

<b>Title of Subject</b>	:	<b>Professional Ethics (Th)</b>	
<b>Code</b>	:	CE422	
<b>Discipline</b>	:	Civil Engineering (7 <sup>th</sup> Semester)	
<b>Effective</b>	:	<b>20-Batch and onwards</b>	
<b>Pre-requisite</b>	:	Nil	<b>Co-requisite: Nil</b>
<b>Assessment</b>	:	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid, 60% Final)	
<b>Credit Hours</b>	:	02 + 00	<b>Marks : 50 + 00</b>
<b>Minimum Contact Hours:</b>	:	30 + 00	

**Course Learning Outcomes (CLOs):**

Upon successful completion of the course, the student will be able to:

CLO	Description	Taxonomy Level	PLO
1	FOLLOW ethical values that guide the civil engineers in their profession.	A2	8
2	ADOPT means of ethically sound professional engineer with commitment and responsible conduct	A3	6

**Course outline:**

**Human Values and Engineering Ethics**

Morals, values, ethics, integrity, work ethics, respect for others, living peacefully, honesty, cooperation, commitment, self-confidence, challenges in workplace. Senses of Engineering ethics, Moral autonomy, Professionalism, Responsibilities, Ethical Theories, Self-control.

**Engineering as Social Experimentation**

Engineering as experimentation, Engineers as responsible practitioners, Codes of ethics in industry. Civil Engineering as Profession, The American Council of Engineering Companies Ethical Conduct Guidelines, The American Society of Civil Engineers Code of Ethics Pakistan Engineering Council Code of conduct and Code of ethics, --Engineer's Role in Project Development, Writing Engineering Proposals, Permitting, Construction and Operation of Engineering Works Byelaws 1987, Dispute Resolution in Construction Projects.

**Responsibilities and Rights**

Collegiality and loyalty, Confidentiality, Conflict of interests, Occupational crime, Human rights, Employee rights, Whistle blowing, Intellectual property rights.

**Communicating as a Professional Engineer**

Communication Conduits, E-mail Usage and Limitations, Behavioural Characteristics of Team Members, Ethical responsibilities of civil engineer in project life cycle, Best practices related to professional ethics, Case studies.

**Recommended Books:**

- 1) A Textbook on Professional Ethics and Human Values by R.S Naagarazan, New Age International Publisher, Latest Edition
- 2) Civil Engineer's Handbook of Professional Practice by Karen Lee Hansen and Kent E. Zenobia, John Wiley & Sons, Latest Edition
- 3) Engineering Ethics Edited by Michael Davis, Routledge Publishing, Latest Edition

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**Approval:****Board of Studies: 33****Board of Faculty: 23****Academic Council:****Resolution No. 33.3****Resolution No. 23.09****Resolution No.****Dated: 30-11-2021****Dated: 09-12-2021****Dated:**

<b>Title of Subject</b>	:	<b><u>Engineering Economics (Th)</u></b>	
<b>Code</b>	:	CE423	
<b>Discipline</b>	:	Civil Engineering (7 <sup>th</sup> Semester)	
<b>Effective</b>	:	20-Batch and onwards	
<b>Pre-requisite</b>	:	Nil	<b>Co-requisite: Nil</b>
<b>Assessment</b>	:	Theory: 20% Sessional, 80% Written Semester Exam (20% Mid, 60% Final)	
<b>Credit Hours</b>	:	02 + 00	<b>Marks : 50 + 00</b>
<b>Minimum Contact Hours:</b>		30 + 00	

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### Course Learning Outcomes (CLOs):

Upon successful completion of the course, the student will be able to:

CLO	Description	Taxonomy Level	PLO
1	UNDERSTAND fundamental principles and basic concept of engineering economy	C2	1
2	APPLY the cost and value concepts to solve engineering problems	C3	2

### Course Outline:

- Introduction to Economics: Supply and demand theory, supply and demand equilibrium, micro-and macro-economic analysis
- Engineering Economics: Principles of engineering economy, engineering economy methodology, steps in an engineering economic analysis.
- Cost and Value Concepts: Sunk and opportunity costs, fixed, variable and incremental costs, recurring and non-recurring costs, direct, indirect and overhead costs, standard costs, cash versus book costs, life cycle costs, value, market value, use value, fair value, book value, salvage value, value addition.
- Comparing alternatives: Net present value, net present cost, Cost Benefit analysis, internal rate of return, payback period, levelised costs, break-even analysis, applicable to capital investment.
- Margin of safety application in Master Production Scheduling. Depreciation: Types of depreciation, methods of computing depreciation, economic life of equipment and replacement decisions.
- Product Costing: Sources of costing information: labor material, overheads, fixed cost, variable cost, absorption costing marginal costing standard costing. Inventory Valuation Methods.

