SEE1002: INTRODUCTION TO COMPUTING FOR ENERGY AND ENVIRONMENT

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Introduction to Computing for Energy and Environment

Subject Code
SEE - School of Energy and Environment
Course Number
1002

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
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

Computing is ubiquitous in Energy and Environment. Whether one works in industry, government or academia, numerical simulations need to be performed, equations solved or data analysed. As part of a modern engineering education, it is therefore highly beneficial for students to acquire familiarity with basic computing practices.

This course will introduce students to computing and programming through the use of an interpreted language, Python. Other software applications (e.g. Flowgorithm and Microsoft Excel) will be covered briefly as well.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the applications of computing in Energy and Environment	5	x		
2	Explain the structure of a computer program	15		x	
3	Write, test and debug simple computer programs	50		x	
4	Solve elementary engineering problems using simple programs	15		x	
5	Read, write and analyse moderately large datasets	15	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		Students will learn on (1) concept of computing; (2) elements of Python programming; (3) basic structure of Python programming; (4) Python for science and engineering	1, 2, 3, 4, 5	21 (for the whole semester)
2		Student will practice Python through computer labs on (1) basic structure of Python programming; (2) Python for science and engineering	2, 3, 4, 5	18 (for the whole semester)

Additional Information for LTAs

Lectures will cover background material on computing and introduce students to key concepts in the Python language. This material will be applied in the computer labs.

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Quizzes Students will be tested on their understanding of basic Python concepts/syntax and ability to write short programs.	2, 3, 4, 5	25	Three quizzes per semester	No
2	Problem sets Longer and more difficult questions based on the computer labs	2, 3, 4, 5	10	Each practical lab has task weekly	No
3	Lecture participation Students will be assessed on their attendance and participation in class activities (e.g. doing assigned exercises, asking questions).	2, 3, 4, 5	5	-	Yes
4	Midterm	1, 2, 3	20	-	No

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

Final exam will emphasize students' ability to solve simple engineering problems and analyse data.

There will be roughly one assignment for each of CILOs 2 - 5.

Examination duration: 2 hrs

Percentage of continuous assessment, examination, etc.: 60% by continuous assessment; 40% by exam

To pass a course, a student must do ALL of the following:

a. 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);
b. obtain at least 30% of the total marks allocated towards final examination (if applicable); and
c. meet the criteria listed in the section on Assessment Rubrics.

Assessment Rubrics (AR)

Assessment Task
1. Quizzes

Criterion
Basic Python concepts and programming

Excellent (A+, A, A-)
No difficulty in identifying syntax errors. Programs conform to standard Python style and give the correct output.

Good (B+, B, B-)
Minor problems with syntax. Programs are structured correctly but some of the output is incorrect.

Fair (C+, C, C-)
Moderate problems with syntax. Programs are structured incorrectly and the output is largely incorrect.

Marginal (D)
Numerous problems with syntax. Programs are somewhat relevant but do not solve the problem.

Failure (F)
Little understanding of Python syntax. Programs are unrelated to the problem.

Assessment Task
2. Problem sets

Criterion
Solve problems using Python programs

Excellent (A+, A, A-)
Programs conform to standard Python style and give the correct output.

Good (B+, B, B-)
Programs are structured correctly but some of the output is incorrect.

Fair (C+, C, C-)
Programs are structured incorrectly and the output is largely incorrect.

Marginal (D)
Programs are somewhat relevant but do not solve the problem.

Failure (F)
Programs are unrelated to the problem.

Assessment Task
3. Lab participation

Criterion
Attendance and participation in activities

Excellent (A+, A, A-)
Attendance of all lab sessions; works on lab exercises and asks questions.

Good (B+, B, B-)
Attendance of most lab sessions; usually works on lab exercises.

Fair (C+, C, C-)
Attendance of some lab sessions; sometimes works on lab exercises

Marginal (D)
Occasionally attends lab sessions; occasionally works on lab exercises

Failure (F)
Rarely attends labs or works on lab exercises

Assessment Task
4. Midterm

Criterion
Basic Python concepts and programming

Excellent (A+, A, A-)
No difficulty in identifying syntax errors. Programs conform to standard Python style and give the correct output.

Good (B+, B, B-)
Minor problems with syntax. Programs are structured correctly but some of the output is incorrect.

Fair (C+, C, C-)
Moderate problems with syntax. Programs are structured incorrectly and the output is largely incorrect.

Marginal (D)
Numerous problems with syntax. Programs are somewhat relevant but do not solve the problem.

Failure (F)
Little understanding of Python syntax. Programs are unrelated to the problem.

Assessment Task
5. Final exam

Criterion
Solve elementary engineering problems and analyse data using Python

Excellent (A+, A, A-)
No difficulty in identifying syntax errors. Programs conform to standard Python style and give the correct output.

Good (B+, B, B-)
Minor problems with syntax. Programs are structured correctly but some of the output is incorrect.

Fair (C+, C, C-)

Moderate problems with syntax. Programs are structured incorrectly and the output is largely incorrect.

Marginal (D)

Numerous problems with syntax. Programs are somewhat relevant but do not solve the problem.

Failure (F)

Little understanding of Python syntax. Programs are unrelated to the problem.

Part III Other Information

Keyword Syllabus

CILO1: operating system, computer language, interpreter, CPU, floating point arithmetic, numerical simulation, visualisation, data analysis, parallel computing
CILO2: structured programming, function, module, variables, comments
CILO3: debugging
CILO4: NumPy, array, spreadsheet
CILO5: text and binary files, sequential access

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	The Python Tutorial, https://docs.python.org/3/tutorial/index.html
2	Kent D. Lee, Python Programming Fundamentals, Springer, 2015. Available from https://julac.hosted.exlibrisgroup.com/permalink/f/10vp6a/TN_cdi_askewsholts_vlebooks_9781447166429
3	John V. Guttag, Introduction to computation and programming using Python, 2013. Available from http://encore.lib.cityu.edu.hk/iii/encore/record/C__Rb4659958__SGuttag%2C%20John.__P0%2C2__Orightresult__X4?lang=eng&suite=pearl