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 (SHM), 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 five specialization 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 140 credit hours (Cr. Hrs.) as per the following details:

	Area	Cr. Hrs.
a)	General Education Courses	42
b)	Disciplinary or Major Courses	73
c)	Multi-disciplinary/Flexible Courses	16
d)	Industrial Training	03
e)	Final Year Design Project	06
f)	Community Service	00
g)	Survey Camp	00
	Total	**140**

General Education Courses (42 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Functional English	CEG1133	3
Expository Writing	CEG2153	3
Ideology and Constitution of Pakistan	CEG1022	2
Pakistan Studies	CEG1032	2

Islamic Studies/Ethics	CEG2012	2
Fehm-ul-Quran I	CEG1021	1
Fehm-ul-Quran II	CEG1031	1
Personal Grooming	CEG1212	2
Sociology	CEG3412	2
Civics and Community Engagement	CEG4812	2
Project Management	CEG4822	2
Entrepreneurship	CEG3712	2
Applications of ICT	CEG1612	2
Applications of ICT Lab	CEG1611	1
Quantitative Reasoning-I	CEG1532	2
Quantitative Reasoning-II	CEG1542	2
Advanced Calculus	CEG2553	3
Applied Mathematics	CEG2563	3
Numerical Analysis	CEG3572	2
Applied Physics and Electro-Mechanical Fundamentals	CEG1332	2
Applied Physics and Electro-Mechanical Fundamentals Lab	CEG1331	1

■ Disciplinary or Major Courses (73 Cr. Hrs.)

a) Foundation Courses (23 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Civil Engineering Materials	CE1412	2
Engineering Drawing	CE1011	1
Engineering Surveying	CE1112	2
Mechanics of Solids-I	CE2232	2
Structural Analysis-I	CE2422	2
Soil Mechanics	CE3322	2
Fluid Mechanics	CE2512	2
Engineering Mechanics	CE1212	2
Transportation Systems	CE3631	1
Civil Engineering Materials Lab	CE1411	1
Engineering Drawing Lab	CE1012	2
Engineering Surveying Lab	CE1111	1

Soil Mechanics Lab	CE3321	1
Fluid Mechanics Lab	CE2511	1
Engineering Mechanics Lab	CE1211	1

b) Breadth Courses (22 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Advanced Engineering Surveying	CE2122	2
Advanced Fluid Mechanics	CE2522	2
Reinforced Concrete Design-I	CE3442	2
Environmental Engineering-I	CE3712	2
Structural Analysis-II	CE3432	2
Quantity and Cost Estimation	CE3052	2
Construction Management	CE3832	2
Engineering Hydrology	CE3552	2
Advanced Engineering Surveying Lab	CE2121	1
Advanced Fluid Mechanics Lab	CE2521	1
Reinforced Concrete Design-I Lab	CE3441	1
Quantity and Cost Estimation Lab	CE3051	1
Construction Engineering and Management Lab	CE3831	1
Engineering Hydrology Lab	CE3551	1

c) Depth Courses (22 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Reinforced Concrete Design-II	CE3452	2
Mechanics of Solids-II	CE2241	1
Geotechnical Engineering	CE3352	2
Foundation Engineering	CE4362	2
Pavement Analysis and Design	CE4642	2
Hydraulics Engineering	CE4562	2
Irrigation Engineering	CE4572	2
Environmental Engineering-II	CE4721	1
Seismic Design of Structures	CE4491	1

Reinforced Concrete Design-II Lab	CE3451	1
Mechanics of Solids-I&II Lab	CE2291	1
Geotechnical Engineering Lab	CE3351	1
Pavement Analysis and Design Lab	CE4641	1
Hydraulics and Irrigation Engineering Lab	CE4561	1
Environmental Engineering-I&II Lab	CE4791	1
Seismic Design of Structures Lab	CE4401	1

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

Multi-disciplinary/Flexible Courses - 16 Cr. Hrs.

Course Title	Code	Cr. Hrs.
Geology for Engineers	CE1342	2
Architecture and Town Planning	ARCE4012	2
Modeling and Simulation	CSCE4021	1
Occupational Health and Safety	OHCE3011	1
Modeling and Simulation Lab	CSCE4091	1
Construction Engineering	CE3811	1
Highway and Traffic Engineering	CE4622	2
Steel Structures	CE4472	2
Concrete Technology	CE2481	1
Geoinformatics	CE2131	1
Concrete Technology Lab	CE2401	1
Geoinformatics Lab	CE2191	1

Final Year Design Project (06 Cr. Hrs.)