### Recommended Books

1. Fundamentals of Engineering Economics by C.S Park, Pearson. Latest Edition
2. Engineering Economy by William G. Sullivan, James A. Bontadelli, Elin M. Wicks, Latest Edition
3. Contemporary Engineering Economics by Chan S. Park. Latest Edition

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**Approval:**

**Board of Studies: 33**

**Board of Faculty: 23**

**Academic Council:**

**Resolution No. 33.3**

**Resolution No. 23.09**

**Resolution No.**

**Dated: 30-11-2021**

**Dated: 09-12-2021**

**Dated:**

<b>Title of Subject</b>	:	<b><u>Environmental Engineering-II (Th)</u></b>	
<b>Code</b>	:	<b>CE431</b>	
<b>Discipline</b>	:	Civil Engineering (7 <sup>th</sup> Semester)	
<b>Effective</b>	:	17-Batch and onwards	
<b>Pre-requisite</b>	:	Environmental Engineering-I	<b>Co-requisite: -----</b>
<b>Assessment</b>	:	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid, 60% Final)	
<b>Credit Hours</b>	:	03 + 00	<b>Marks : 100 + 00</b>
<b>Minimum Contact Hours:</b>		45 + 00	

### Course Learning Outcomes (CLOs):

Upon successful completion of the course, the student will be able to:

CLO	Description	Taxonomy Level	PLO
1	DESCRIBE various characteristics of municipal and industrial wastewater and its composition, solid waste management, air and noise pollution.	C2	1
2	EXPLAIN wastewater collection and conveyance systems, understanding the management tools for solid waste reduction, reuse and recycling.	C2	2
3	DESIGN the wastewater treatment plant and manage the hazardous waste for societal and environmental sustainability.	C6	3,7

### Course outline:

#### PART – I: WASTEWATER ENGINEERING

- **Wastewater Quality**  
Wastewater terminology, Characteristics of municipal industrial wastewater, Wastewater composition, Sampling techniques, Wastewater quality and analysis, Quality parameters/monitoring.
- **Wastewater Treatment Unit Processes/Operations**  
Estimating wastewater quantity, Conventional wastewater treatment systems, Municipal wastewater treatment unit processes: physical treatment methods, biological treatment methods, special/physico-chemical and chemical treatment methods, Sludge disposal and reuse, Wastewater reclamation and reuse, Natural treatment, Self-purification systems.
- **Design of a Wastewater Treatment Plant**  
Design of bar racks and screens, Grit chambers, Sedimentation tanks (detritus tanks, skimming tanks), Activated sludge processes, Aerated lagoons, Trickling filters, Rotating biological contractors, Stabilization ponds, Control of nutrients, Odour and VOCs control, Sludge thickeners and digesters, Composting units, Dewatering equipment, Wetlands.
- **Small Wastewater Treatment Systems**

Small wastewater systems and characteristics, Design of on-site systems: septic tanks, imhoff tanks, pit latrines.

- **Wastewater Infrastructure (collection and conveyance)**

Sewerage systems, Methods of carrying wastewater and its disposal: sewer materials, shapes, fittings and joints, design of sewers, laying and testing of sewers, ventilation of sewers, cleaning of sewers, surface drains, sewer appurtenances, House drainage system.

## **PART – II: SOLID AND HAZARDOUS WASTE MANAGEMENT**

Characteristics of solid waste, Generation-collection-transferring and disposal of waste (incineration and landfill options), Waste minimization: recycling reuse of solid waste, composting, Hazardous waste: classification and treatment, Contaminated sites and their remedies.

## **PART – III: AIR AND NOISE POLLUTION**

Air pollution: their origin, sources, types, effects, and dispersion, Control of air pollutants, Air emission measurement and control, Ambient air quality, Noise pollution: concept of sound and sound pressure level, noise sources and their effects on health, Acoustic environmental criteria (safety and health at work), Noise measurement and control.

### **Recommended Books:**

- Environmental Engineering and management, Suresh K. Dhamejarg, Vikas Publishing House Pvt Ltd. Latest Edition
- Wastewater Engineering, Metcalf and Eddy, Tata Mc Graw Hill Publishing Company Ltd.
- Water Supply, Twort, Ac Twist. F.M. Low and FW Crowley Arnold International student Edition (AISE), Latest Edition

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### **Approval:**

**Board of Studies:**

**Resolution No. 32.3**

**Dated: 03-10-2020**

**Board of Faculty:**

**Resolution No. 20.11**

**Dated: 07-10-2020**

**Academic Council:**

**Resolution No. 98.7(ii)**

**Dated: 22-10-2020**



9. To draw a cross section of end connection of a column with a beam.
10. To draw cross section showing connection of two beams (1st floor and roof level) with intermediate and end columns.
11. Introduction to ETABS software and setting out grid lines and story data in ETABS.
12. To define and assign the various sections and loads in ETABS.
13. To analyze a multi-story building using ETABS software.
14. To design a multi-story building using ETABS software.
15. To perform an open-ended lab.

