved Test

## 1. Admission Requirements

- a) A minimum of 16 years of education leading to B.Sc./ BS/ BE in Civil Engineering or equivalent<sup>6</sup>.

## 2. Degree Requirements

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

Area	Cr. Hrs.
a) 24 Cr. Hrs course work with 6 Cr. Hrs thesis	30
b) 27 Cr. Hrs course work with 3 Cr. Hrs project	30
c) Course work only (10 Courses)	30

## 3. Specialization Requirements

A student can claim a specialization if he/she has completed 15 Cr. Hrs. including research work, if opted, from one of the specialization

area courses offered by the department. Otherwise, on the completion of 30 Cr. Hrs., he/she will be awarded the MS Degree without any specialization.

### i. Water Resource Engineering and Management (WRE&M)

Course Title	Code	Cr. Hrs.
Advanced Open Channel Hydraulics	CE 5103	03
Advanced Hydrology	CE 5113	03
River Engineering	CE 6123	03
Design of Hydraulic Structures	CE 6133	03
Advanced Hydraulics	CE 5143	03
Drainage and Irrigation Engineering	CE 5153	03
Sediment Transport	CE 5163	03
Stochastic Hydrology	CE 5173	03
Ground Water Development/Exploration	CE 5183	03
Flood Risk Assessment	CE 6823	03

<sup>6</sup>Applicants with undergraduate degree from non-relevant 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.

Water Management Computations	CE 6833	03
Hydro Power Development	CE 6193	03

## ii. Structural Engineering (SE)

Courses	Code	Cr. Hrs.
Dynamics of Structures	CE 5303	03
Fiber Reinforced Composites	CE 5313	03
Computer Aided Analysis and Design of Structures	CE 6323	03
Earthquake Engineering	CE 6213	03
Structural Design Practice	CE 5343	03
Matrix Analysis of Structures	CE 5353	03
Domes, Shells and Space Structures	CE 5383	03
Properties of Concrete and its constituents	CE 5393	03
Finite Element Methods for Structural Analysis	CE 5413	03
Pre-stressed Concrete theory and Practice	CE 6373	03
Structural Fire Engineering	CE 6423	03
Instability of Structures	CE 6433	03
Seismic Design of Structures	CE 6443	03
Advanced Steel Structures	CE 6453	03

## iii. Elective Courses

Courses	Code	Cr. Hrs.
Advanced Topics in Civil Engineering	CE 5003	03
Application of Modern Tools in Civil Engineering	CE 5013	03
Dam Engineering	CE 5123	03
Bridge Engineering	CE 5363	03
Advanced Civil Engineering Practices	CE 5813	03
Advanced Geo-Informatics	CE 5903	03

Disaster Risk Assessment and Evaluation	CE 5913	03
Research Methods in Civil Engineering	CE 6023	03
Infrastructure Design and Development	CE 6603	03
Environmental Hydrology	CE 6713	03
Water Supply & Wastewater Engineering	CE 6733	03
Solid Waste Management	CE 5703	03
Environmental Impact Assessment (EIA)	CE 6723	03
Water Quality Management	CE 6743	03
Advanced Construction Management	CE 5803	03
Project Planning and Control	CE 5813	03
Data Analysis and Quality Control	CE 5403	03
Advanced Geotechnical Engineering	CE 6503	03
Rock Mechanics	CE 6533	03
Foundation Engineering	CE 6543	03
Deep Foundations	CE 6503	03
Pavement Evaluation and Rehabilitation	CE 5603	03
Principles of Pavement Engineering	CE 6633	03
Highway Planning and Design	CE 6643	03
Traffic Engineering	CE 6653	03

#### 4. Research Thesis/ Project

Courses	Code	Cr. Hrs.
Research Thesis	CE 6916	6
Research Project	CE 6913	3

#### 5. CGPA Requirement

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

#### 6. Duration

This is normally a two year 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

- MS degree in relevant discipline\*
- Minimum CGPA 3.0/4.0 (Semester System) or 60% marks (Annual System)
- Admission Test / HEC approved Test
- Interview

### Degree Requirements

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

- a) 18 Cr. Hrs. Course Work with CGPA > 3
- b) Comprehensive Examination (written and oral)
- c) 30 Cr. Hrs. Research Work
- d) Synopsis Defense
- e) Thesis Foreign Evaluation
- f) Publication/Acceptance of at least one research paper.
- g) Local Defense



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	10 Semesters

\* Relevancy shall be established by the Graduate Admission Committee.