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

taken in the next i.e. 8^{th} semester provided Design Project (Part-I) is passed.

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

Industrial Training (03 Cr. Hrs.)

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

Course Title	Code	Cr. Hrs.
Industrial Training	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 4^{th} 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 (15 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CEG1022	Ideology and Constitution of Pakistan	2
CEG1021	Fehm-ul-Quran I	1
CEG1212	Personal Grooming	2
CEG1532	Quantitative Reasoning-I	2
CE1011	Engineering Drawing	1
CE1342	Geology for Engineers	2
CE1412	Civil Engineering Materials	2
CE1012	Engineering Drawing Lab	2
CE1411	Civil Engineering Materials Lab	1

☐ Semester-II (18 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CEG1031	Fehm-ul-Quran II	1
CEG1133	Functional English	3
CEG1332	Applied Physics and Electro-Mechanical Fundamentals	2
CEG1542	Quantitative Reasoning-II	2
CEG1612	Applications of Information and Communication Technologies	2
CE1112	Engineering Surveying	2
CE1212	Engineering Mechanics	2
CEG1331	Applied Physics and Electro-Mechanical Fundamentals Lab	1
CEG1611	Applications of Information and Communication Technologies Lab	1
CE1111	Engineering Surveying Lab	1
CE1211	Engineering Mechanics Lab	1

☐ Semester-III (18 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CEG2012	Islamic Studies/Ethics	2
CEG2553	Advanced Calculus	3

CSCE2012	Computer Programming	2
CE2122	Advanced Engineering Surveying	2
CE2232	Mechanics of Solids-I	2
CE2481	Concrete Technology	1
CE2512	Fluid Mechanics	2
CSCE2011	Computer Programming Lab	1
CE2121	Advanced Engineering Surveying Lab	1
CE2401	Concrete Technology Lab	1
CE2511	Fluid Mechanics Lab	1

☐ Semester-IV (18 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CEG2153	Expository Writing	3
CEG2563	Applied Mathematics	3
CE2041	Civil Engineering Drawing and Graphics	1
CE2131	Geoinformatics	1
CE2241	Mechanics of Solids-II	1
CE2422	Structural Analysis-I	2
CE2522	Advanced Fluid Mechanics	2
CE2042	Civil Engineering Drawing and Graphics Lab	2
CE2191	Geoinformatics Lab	1
CE2291	Mechanics of Solids-I&II Lab	1
CE2521	Advanced Fluid Mechanics Lab	1

☐ Semester-V (18 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CEG1032	Pakistan Studies	2
CEG3572	Numerical Analysis	2
CE3052	Quantity and Cost Estimation	2
CE3322	Soil Mechanics	2
CE3432	Structural Analysis-II	2
CE3442	Reinforced Concrete Design-I	2
CE3712	Environmental Engineering-I	2
CE3811	Construction Engineering	1

CE3051	Quantity and Cost Estimation Lab	1
CE3321	Soil Mechanics Lab	1
CE3441	Reinforced Concrete Design-I Lab	1

☐ Semester-VI (18 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CEG3412	Sociology	2
CEG3712	Entrepreneurship	2
OHCE3011	Occupational Health and Safety	1
CE3352	Geotechnical Engineering	2
CE3452	Reinforced Concrete Design-II	2
CE3552	Engineering Hydrology	2
CE3631	Transportation Systems	1
CE3832	Construction Management	2
CE3351	Geotechnical Engineering Lab	1
CE3451	Reinforced Concrete Design-II Lab	1
CE3551	Engineering Hydrology Lab	1
CE3831	Construction Engineering and Management Lab	1

☐ Semester-VII (17 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CEG4822	Project Management	2
ARCE4012	Architecture and Town Planning	2
CSCE4021	Modelling and Simulation	1
CE4491	Seismic Design of Structures	1
CE4562	Hydraulics Engineering	2
CE4572	Irrigation Engineering	2
CE4622	Highway and Traffic Engineering	2
CSCE4091	Modelling and Simulation Lab	1
CE4401	Seismic Design of Structures Lab	1
CE4561	Hydraulics and Irrigation Engineering Lab	1
CE4912	Final Year Design Project (Part-I)	2

☐ Semester-VIII (15 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
CEG4812	Civics and Community Engagement	2
CE4362	Foundation Engineering	2
CE4472	Steel Structures	2
CE4642	Pavement Analysis and Design	2
CE4721	Environmental Engineering-II	1
CE4641	Pavement Analysis and Design Lab	1
CE4791	Environmental Engineering-I&II Lab	1
CE4924	Final Year 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 2 Cr. Hrs. Fehm-ul-Quran and 6 Cr. Hrs. Thesis

