ENS-315 ENVIRONMENTAL ANALYTICAL TECHNIQUES 3(2+1)

COURSE CODE:	ENS-315		
COURSE NAME:	Environmental Analytical Techniques		
CREDIT HOURS:	Theory = 02	Practical = 01	Total = 03
CONTACT HOURS:	Theory = 32	Practical = 48	Total = 80
PREREQUISITE:	None		
MODE OF TEACHING:	2 hours of Lecture and 3 hours of Lab per week (67% + 33%)		

COURSE DESCRIPTION:

The course will educate the students about different types of solutions, instruments & analytical procedures and enhance their skills about practical aspects of environmental science so that knowledge becomes more productive.

COURSE LEARNING OUTCOMES:

By the end of this course, students will be able to:

a) Apply various analytical techniques to analyze environmental samples and data effectively.
b) Demonstrate proficiency in using laboratory equipment and analytical instruments commonly used in environmental science research and monitoring.
c) Interpret analytical results and draw conclusions regarding environmental quality.

TOPICS COVERED:

Theory

Week	Topics
1	Quality assurance in an Environmental Science laboratory
2	Purposes and designs of environmental sampling
3	Sample collection & preservation methods
4	Data acquisition from analytical instruments, processing, interpretation, and validation
5	Quality control, quality assurance, precision, and accuracy
6	Standard solutions and standard curves
7	Instrumentations: principles and procedure for Potentiometery
8	Physicochemical analysis of environmental samples including Conductivity meter, pH meter,
9	**Midterm Exam – MSE**
10	Titrimetery
11	Gravimetery
12	Spectroscopy
13	Chromatography
14	Air quality sampling and analysis
15	Analysis of water and wastewater
16	Analysis of solid waste and sediment samples
17	Case studies on method selection for specific environmental issues (e.g., heavy metal contamination, microplastics, pesticide detection)
18	**End Semester Exam**

Practical:

Week	Topics

1	Sample collection, handling, preparation and storage
2	Analytical techniques for water
3	Preparation of standard solutions and standard curve
4	Use of potentiometery and conductivitymetry
5	Use of titrimetery
6	Use of gravimetery
7	Use of spectroscopy
8	Use of chromatography
9	Determination of chemical characteristics of water & WW (pH, All Solids, BOD, COD)
10	Determination of chemical characteristics of water & WW (Fluoride, NO3–N & NH4-N)

TEXT AND MATERIAL:

1. Fundamentals of Analytical Chemistry. 2021. Skoog, D. A., West, D. M. and F. J. Holler. 10th edition. Cengage Learning,
2. Standard Methods for the Examination of Water & Wastewater. 2022. 24th Edition. A Greenberg (American Public Health Association),
3. Qualitative Chemical Analysis. 2019. Harris, D. C., Freeman & Co. 10th Edition. New York.

ASSESMENT SYSTEM:

Theoretical/ Instruction		
Assessment Category	**Marks Distribution (%)**	
	Without Project	**With Project**
Quiz	15	10-15
Assignment	10	5-10
MSE	25	25
Project	-	5-10
ESE	50	45-50
Lab (if Applicable)		
Assessment Category	**Marks Distribution (%)**	
Lab Work/ Psychomotor Assessment/ Lab Reports	50–70	
Lab Project/ Open-ended Lab Project/ Assignment/Quiz	10–20	
Final Assessment/ Mid Semester Assessment (Written, viva, hands-on experimentation, group task)	20–30	