

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT**COURSE CURRICULUM**

Course Title: ENVIRONMENTAL SCIENCE
(Code: 3331301)

Diploma Programmer in which this course is offered	Semester in which offered
Environmental Engineering	THIRD

1. RATIONALE

This course contains the topics and sub topics which will be useful for them in different ways like selection of chemicals and processes to have comfort, Fresh water and Air and life style. To know the chemical parameters and their environmental significance, the subject will help in the real world. Also compare the parameters with Bureau of Indian Standards.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- I** Perform the different test to assess the quality of fresh & waste water.
- II** To select proper process or equipment for different tests for chemical and biological analysis.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
L	T	P		Theory Marks		Practical Marks		Total Marks
			C	ESE	PA	ESE	PA	
3	0	2	5	70	30	20	30	150

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

4. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT-I Elements of Water pollution	1a. Know the Quality of fresh and waste water	1.1 Basic information related to Physical, Chemical and Biological Parameters. Causes of environmental pollution. Health effects on living organisms.
Unit – II Familiarization of Instrument, Laboratory wares & Preparation of reagent water	2a. Know the Laboratory wares and instruments 2b. To prepare Reagent water	2.1 Laboratory wares 2.1.1. Types and Uses 2.1.2. Cleaning solutions 2.1.3. Methods of Cleaning laboratory wares 2.1.4. Calibration of laboratory wares and importance 2.2 Instruments used in Environmental Engg. Field 2.2.1. Types 2.2.2. Uses and Importance of instruments 2.2.3. Calibration of instruments 2.3. Distilled water and Dematerialized water 2.4. Method of preparing distilled water and Standard solutions 2.5 Comparison of Method 2.6 Pressure, Temperature and Volume relationship
Unit – III Testing of Chemical parameters	3a. Calculate the Chemical parameters	3.1 pH 3.2 Alkalinity 3.3 Chloride 3.4 Hardness 3.5 Fluorides 3.6 Solids 3.7 Sulphate 3.8 Dissolve Oxygen 3.9 Chemical Oxygen Demand (COD) 3.10 Oil and Grease 3.11 Other waste water parameters
Unit – IV Testing of Physical, and Biological parameters	4a. Calculate the Physical and Biological parameters	4.1 Turbidity 4.2 TOTAL SOLID 4.3. TOTAL DISSOLVE SOLID 4.4 TOTAL SUSPENDED SOLID 4.5 Biochemical Oxygen Demand (BOD)

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Elements of Water pollution	02	02	02	02	06
II	Familiarization of Instrument, Laboratory wares & Preparation of reagent water	14	05	07	08	20
III	Testing of Chemical parameters	20	05	10	15	30
IV	Testing of Physical, and Biological parameters	06	04	04	06	14
Total		42	16	23	31	70

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills so that students are able to acquire the competency.

Following is the list of experiments for guidance.

S. No.	Unit No.	Practical/Exercise	Apprx. Hrs. Required
1	1	Familiarization of Laboratory and Calibration of Instruments and Glass wares	08
2	2	Preparation of Primary standards like, (i) 0.25 N $K_2Cr_2O_7$ (ii) 0.1 M $CaCO_3$ (iii) 0.0282 N NaCl (iv) 0.02 N Na_2CO_3 Preparation of Secondary standards like, (i) 0.25 N FAS (ii) 0.1 M EDTA (iii) 0.0282 N $AgNO_3$ (iv) 0.02 N NaOH	20
3	3	Determination of pH of water and waste water samples	02
4	4	Determination of Turbidity of water samples	02
5	5	Gravimetric Analysis (i) Determination of Solids of water and waste water samples (ii) Determination of Sulphate of water and waste	08

S. No.	Unit No.	Practical/Exercise	Apprx. Hrs. Required
		water samples (iii) Determination of Oil and Grease of waste water samples	
6	6	Volumetric Analysis (i) Determination of Alkalinity of waste water samples (ii) Determination of Chloride of water and waste water samples (iii) Determination of Hardness of water samples (iv) Determination of Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD) of waste water samples	14
7	7	Determination of Fluoride of water samples	02
		Total	

7. SUGGESTED LIST OF STUDENT ACTIVITIES

- Following is the list of proposed student activities like:
- Preparation of Inorganic and Organic chemicals used in food.
- List out the Toxic materials used in food.
- List different types of manure and its chemical content with its atomic weight.
- Materials used as binding material in Civil engineering.
- Different methods of finding pH of the sample.
- Properties of Insecticides, Pesticides and Rhodenticid and its effects on soil.
- Process of metabolism occur in Plant and Animal body

8. SUGGESTED LEARNING RESOURCES

(A) List of Books:

S. No.	Title of Books	Author	Publication
1	Environmental Chemistry	B.K.Sharma and S.H.Kaur	Goel Publication House, Meerut
2	Environmental Chemistry	A.K.De.	New Age international . Pub. New Delhi
3	Chemistry for Environmental Engineering	C.N.Sawyer and P.L.Mc Carty	Mc Graw Hill ltd.
4	Standard Methods	–	International
5	Environmental Chemistry	P.S.Sindhu	New Age international . Pub. New Delhi
6	Relevant BIS Codes	–	Bureau of Indian Standards

B. List of Major Equipment/Materials:

1. UV Spectrophotometer
2. Onsite Water Testing kit
3. Flame photometer
4. pH meter
5. Turbidity meter
6. B.O.D. Incubator
7. C.O.D. Digester
8. TDS meter
9. Chemical testing glasswares

C List of Software/Learning Websites

Qualitative and Quantitative analysis softwares

1. www.gpcb.gov.in
2. www.gwssb.org
3. www.cpcb.nic.in
4. www.neeri.res.in

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics**

- (1) Shri H.L.PUROHIT, H.O.D. Civil Engineering, L.E. College, Morbi (634)
- (2) Shri M.C.SANANDIYA, Lecturer in Environmental Engineering, Shri K.J.Polytechnic, Bharuch (645)

Coordinator and Faculty Members from NITTTR Bhopal

1. Dr. K.K.PATHAK, Professor department of Civil and Environmental Engineering, NITTTR, BHOPAL.

