# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Minor/Hons. Program**
**Level: UG**
**Branch: Minor/Hons. Green Technology and Sustainability Engineering**
**Subject Code: BE050AS011**
**Subject Name: Environmental Engineering and Pollution Prevention for Sustainability**

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|---|---|
| w. e. f. Academic Year: | 2026-2027 |
| Semester: | 5 |
| Category of the Course: | Core Courses |

| | |
|---|---|
| **Prerequisite:** | Students should have clear idea about environment and its components and basics of pollution. |
| **Rationale:** | This course focuses on classification of pollution, sources of pollutants and its mitigating techniques. Prevention of pollution is essential component of sustainability as understanding how waste is produced and how it can be minimized, or prevented, is the first step to reduce waste and protect the environment. Waste management, recycling and reduction equally contribute for sustainable development. |

**Course Outcomes:**

| Sr. No. | CO statement | Marks% weightage |
|---|---|---|
| 1 | CO 1- Explain the sources of environmental pollution and their causes. | 10 |
| 2 | CO 2 - Analyze advanced treatment methods and pollution abatement techniques for water pollution. | 30 |
| 3 | CO 3 - Explain sources of air pollution and its control techniques. | 25 |
| 4 | CO 4 - Summarize the techniques for solid waste management. | 10 |
| 5 | CO 5- Design and evaluation of environmental issues pertaining to industry and society. | 25 |

**Teaching and Examination Scheme:**

| Teaching / Learning Scheme (in Hours per semester) | | | | | Total Credits = TH/30 | Assessment Pattern and Marks | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | Tutorial / Practical | | | |
| L | T | P | PBL* | TH | | ESE (E) | PA (M) | PA (I) | PBL (I) | ESE (V) | |
| 45 | 30 | 00 | 45 | 120 | 4 | 70 | 00 | 00 | 30 | 50 | 150 |

**** Problem Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.***

Where L = Lecture, T= Tutorial, P= Practical, TW/SL = Term-Work / Self-Learning, TH = Total Hours, PA = Progressive Assessment, ESE = End-Semester Examination

**Content:**

| Sr. No. | Content | Total Hrs |
|---|---|---|
| 1. | Basic concepts- biotic and abiotic environment, environmental acts and regulations, | 05 |

| | | |
|---|---|---|
| | environment and public health, air quality standards, Environmental impact analysis | |
| 2. | Water pollution – nature and types of water pollutants, organic and inorganic water pollutants | 05 |
| 3. | Water treatment- municipal sewage and industrial water treatment, Preliminary primary, secondary and tertiary treatment methods water reuse and recycling | 07 |
| 4. | Air pollution: Definition of pollutants, standards and limits of pollutants, Sources and sinks of pollutants, Meteorology, Problems associated with dispersion, Sampling techniques, Control techniques for removal of particulate and gaseous pollutants applications | 08 |
| 5. | Global atmosphere- greenhouse gases, global warming, acid rain, ozone depletion and photochemical smog | 05 |
| 6. | Solid waste management- sources, characteristic, waste reduction and material recovery, hazardous waste management | 07 |
| 7. | Environmentally compatible materials, Design of unit operations for pollution prevention, Economics of pollution prevention, Process flow-sheet for pollution prevention, sustainable process design, life cycle analysis of plastics and paper | 08 |
| **TOTAL** | | **45** |

**Suggested Specification table with Marks (Theory):**

| **Distribution of Theory Marks** | | | | | |
|---|---|---|---|---|---|
| R Level | U Level | A Level | N Level | E Level | C Level |
| **20** | **30** | **20** | **20** | **10** | **-** |

**R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

**Reference Books:**


1) Introduction to environmental engineering - P. Aarne Veslind- Cenage learning
2) Environmental engineering - Joseph A. Salvato - Wiley
3) Unit operations and processes in environmental engineering-Tom D Reynolds – PWS Publishing


**List of Tutorials:**

1) Parameter determination of wastewater. (COD, BOD, DO etc.)
2) Determination of hardness and TDS of water.
3) Treatment of water to reduce hardness and TDS.
4) Decolorization of wastewater using adsorbent.
5) Analysis of air sample from stack.
6) Synthesis of bio-adsorbent or adsorbent from waste.

**List of Open Source Software/learning website:**

1) https://www.unep.org/
2) https://www.epa.gov/
3) https://moef.gov.in/
4) SWAYAM/NPTEL courses

**List of suggested activities for Problem Based Learning:**

| No. | Description | No. of hours | Total hours |
|---|---|---|---|
| 1. | Students will have to undergo industrial visit related to any one of the contents mentioned in syllabus and submit the report for the same | Visit = 5h, Report preparation = 5h<br>Total = 10h | 10 |
| 2. | Students will have to undergo technical video based learning related to subject and have to present it or prepare a report of that learning | Duration of video = 5 hrs<br>Report Preparation = 5hrs | 10 |
| 3. | Students will have to submit assignment work assigned to them. | 5 assignments of 2h each. | 10 |
| 4. | Discussion on research paper based on relevant subject. Summarize research paper and evaluation critical parameters | 3 research papers can be included. Each one has 5h | 15 |
| 5. | Student have to undergo an on-line course | Minimum duration of the course should be 10h. | 10 |
| 6. | Students will have to prepare poster, chart or PowerPoint presentation on technical topic related to subject content | Poster/Chart/Power point preparation and presentation | 10 |
| 7 | Students will have to prepare Working/non-working model on technical topics | For each model 10 h duration | 10 |
| 8 | Real world case studies-based learning | Duration of data collection/study = 5h<br>Report preparation = 5h | 10 |
| **Maximum Hours to be allotted** | | | **45** |

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