**Recommended Books:**

- Reinforced Concrete Design, Park & Palily, Willy Interscieer Publication, John Willy & Sons
- Reinforced Concrete Design, C.K Wang and C.G Salamon, Harlperand Row Publisher New York, Latest Edition
- Reinforced & Pre-stressed Concrete, F.K Kong and R.H Evans, Ven National Reinhold U.K, Latest Edition
- Structural Concrete: Theory and Design, M.N. Hassoun and A.A. Manaseer, Publisher: John Wiley & Sons. Inc., Latest Edition

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**Approval:**

<b>Board of Studies:</b>	<b>Resolution No. 32.3</b>	<b>Dated: 03-10-2020</b>
<b>Board of Faculty:</b>	<b>Resolution No. 20.11</b>	<b>Dated: 07-10-2020</b>
<b>Academic Council:</b>	<b>Resolution No. 98.7(ii)</b>	<b>Dated: 22-10-2020</b>



<b>Title of Subject</b>	:	<b><u>Geotechnical Engineering (Th + Pr)</u></b>	
<b>Code</b>	:	CE411	
<b>Discipline</b>	:	Civil Engineering (7 <sup>th</sup> Semester)	
<b>Effective</b>	:	17-Batch and onwards	
<b>Pre-requisite</b>	:	Soil Mechanics	<b>Co-requisite: ---</b>
<b>Assessment</b>	:	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid,60% Final)	
		Practical: 40% Sessional, 60% Written Semester Examination	
<b>Credit Hours</b>	:	03 + 01	<b>Marks : 100 + 50</b>
<b>Minimum Contact Hours:</b>		45 + 45	

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**Course Learning Outcomes (CLOs):**

Upon successful completion of the course, the student will be able to:

CLO	Description	Taxonomy Level	PLO
1	EXPLAIN various soil improvement techniques, their applications and equipment.	C2	5
2	ANALYZE the range of soil related problems especially those involving external stresses, shear strengths, earth retaining structures and slope stability.	C4	4
3	PRACTICE laboratory testing to determine compaction characteristics and shear strength parameters of soil.	P3	4

**Course outline:**

- **Compaction**  
Definition, compaction fundamentals, Moisture-Density relationship, Laboratory compaction methods: standard and modified Proctor tests, Factors affecting compaction, Compaction in the field, field compaction equipment and machinery, field control and measurements of in-situ density.
- **Soil Improvement**  
Introduction to soil improvement techniques: removal and replacement of soil, mechanical and chemical stabilization of soil, in-situ densifications, grouting, preloading, and vertical drains, and soil reinforcement, Basic principles and objectives of various methods of soil improvement, Application of various soil improvement techniques.
- **Shear Strength**  
Shear strength parameters of soils, shear strength of cohesive and cohesion less soils, Mohr-Coulomb failure criterion, Laboratory measurement of shear strength parameters: shear box test, unconfined compression test, vane shear test and tri-axial shear test.
- **Earth Pressures**  
Earth pressure at rest, active and passive earth pressures, Coulombs and Rankine theories for active and passive earth pressures, Earth pressure diagrams for different loading conditions.
- **Stress in a Soil Mass**

Boussinesq's equations for computing vertical stresses in soil mass under various loadings: point load, line load, uniform load on a strip area, uniform load on circular area, uniform load on rectangular area and stresses at a point outside the loaded area, Pressure distribution diagrams: Stress isobar, pressure distribution diagrams on horizontal and vertical planes, Equivalent point load method, Newmark influence chart for vertical pressure, 2:1 Method.

- **Stability of Slopes**

Types of slopes, Factors affecting stability, Types of failure and remedial measures, Factor of safety, Stability of infinite slopes, stability numbers, Stability analysis of finite slopes: Taylor's chart, friction circle, method of slices.

- **Introduction to Relevant Software**

**Practical work to be carried out:**

1. To determine the moisture-density relationship by Standard Proctor Test.
2. To determine the moisture-density relationship by Modified Proctor Test.
3. To determine the CBR value for un-soaked soil sample.
4. To determine the CBR value for soaked soil sample.
5. To determine the field density by Core Cutter Method.
6. To determine the field density by Water Replacement/Oil Replacement Method.
7. To determine the field density by Sand Replacement (Sand Cone) Method.
8. To determine the relative density of soil sample by Vibrating Table.
9. To determine the shear strength parameters of sandy soil by Direct Shear Box Test.
10. To determine the shear strength parameters of clayey soil by Direct Shear Box Test.
11. To determine the shear strength of clayey soil by Un-Confined Compression Test and Pocket Penetrometer Test.
12. To determine the shear strength of a clayey soil by Laboratory Vane Shear Test.
13. To determine shear strength of fine grained soil by Tri-Axial Test (Demonstration only).
14. To determine sand equivalent value of sand.
15. To perform an open-ended lab.

**Recommended Books:**

- Modern Geotechnical Engineering, Alam Singh, CBS Publication, Latest Edition
- Principles of Geotechnical Engineering, Das, B.M, Brook/Cole, Latest Edition
- Soil Mechanics and Foundations, Garg, S. K, Khanna Publishers, Delhi, Latest Edition

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**Approval:**

<b>Board of Studies:</b>	<b>Resolution No. 32.3</b>	<b>Dated: 03-10-2020</b>
<b>Board of Faculty:</b>	<b>Resolution No. 20.11</b>	<b>Dated: 07-10-2020</b>
<b>Academic Council:</b>	<b>Resolution No. 98.7(ii)</b>	<b>Dated: 22-10-2020</b>