

The Hong Kong University of Science and Technology

IEDA 1180 Python for Analytics (Fall 2026) Syllabus

Python for Analytics

IEDA 1180

3 Credits

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Office Hours: Wednesday 4:30 pm – 5:30 pm

Course Description

This course equips students with Python programming skills for data analytics in engineering and business contexts, focusing on foundational techniques for data manipulation, visualization, and statistical analysis. Students will learn to process and analyze data using Python libraries such as NumPy, matplotlib, seaborn, bokeh, and GraphViz, with an emphasis on creating insightful visualizations and handling raw datasets. The course covers data wrangling without relying on pandas, basic statistical methods, and workflow automation. Hands-on projects with real-world datasets will enable students to build practical skills for data-driven decision-making, complementing database and advanced analytics courses.

Course Intended Learning Outcomes (CILOs)

By the end of this course, students should be able to:

1. Write, test, and debug Python programs using core language constructs for data analytics.
2. Clean, transform, and summarize raw datasets using Python standard libraries and NumPy.
3. Create and interpret static, interactive, and graph-based visualizations using appropriate Python libraries.
4. Apply basic methods to analyze data and communicate evidence-based insights.
5. Develop reproducible, well-documented Python scripts and analytics pipelines for real-world applications.

Assessment and Grading

This course will be assessed using criterion-referencing, and grades will not be assigned using a curve. The mapping of CILOs to assessment tasks and the general grading rubrics for each assessment are provided below. Task-specific requirements, mark allocations, and any additional rubric details will be provided in the relevant assessment instructions on Canvas when the assessment is released.

Assessment Task	Contribution to Overall Course grade (%)	Tentative Due date
Homework & Lab Assignments	15%	Usually within one week
Midterm	30%	November 6, 2026 (in class, closed book, no make-up)
Final Exam	40%	TBD
Project	15%	Last day of the class

Mapping of Course CILOs to Assessment Tasks

Assessment Task	Mapped CILOs	Explanation
Homework & Lab Assignments	CILOs 1-5	These tasks assess students' ability to write, test, and debug Python programs (CILO 1); clean, transform, and summarize data (CILO 2); create and interpret visualizations (CILO 3); apply analytical methods and communicate evidence-based insights (CILO 4); and produce reproducible, well-documented work (CILO 5).
Midterm	CILOs 1-4	The Midterm assesses students' understanding and application of core Python programming, data processing, visualization, and analytical concepts covered in the first part of the course.
Final Exam	CILOs 1-4	The Final Examination assesses students' integrated understanding and application of Python programming, data handling, visualization, and analytical methods across the course.
Project	CILOs 1-5	The Project requires students to complete an end-to-end analytics workflow, including programming, data preparation, visualization, analysis, interpretation, and reproducible documentation.

Grading Rubrics

The following rubrics specify the general criteria used for each assessment. Performance on each criterion is judged using the common performance-level descriptors below. Where applicable, task-specific instructions and question-level mark allocations will be provided on Canvas or on the examination paper.

Common Performance-Level Descriptors

Performance Level	Descriptor
Excellent	The criterion is fully satisfied. Work is accurate, complete, appropriate, clearly justified, well presented, and, where applicable, reproducible, with only negligible errors.
Good	The criterion is substantially satisfied. Work is generally accurate and appropriate; minor errors or omissions do not materially affect the main solution, analysis, or interpretation.
Satisfactory	The core requirement is met, but the work contains noticeable gaps, errors, or weaknesses in method, reasoning, implementation, documentation, or presentation.
Below Standard	The criterion is not adequately met. The work contains major errors or omissions, is substantially incomplete, or provides insufficient evidence of the required understanding or skill.

Homework & Lab Assignments Rubric (15% of overall course grade)

Criterion	Weight within Assessment	Evidence Considered
Correctness and completeness	45%	The submitted solution runs as intended, produces correct results, and addresses all stated requirements.
Appropriateness of methods and data handling	25%	Appropriate Python constructs, libraries, data-processing steps, and analytical methods are selected and applied correctly.
Code quality, documentation, and reproducibility	20%	Code is readable, logically organized, appropriately commented, and can reproduce the submitted results from the provided materials.
Interpretation and presentation	10%	Outputs, tables, and visualizations are presented clearly and interpreted accurately in relation to the task.

Unless otherwise stated in an individual assignment brief, the above criteria apply. The brief will provide the requirements and mark allocation for each question or component.

