City University of Hong Kong
Course Syllabus

offered by Department of Information Systems
with effect from Semester A 2022 / 2023

Part I Course Overview

Course Title:	Advanced Business Programming in Python
Course Code:	IS3240
Course Duration:	One Semester
Credit Units:	3
Level:	B3
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)*	CB2240 Introduction to Business Programming in Python or IS2240 Python Programming for Business
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)

The Advanced Business Programming in Python provides an introduction to big data handling and analysis and supervised machine learning through Python programming with applications in business settings. Key topics include data analysis and visualization using Python libraries (NumPy, pandas, matplotlib), database handling with SQLite, data extraction with web scraping and API connection, data wrangling, and a glimpse into supervised machine learning (regression and classification). Upon completion, students will be equipped with the programming and analytical skills to engage in data-driven decision-making in modern organizations. This course will also provide the knowledge and training to prepare students for more advanced data analytics and machine learning subjects.

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 structure of a Python program and understand applications of computer programming in data handling and analyses.	20%	✓		
2.	Read, analyze, test and debug Python programs.	20%	✓	✓	
3.	Identify, characterize, and analyze a problem, and write Python programs to solve the business problem.	30%		✓	✓
4.	Apply Python programming knowledge and techniques to address data-driven business problems, which involve advanced skills such as data analysis and visualization, database connection, web scraping.	30%		✓	✓
	** 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.				Hours/week (if applicable)
		1	2	3	4	
TLA1: Lecture	Concepts and general knowledge of advanced programming techniques in Python related to data handling and analysis are explained.	✓	✓	✓	✓	Seminar: 3 Hours/Week
TLA2: Laboratory Exercise	Hands-on computer exercises related with business domains are designed to help students apply what they have learned in lecture. Major assignment involves individual work or teamwork by a group of students in the same laboratory group to solve a specific business problem.		✓	✓	✓	
TLA3: Tutorial	Concepts, techniques, and good practices of programming are discussed.	✓	✓	✓	✓	
TLA4: Class Discussion and Presentation	Perform in class programming exercises in tutorial and laboratory to get immediate feedback from students. This is followed by discussion of the exercises afterwards to reinforce the learning of the materials tested. Presentation of laboratory results and assignments may be required.	✓	✓	✓	✓	

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		
Continuous Assessment: 60%						
AT1: Participation and Laboratory Exercises Each laboratory has in-class exercises to assess students' hands-on programming skills of the topics covered.	✓	✓	✓	✓	20%	
AT2: Individual Assignment The individual assignment, including programme codes, results, written report and presentation, is required to assess the technical analysis and implementation skill sets of the students.		✓	✓	✓	20%	
AT3: Group Project The group project serves the purpose of continuous assessment of students' understanding of the key domain areas and as an indicator of how well the students have performed.	✓	✓	✓	✓	20%	
Examination: 40% (duration: one 2-hour exam)						
AT4. Final Examination Students will be assessed via the examination on their understanding of concepts learned in class, textbooks, reading materials, and their ability to apply subject-related knowledge. .	✓	✓	✓	✓	40%	
** The weightings should add up to 100%.*					100%	

[#] Remark: Students must pass BOTH coursework and examination in order to get an overall pass in this course.

5. Assessment Rubrics

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

Assessment Task (AT)	**Criterion**	**Excellent (A+, A, A-)**	**Good (B+, B, B-)**	**Fair (C+, C, C-)**	**Marginal (D)**	**Failure (F)**
AT1: Participation and Laboratory Exercises	Ability to accurately describe and understand the concepts in Python programming related to big data handling and analysis	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to quickly understand and analyze a Python program	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to creatively, effectively and efficiently write Python programs	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to creatively and effectively develop applications that involve advanced techniques to solve business problems	High	Significant	Moderate	Basic	Not even reaching marginal levels
AT2: Individual Assignment	Ability to effectively test and debug Python programs	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to creatively, effectively and efficiently write Python programs	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to creatively and effectively develop applications that involve advanced techniques to solve business problems	High	Significant	Moderate	Basic	Not even reaching marginal levels
AT3: Group Project	Ability to accurately describe and understand the concepts in Python programming related to big data handling and analysis	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to accurately understand and analyze a Python program	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to creatively, effectively and efficiently write Python programs	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to creatively and effectively develop applications that involve advanced techniques to solve business problems	High	Significant	Moderate	Basic	Not even reaching marginal levels
AT4: Final Examination	Ability to accurately describe and understand the concepts in Python programming related to big data handling and analysis	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to accurately understand and analyze a Python program	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Ability to creatively, effectively and efficiently write Python programs	High	Significant	Moderate	Basic	Not even reaching marginal levels

	Capability to creatively and effectively develop applications that involve advanced techniques to solve business problems	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information

1. Keyword Syllabus

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

Python, big data, machine learning, business application, data handling, data analysis, NumPy, Pandas, Matplotlib, Scikit-Learn, SQL, web scraping, database connection, data wrangling, regression, and classification.

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. All materials will be distributed through lecture slides and supplementary materials on Canvas.

2.2 Additional Readings

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

1.	Wes McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, 2nd Edition, O'Reilly Media, 2017.
2.	David I. Schneider, An Introduction to Programming Using Python, 1st Edition, Pearson, 2016.
3.	Jake VanderPlas, Python Data Science Handbook: Essential Tools for Working with Data, 1st Edition, O'Reilly Media, 2016.
4.	Fabio Nelli, Python Data Analytics: With Pandas, NumPy, and Matplotlib, 2nd Edition, Apress, 2018.
5.	Jason Myers, Rick Copeland, Essential SQLAlchemy: Mapping Python to Databases, 2nd Edition, O'Reilly Media, 2015.
6.	Ryan Mitchell, Web Scraping with Python: Collecting More Data from the Modern Web, 2nd Edition, O'Reilly Media, 2018.
7.	Andreas Müller, Sarah Guido, Introduction to Machine Learning with Python: A Guide for Data Scientists, 1st Edition, O'Reilly Media, 2016.