# SEE4002: ENVIRONMENTAL ENGINEERING LABORATORY

**Effective Term**
Semester A 2025/26

## Part I Course Overview

**Course Title**
Environmental Engineering Laboratory

**Subject Code**
SEE - School of Energy and Environment
**Course Number**
4002

**Academic Unit**
School of Energy and Environment (E2)

**College/School**
School of Energy and Environment (E2)

**Course Duration**
One Semester

**Credit Units**
3

**Level**
B1, B2, B3, B4 - Bachelor's Degree

**Medium of Instruction**
English

**Medium of Assessment**
English

**Prerequisites**
SEE1002 Introduction to Computing for Energy and Environment;
SEE2002 Chemical Sciences for Energy and Environmental Engineers;
SEE2003 Introduction to Energy and Environmental Data Analysis;
SEE3101 Engineering Thermofluids II;
SEE3203 Air Pollution;
SEE4217 Waste and Wastewater Treatment Engineering; AND
SEE4218 Water and Water Resource Engineering

**Precursors**
Nil

**Equivalent Courses**
Nil

**Exclusive Courses**

Nil

# Part II Course Details

**Abstract**

The course aims to impart practical skills to undergraduate students in bridging fundamental sciences and practical environmental engineering. Students are expected to assemble and/or apply basic scientific tools to measure properties of air, water and soil that are required in the design of infrastructure relevant to environmental engineering. Students are expected to develop proficiency in data processing, interpretation and statistical analyses.

**Course Intended Learning Outcomes (CILOs)**

| | CILOs | Weighting (if app.) | DEC-A1 | DEC-A2 | DEC-A3 |
|---|---|---|---|---|---|
| 1 | Demonstrate the ability to construct and apply basic scientific tools for environmental measurements | | x | x | |
| 2 | Apply fundamental knowledge of science and statistical analyses to interpret various environmental measurements | | x | x | |
| 3 | Design systems or infrastructure related to environmental engineering based on the collected measurements | | | x | x |

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

**Learning and Teaching Activities (LTAs)**

| | LTAs | Brief Description | CILO No. | Hours/week (if applicable) |
|---|---|---|---|---|
| 1 | Lab-based experiments | Students will perform hands-on experimentation and data collection and interpretation. Based on the collected data, students will engineer environmental system/ infrastructures. | 1, 2, 3 | 3 |

**Assessment Tasks / Activities (ATs)**

| | ATs | CILO No. | Weighting (%) | Remarks ("-" for nil entry) | Allow Use of GenAI? |
|---|---|---|---|---|---|
| 1 | Data analyses and report write-up | 1, 2, 3 | 100 | Student will be denied the right to submit report if he/she fails to take part in the hands-on experimentation. | Yes |

**Continuous Assessment (%)**

100

**Examination (%)**

0

**Minimum Continuous Assessment Passing Requirement (%)**

30

**Additional Information for ATs**

Examination duration: N/A Percentage of continuous assessment, examination, etc.: 100% by continuous assessment To pass a course, a student must do ALL of the following: 1) obtain at least 30% of the total marks allocated towards continuous assessment (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable); 2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and 3) meet the criteria listed in the section on Assessment Rubrics.

**Assessment Rubrics (AR)**

**Assessment Task**

1. Data analyses and report write-up

**Criterion**

1.1. Capacity to explain and analyse collected data

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Unsatisfactory

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**Assessment Task**

1. Data analyses and report write-up

**Criterion**

1.2 Ability to design systems/infrastructure related to environmental engineering

**Excellent (A+, A, A-)**
High

**Good (B+, B, B-)**
Significant

**Fair (C+, C, C-)**
Moderate

**Marginal (D)**
Basic

**Failure (F)**
Unsatisfactory

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# Part III Other Information

**Keyword Syllabus**

Aerosol measurements, air pollution, water quality analysis, wastewater treatment, solid waste treatment, data collection and statistical analysis

**Reading List**

**Compulsory Readings**

| | Title |
|---|---|
| 1 | Teaching materials of all the following courses: SEE2101 Engineering Thermofluids I, SEE3101 Engineering Thermofluids II, SEE2002 Chemical Sciences for Energy and Environmental Engineers, SEE2003 Introduction to Energy and Environmental Data Analysis, SEE4216 Air Pollution Measurement and Control, SEE4217 Waste and Wastewater Treatment Engineering, AND SEE4218 Water and Water Resource Engineering |

**Additional Readings**

| | Title |
|---|---|
| 1 | Fundamentals of Analytical Chemistry, 9th Edition, Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch, Brooks Cole Publishing, 2013 |
| 2 | Smoke, Dust, and Haze: Fundamentals of Aerosol Dynamics, 2nd edition, Sheldon K. Friedlander, Oxford University Press, 2000 |
| 3 | Air Pollution: Measurement, Modelling and Mitigation, 3rd edition, Abhishek Tiwary, Jeremy Colls, CRC Press, 2009 |
| 4 | Wastewater Engineering: Treatment and Reuse, 4th Edition, Metcalf & Eddy Inc., George Tchobanoglous, Franklin L Burton, H.David Stensel, McGraw Hill Higher Education, 2002 |
| 5 | Solid Waste Engineering, 2nd edition, William A. Worrell, P. Aarne Vesilind, CL Engineering, 2011 |
| 6 | Elements of Chemical Reaction Engineering, 5th Edition, H. Scott Fogler, Prentice Hall, 2016 |