Midterm Rubric (30% of overall course grade)

Criterion	How the Criterion Is Assessed
Conceptual understanding	Accurate understanding of the Python programming, data-processing, visualization, and analytical concepts assessed in the Midterm.
Selection of method or approach	Identification and use of an appropriate programming construct, algorithm, analytical procedure, or problem-solving strategy.
Correctness and completeness	Correct code, calculations, reasoning, and results, with all material parts of the question addressed.
Clarity of reasoning	Logical steps, readable code or notation, and explanations sufficient to show how the answer was obtained.

Objective questions will be graded according to the correct answer and the marks stated on the examination paper. For constructed-response and programming questions, partial credit may be awarded for an appropriate method or correct intermediate reasoning even when the final answer is incorrect.

Final Examination Rubric (40% of overall course grade)

Criterion	How the Criterion Is Assessed
Integrated conceptual understanding	Accurate understanding of the major Python programming and data-analytics concepts covered across the course, including their relationships and limitations.
Application and method selection	Selection and application of appropriate programming, data-processing, visualization, and analytical methods to unfamiliar or integrated problems.
Correctness and completeness	Correct code, calculations, analytical procedures, outputs, and conclusions, with all material parts of the question addressed.
Explanation and interpretation	Clear reasoning and accurate interpretation of results, including appropriate communication of assumptions, limitations, and evidence where required.

Objective questions will be graded according to the correct answer and the marks stated on the examination paper. For constructed-response and programming questions, partial credit may be awarded for an appropriate method or correct intermediate reasoning even when the final answer is incorrect.

Project Rubric (15% of overall course grade)

Criterion	Weight within Assessment	Evidence Considered
Problem definition and objectives	10%	The problem, analytical objectives, and intended outputs are clearly defined and appropriate for the selected data.
Data preparation and quality	20%	Data are examined, cleaned, transformed, and validated using appropriate and clearly documented procedures.
Analysis and methodological correctness	20%	Analytical methods are appropriate, correctly implemented, and supported by sound reasoning.
Visualization and interpretation	20%	Visualizations are accurate, appropriately selected, clearly designed, and used to support well-founded interpretations.
Code quality, documentation, and reproducibility	20%	Code is readable, organized, documented, and capable of reproducing the reported analysis and outputs from the submitted materials.
Communication and required AI-use disclosure	10%	Findings are communicated clearly and concisely, and any permitted use of generative AI is disclosed in accordance with the Course AI Policy.

Detailed project requirements, deliverables, and any task-specific adjustments to the rubric will be stated in the Project brief released on Canvas.

Final Grade Descriptors

Letter Grade Minimum Averages Required (Tentative): A: 90; B: 80; C: 70; D: 60; F: <60.

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates comprehensive mastery of Python programming and data analytics; produces accurate, efficient, well-documented and reproducible solutions; interprets results insightfully.
B	Good Performance	Demonstrates good understanding and applies appropriate methods effectively, with only minor errors or omissions.
C	Satisfactory Performance	Demonstrates adequate understanding of core concepts and can solve familiar programming and data-analysis problems.
D	Marginal Pass	Demonstrates threshold attainment of the essential course outcomes but has substantial weaknesses in accuracy, reasoning or implementation.
F	Fail	Does not demonstrate sufficient attainment of the essential course outcomes and cannot reliably apply the required programming or analytical methods.

Course AI Policy

Use of generative AI tools is permitted in Homework and Lab Assignments and the Project for purposes such as brainstorming, debugging, code explanation, and language editing, unless the instructions for a particular assessment state otherwise. Generative AI tools are not permitted during the Midterm or Final Examination.

Any permitted use of generative AI must be disclosed in an AI Use Statement, identifying the tool used, the purpose of use, and the parts of the submission affected. Students remain responsible for the originality, accuracy, integrity, and reproducibility of all submitted work and must be able to explain all submitted code, analyses, and conclusions. Generative AI output must not be treated as an authoritative factual source without independent verification. Undisclosed use, prohibited use, fabricated references or results, or submission of work that a student cannot explain may be handled in accordance with the University's Academic Integrity policy and applicable procedures.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Required Texts and Materials

[1] McKinney, Wes. Python for Data Analysis, 3E, 2022.

[2] Bynum, Michael L., et al. Pyomo-Optimization Modeling in Python. Vol. 67. No. s 32. Berlin/Heidelberg, Germany: Springer, 2021.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to [Academic Integrity | HKUST – Academic Registry](#) for the University's definition of plagiarism and ways to avoid cheating and plagiarism.