| | | | |
|---|---|---|---|
| | Class 39 | Water safety through water safety plans | |
| **Week 14** | | | |
| | Class 40 | Water demand management, Water charging/ tariff, Water conservation | |
| | Class 41 | Developing a WSP | |
| | Class 42 | Review of water treatment options with examples | |

ASSESSMENT STRATEGY

| Components | | Grading | CO | Bloom's Taxonomy |
|---|---|---|---|---|
| Continuous Assessment (40%) | Class Test/ Assignment (1-3) | 20% | CO1, CO4 | |
| | Class Participation | 5% | CO2 | |
| | Mid Term | 15% | CO2, CO3 | |
| Final Exam | | 60% | CO1 | C1, C2 |
| | | | CO2 | C2 |
| | | | CO3 | C3, C4 |
| | | | CO4 | C2, C3, C4 |
| Total Marks | | 100% | | |

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCES BOOKS


1. A Text Book of Water Supply Engineering - M. A. Aziz, 1st ed., Hafiz Book Center.
2. Water Supply and Sanitation - M. Feroz Ahmed, Md. Mujibur Rahman, 1st ed., ITN-BUET.
3. Water and Environmental Engineering - M. Habibur Rahman, Abdullah Al-Muyeed , 1st ed., ITN-BUET.
4. Environmental Engineering - Howard S. Peavy, Donald R. Rowe and George Tchobanoglous, International Edition, McGraw Hill Companies.
5. Water Safety Plan (WSP) – A Risk Based Approach for Water Safety, 1st ed., ITN-BUET.


REFERENCE SITE

http://classroom.google.com/...../.....

| COURSE INFORMATION | | |
|---|---|---|
| Course Code: EWCE 332 | Credit Hour: 1.5 | |
| Course Title: Environmental Engineering Sessional-I | Contact Hour: 3.0 | |
| PRE-REQUISITE | | |
| EWCE105, CHEM-102, CE-331 | | |
| CURRICULUM STRUCTURE | | |
| Outcome Based Education (OBE) | | |
| SYNOPSIS/ RATIONALE | | |
| This is the practical course on environmental engineering where students will be trained and practiced on various water and wastewater sampling and testing methods. Experience gained from this course will be used in later semesters and also in professional life. | | |

OBJECTIVE

1. To impart knowledge to determine and analyze different parameters and substances in water.
2. To make the students efficient in performing different environmental experiments to satisfy specific needs and interpret the findings.
3. To introduce the students with standard procedure, how the test of water samples are conducted according to the standard code.

COURSE OUTCOMES & GENERIC SKILLS

| No | Course Outcome | Corresponding POs | Bloom's Taxonomy* | CP | CA | KP | Assessment Methods |
|---|---|---|---|---|---|---|---|
| CO1 | Ability to **use** sophisticated instruments to analyse water quality parameters with their standard test protocol in terms of Engineering practice. | PO – 5 | C3 | 1 | | 6 | Viva, Quiz |
| CO2 | Ability to **conduct** experiments to analyse the water quality parameters against their standards and also to interpret data in order to ensure safe water supply requirements to protect public health and Environment. | PO – 4 | C4 | 2 | | 4 | Viva, Quiz |

**Level of Bloom's Taxonomy:*

C1 - Remember | C2 - Understand | C3 - Apply | C4 - Analyze | C5 - Evaluate | C6 - Create

(CP – Complex Problems, CA – Complex Activities, KP – Knowledge Profile, T – Test, PR – Project, Q – Quiz, M – Mid Term Exam, Asg – Assignment, Pr – Presentation, R – Report, F – Final Exam)

COURSE CONTENT

Water and wastewater sampling techniques, sample preservation, physical, chemical and biological tests of water and wastewater, breakpoint chlorination, alum coagulation, sampling and laboratory analysis of air, particulate matter, sampling and laboratory analysis of soil and solid waste, sampling and laboratory analysis of noise.

SKILL MAPPING (CO – PO MAPPING)

| No | Course Outcome | PROGRAM OUTCOMES (POs) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| CO1 | Ability to **use** sophisticated instruments to analyze water quality parameters with their standard test protocol in terms of Engineering practice. | | | | | 3 | | | | | | | |
| CO2 | Ability to **conduct** experiments to analyze the water quality | | | | 4 | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | parameters against their standards and also to interpret data in order to ensure safe water supply requirements to protect public health and Environment. | | | | | | | | | | | | | |

(Numerical method used for mapping which indicates 3 as high, 2 as medium and 1 as low level of matching)

JUSTIFICATION FOR CO – PO MAPPING

| | Mapping | Corresponding Level of Matching | Justifications |
|---|---|---|---|
| | CO1 – PO5 | 3 | Ability to **use** sophisticated instruments to analyze water quality parameters with their standard test protocol in terms of Engineering practice. |
| | CO2 – PO4 | 3 | Ability to **conduct** experiments to analyse the water quality parameters against their standards and also to interpret data in order to ensure safe water supply requirements to protect public health and Environment. |

