City University of Hong Kong
Course Syllabus

offered by Department of Information Systems
with effect from Semester A 2024 / 2025

Part I   Course Overview

Course Title: Analytical Programming with Python

Course Code: IS5312

Course Duration: One Semester (13 weeks)

Credit Units: 3

Level: P5

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**

The aim of this course is to introduce the students to programming concepts and skills with python, with emphasis on data analytics in business applications. On completion of this course, student should be able to: a) understand python basics including control flow, functions, modules, libraries and object oriented programming; b) understanding basic algorithms in data analysis; c) construct data structure to analyse particular business data and solve practical business problem by integrating python modules, files and database technologies.

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.	Design and develop appropriate programming skill for business data analytics.	30%			
2.	Design and develop appropriate solution for business problems.	20%	✓	✓	✓
3.	Explore and visualize data analysis results with data analytic toolkit Pandas, Numpy etc. in Python.	25%	✓	✓	✓
4.	Design basic module/class structures and algorithms for business applications.	25%			
		100%			

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.

3. Learning and Teaching Activities (LTAs)
(LTAs designed to facilitate students' achievement of the CILOs.)

LTA	Brief Description	CILO No.				Hours/week (if applicable)
		1	2	3	4	
LTA1: Lecture	Students will learn the concepts and general knowledge of python programming. Furthermore, programming algorithm and skills, such as object oriented programming, drawing and animation, files handling, linking to databases, and basic data structures are explained and illustrated using examples to enable students understanding on how to get insights using practical business data.	✓	✓	✓	✓	
LTA2: Laboratory	Students will spend time to reinforce and practice various business software construction techniques learnt in lectures through the following activities during laboratory sessions. Exercises: Hands-on activities using a programming toolkit (python) as data analytical tool.	✓	✓	✓	✓	
LTA3: Project	Students would have to complete a project requiring them to aiming at solving a practical business problem and build prototype for to be used in business applications.	✓	✓	✓	✓	

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: 100%						
AT1: Continuous Assessment Participation in class and lab sessions in activities such as: - a number of take-home exercises - class performance - online quizzes	✓	✓	✓	✓	10%	
AT2: Mini-Project Each students will design and develop an algorithm by using appropriate python modules and programming techniques	✓	✓	✓	✓	40%	
AT3: Individual Lab Test The individual lab test is to assess students' overall competence level in the domain areas.	✓	✓	✓	✓	50%	
					100%	

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

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
AT1: Continuous Assessment	Capability to design and develop appropriate data analytical skill for business applications.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate data structure for business data analytics.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate program to handle files and data using databases for business applications.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to develop basic data structures and algorithms for business decision making.	High	Significant	Moderate	Basic	Not even reaching marginal levels
AT2: Mini-Project	Capability to design and develop appropriate analytical skill for business data analysis.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate data structure for business data analytics.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate program to handle files and data using databases for business applications.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to develop basic data structures and algorithms for business decision making.	High	Significant	Moderate	Basic	Not even reaching marginal levels

Assessment Task	Criterion				
AT3: Individual Lab Test	Capability to design and develop appropriate analytical skill for business data analysis.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate data structure for business data analytics.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate program to handle files and data using databases for business applications.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	Capability to develop basic data structures and algorithms for business decision making.	High	Significant	Moderate	Basic	Not even reaching marginal levels

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
AT1: Continuous Assessment	Capability to design and develop appropriate data analytical skill for business applications.	High	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate data structure for business data analytics.	High	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate program to handle files and data using databases for business applications.	High	Moderate	Basic	Not even reaching marginal levels
	Capability to develop basic data structures and algorithms for business decision making.	High	Moderate	Basic	Not even reaching marginal levels

AT2: Mini-Project	Capability to design and develop appropriate analytical skill for business data analysis.	High	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate data structure for business data analytics.	High	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate program to handle files and data using databases for business applications.	High	Moderate	Basic	Not even reaching marginal levels
	Capability to develop basic data structures and algorithms for business decision making.	High	Moderate	Basic	Not even reaching marginal levels
AT3: Individual Lab Test	Capability to design and develop appropriate analytical skill for business data analysis.	High	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate data structure for business data analytics.	High	Moderate	Basic	Not even reaching marginal levels
	Capability to design and develop appropriate program to handle files and data using databases for business applications.	High	Moderate	Basic	Not even reaching marginal levels
	Capability to develop basic data structures and algorithms for business decision making.	High	Moderate	Basic	Not even reaching marginal levels

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.)

     Python programming basics, control flow, functions, series and dataframes, data wrangling, file handling, data structure and analysis algorithms

     Detailed Syllabus:

     •   Python basics
     •   Python functions
     •   Python modules
     •   Series and DataFrames
     •   Data scraping
     •   Data wrangling and visualization
     •   Handling data in database with Python

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.)

1.	David Schneider, "An Introduction to Programming Using Python", Pearson Education, 2 February 2015.

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

1.	Tony Gaddis, "Starting Out with Python", 4th edition, Pearson, March 2017
2.	Starting Out with Java: From Control Structures through Objects: International Edition, 6/E, Tony Gaddis, ISBN-13: 978-0133957051
3.	https://docs.python.org/3/tutorial/index.html