City University of Hong Kong
Course Syllabus

offered by School of Energy and Environment
with effect from Semester A 2021/22

Part I Course Overview

Course Title:	Introduction to Computing for Energy and Environment
Course Code:	SEE1002
Course Duration:	1 semester
Credit Units:	3 credits
Level:	B1
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	Nil
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

(A 150-word description about the course)

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.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs[#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Explain the applications of computing in Energy and Environment	5%	✓		
2.	Explain the structure of a computer program	15%		✓	
3.	Write, test and debug simple computer programs	50%		✓	
4.	Solve elementary engineering problems using simple programs	15%		✓	
5.	Read, write and analyse moderately large datasets	15%	✓	✓	
	** If weighting is assigned to CILOs, they should add up to 100%.*	100%			

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

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 self-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.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.						Total Hours
		1	**2**	**3**	**4**	**5**		
1	Tutorials and video lectures on (1) introduction to computing; (2) elements of Python programming; (3) basic Python programming; (4) Python for science and engineering	2	4	7	4	4		21
2	Computer labs on (1) elements of Python programming; (2) basic Python programming; (3) Python for science and engineering		2	8	4	4		18
Total		**2**	**6**	**15**	**8**	**8**		**39**

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.

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting *	Remarks
	1	2	3	4	5			
Continuous Assessment: _60_%								
Quizzes Students will be tested on their understanding of basic Python concepts/syntax and ability to write short programs..		✓	✓	✓	✓		25%	Two quizzes per week
Problem sets Longer and more difficult questions based on the computer labs		✓	✓	✓	✓		10%	Approximately 3-4 problem sets
Lab participation Students will be assessed on their attendance and participation in class activities (e.g. doing assigned exercises, asking questions).		✓	✓	✓	✓		5%	
Midterm	✓	✓	✓				20%	
Examination: 40% (duration: 2 hours) Final exam will emphasize	✓	✓	✓	✓	✓		40%	

students' ability to solve simple engineering problems and analyse data.								
** The weightings should add up to 100%.*							**100%**	

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

Examination duration: 2 hrs
Percentage of coursework, examination, etc.: 60% by coursework; 40% by exam

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

1) obtain at least 30% of the total marks allocated towards coursework (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.

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Quizzes	Basic Python concepts and programming	No difficulty in identifying syntax errors. Programs conform to standard Python style and give the correct output.	Minor problems with syntax. Programs are structured correctly but some of the output is incorrect.	Moderate problems with syntax. Programs are structured incorrectly and the output is largely incorrect.	Numerous problems with syntax. Programs are somewhat relevant but do not solve the problem.	Little understanding of Python syntax. Programs are unrelated to the problem.
2. Problem sets	Solve problems using Python programs	Programs conform to standard Python style and give the correct output.	Programs are structured correctly but some of the output is incorrect.	Programs are structured incorrectly and the output is largely incorrect.	Programs are somewhat relevant but do not solve the problem.	Programs are unrelated to the problem.
3. Lab participation	Attendance and participation in activities	Attendance of all lab sessions; works on lab exercises and asks questions.	Attendance of most lab sessions; usually works on lab exercises.	Attendance of some lab sessions; sometimes works on lab exercises	Occasionally attends lab sessions; occasionally works on lab exercises	Rarely attends labs or works on lab exercises
4. Midterm	Basic Python concepts and programming	No difficulty in identifying syntax errors. Programs conform to standard Python style and give the	Minor problems with syntax. Programs are structured correctly but some of the output is incorrect.	Moderate problems with syntax. Programs are structured incorrectly and the output is largely	Numerous problems with syntax. Programs are somewhat relevant but do not solve the problem.	Little understanding of Python syntax. Programs are unrelated to the problem.

		correct output.		incorrect.		
5. Final exam	Solve elementary engineering problems and analyse data using Python	No difficulty in identifying syntax errors. Programs conform to standard Python style and give the	Minor problems with syntax. Programs are structured correctly but some of the output is incorrect.	Moderate problems with syntax. Programs are structured incorrectly and the output is largely incorrect.	Numerous problems with syntax. Programs are somewhat relevant but do not solve the problem.	Little understanding of Python syntax. Programs are unrelated to the problem.

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

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

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

Nil.

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

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