TEACHING AND LEARNING STRATEGY

| | Teaching and Learning Activities | Engagement (Hours) |
|---|---|---|
| | Face-to-face Learning<br>• Lecture (1 hours/week x 10 weeks)<br>• Experiment (1 hr/week X10 weeks)<br>• Data analysis and calculation (0.75 hr/week X 10 weeks) | <br>10<br>10<br>7.5 |
| | Guided Learning<br>• Report Writing (2 hours/week x 10 weeks) | <br>20 |
| | Independent Learning<br>• Preparation for tests and examination | <br>07 |
| | Assessment<br>• Quiz<br>• Viva<br>• Class Performance (0.25 hr/week X 10 weeks) | <br>02<br>01<br>2.5 |
| | Total | 60 |

TEACHING METHODOLOGY

Lecture and Discussion, Problem Based Method

COURSE SCHEDULE

| | | Intended Topics to be Covered | Assessment |
|---|---|---|---|
| **Week 1** | | | |
| | Class 1 | Introduction, units of measurements, sampling procedure | |
| | | Determination of pH of water | |
| | | Determination Color of water | Viva, Class |

| | | | | |
|---|---|---|---|---|
| **Week 2** | | | Assessment, Report, Quiz -1 | |
| | Class 2 | Determination Turbidity of water | | |
| | | Determination TS, TDS, TSS of water | | |
| **Week 3** | | | | |
| | Class 3 | Determination of $CO_2$ | | |
| | | Determination of Chloride of Water | | |
| **Week 4** | | | | |
| | Class 4 | Determination of Alkalinity of water | | |
| | | Determination of Hardness of water | | |
| **Week 5** | | | | |
| | Class 5 | **Quiz --- 1** | | |
| **Week 6** | | | Viva, Class Assessment, Report, Quiz -2 | |
| | Class 6 | Determination of Biochemical Oxygen Demand ($BOD_5$) | | |
| | | Determination of Chemical Oxygen Demand (COD) | | |
| **Week 7** | | | | |
| | Class 7 | Determination of Total Iron of Water | | |
| | | Determination of Arsenic contamination of water | | |
| **Week 8** | | | | |
| | Class 8 | Alum Coagulation | | |
| | | Determination of Total and Fecal Coliform of water | | |
| **Week 9** | | | | |
| | Class 9 | Break Point Chlorination | | |
| **Week 10** | | | | |
| | Class 10 | Noise survey, data collection and laboratory analysis | | |
| **Week 11** | | | | |
| | Class 11 | Air quality survey, data collection and laboratory analysis | | |
| **Week 12** | | | | |
| | Class 12 | Review Lectures and Viva/Assessment | | |
| **Week 13** | | | | |
| | Class 13 | Quiz - 2 | | |
| **Week 14** | | | | |
| | Class 14 | No class | | |

ASSESSMENT STRATEGY

| Components | | Grading | CO | Bloom's Taxonomy |
|---|---|---|---|---|
| Continuous Assessment (40%) | Continuous Assessment (Class Assessment, Report) | 20% | CO1, CO2 | C3, C4 |
| | Viva | 10% | CO1, CO2 | C3, C4 |
| | Quiz | 70% | | |
| Total Marks | | 100% | | |

| |
|---|
| (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affectiv Domain) |
| REFERENCES BOOKS |
| 1. A Textbook of Water Supply Engineering by – M.A. Aziz<br>2. Water Supply and Sanitation by – Ahmed and Rahman<br>3. Laboratory Manual |
| REFERENCE SITE |
| http://classroom.google.com/...../..... |

| COURSE INFORMATION | |
|---|---|
| Course Code: EWCE 333 | Credit Hour: 4.0 |
| Course Title: Waste Water Engineering and Sanitation | Contact Hour: 4.0 |
| PRE-REQUISITE | |
| Chem 101, EWCE-200 (Details of Construction and Quantity Surveying), EWCE-201 (Construction Materials), EWCE-261 (Fluid Mechanics), EWCE-331 (Water Supply Engineering) | |
| CURRICULUM STRUCTURE | |
| Outcome Based Education (OBE) | |
| SYNOPSIS/ RATIONALE | |
| In this course students will be presented with basic knowledge on wastewater source, design of sewage collection and treatment system, microbiology, characteristics, treatment and management of sewage sludge, sanitation system, and plumbing system. Knowledge gained from this course will be used in later semesters and also in professional life. | |
| OBJECTIVE | |
| 1. To gain knowledge on the basics of waste water technology and sanitation options.<br>2. To become skilled at the design and construction of sanitary sewer, storm sewer, waste water treatment plant.<br>3. To learn about the details of sewage treatment methods and design of treatment units.<br>4. To understand the importance of sludge management and learn about the sludge treatment facilities.<br>5. To be acquainted with the sanitation technologies, especially practiced in low-income and developing countries around the world and learn to design those facilities knowing the appropriateness of technologies suitable to specific site condition. | |

COURSE OUTCOMES & GENERIC SKILLS

| No | Course Outcome | Corresponding POs | Bloom's Taxonomy* | CP | CA | KP | Assessment Methods |
|---|---|---|---|---|---|---|---|
| CO 1 | Able to **estimate** the waste water, solid waste and human waste generation rate and **assess** the requirements for preferred sanitation system in urban as well as rural | PO – 1 | C2 | 1 | | 1, 3 | T, F |