(ii) 30 Cr. Hrs. course work (10 courses) with 2 Cr. Hrs. Fehm-ul-Quran

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

General Education

Course Title	Code	Cr. Hrs.
Fehm-ul-Quran I	CE7021	1
Fehm-ul-Quran II	CE7031	1

Water Resource Engineering and Management

Course Title	Code	Cr. Hrs.
Advanced Open Channel Hydraulics	CE7103	3
Advanced Hydrology	CE7113	3
River Engineering	CE8123	3
Design of Hydraulic Structures	CE8133	3
Advanced Hydraulics	CE7143	3
Drainage and Irrigation Engineering	CE7153	3
Flood Risk Assessment	CE8203	3
Sediment Transport	CE7163	3
Stochastic Hydrology	CE7173	3
Ground Water Development/Exploration	CE7183	3
Hydro Power Development	CE8193	3
Water Management Computations	CE7213	3

Structural Engineering

Course Title	Code	Cr. Hrs.
Dynamics of Structures	CE7303	3
Fiber Reinforced Composites	CE7313	3
Computer Aided Analysis and Design of Structures	CE8323	3
Earthquake Engineering	CE8333	3
Matrix Analysis of Structures	CE7353	3
Pre-stressed Concrete theory and Practice	CE8373	3
Advanced Steel Structures	CE8403	3
Structural Fire Engineering	CE8423	3
Performance Based Seismic Design	CE8453	3
Design of Tall Structures	CE8463	3
Domes, Shells and Space Structures	CE7383	3
Properties of Concrete and its Constituents	CE7393	3
Bridge Engineering	CE7363	3
Finite Element Methods for Structural Analysis	CE7413	3
Instability of Structures	CE8433	3
Seismic Design of Structures	CE8443	3
Structural Design Practice	CE7343	3

Construction Engineering and Management

Course Title	Code	Cr. Hrs.
Advanced Construction Management	CE7803	3
Project Planning and Control	CE7813	3
Advanced Project Management for Construction Projects	CE7823	3
Construction and Safety Management	CE7833	3
Construction Contracts for Civil Engineers	CE8863	3
Sustainability in Construction Projects	CE8873	3
Construction Economics and Financial Management	CE8853	3
Advanced Civil Engineering Practices	CE7843	3
Engineering Management Techniques	CE8883	3
Project Risk Assessment and Decision Analysis	CE8893	3

Environmental Engineering

Course Title	Code	Cr. Hrs.
Solid Waste Management	CE7703	3
Environmental Impact Assessment (EIA)	CE8723	3
Water Supply & Wastewater Engineering	CE8733	3
Water Quality Management	CE8743	3
Environmental Hydrology	CE8713	3

Transportation Engineering

Course Title	Code	Cr. Hrs.
Transportation Planning and Policy Making	CE7603	03
Pavement Evaluation and Management	CE8613	03
Traffic Engineering and Management	CE8623	03
Highway Construction Materials and Equipment	CE7633	03
Highway Planning and Design	CE8643	03
Pavement Distress Identification and Preservation	CE7653	03
Railway Engineering	CE8663	03
Airport Planning and Design	CE8673	03
Waterways Transportation	CE8683	03
Geometric Design and Highway Safety	CE7693	03

Elective Courses

Course Title	Code	Cr. Hrs.
Advanced Topics in Civil Engineering	CE7003	3
Research Methods in Civil Engineering	CE8053	3
Disaster Risk Assessment and Evaluation	CE8063	3
Advanced Geotechnical Engineering	CE8503	3
Foundation Engineering	CE8523	3
Infrastructure Design and Development	CE8603	3
Principles of Pavement Engineering	CE8633	3
Application of Modern Tools in Civil Engineering	CE7013	3

Data Analysis and Quality Control	CE7023	3
Dam Engineering	CE7033	3
Advanced Geo-Informatics	CE7043	3
Deep Foundations	CE8513	3
Rock Mechanics	CE8533	3

Research Thesis

Course Title	Code	Cr. Hrs.
Research Thesis	CE8916	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) 2 Cr. Hrs. Fehm-ul-Quran

(iii) Comprehensive Examination

(iv) 30 Cr. Hrs. Research Work

(v) Synopsis Defense

(vi) Dissertation Foreign Reviews

(vii) Publication of at least one research paper in HEC approved journal.

(viii) 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


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