The Hong Kong University of Science and Technology

UG Course Syllabus

Capstone Project in Statistics

MATH 4993

3 credits

Pre-requisites: MATH 3424

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Office Hours: By email appointments

Course Description

This is a project-based course that provides students an opportunity to integrate and apply their statistical knowledge to analyzing data. Students may make use of the statistical package such as R, Python, Excel, etc, to conduct their project. For MATH students in their fourth year of study only.

Intended Learning Outcomes (ILOs)

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

No.	ILOs
1.	Examine the key theories, principles and techniques of data analysis.
2.	Apply independent judgment to objective analysis and prediction of quantitative information.
3.	Apply a rigorous analytic and highly numerate approach to analyze and solve both day-to-day and professional problems.
4.	Work independently and collaborate effectively in a team.
5.	Communicate statistical outcomes effectively to both lay and expert audiences by utilizing appropriate information and communication technology, through all project presentations.
6.	Apply an appropriate method to analyze and solve both day-to-day and professional problems using statistical software.
7.	Appraise the application of statistical modeling to a range of problems and persuade and influence others of its precision and value.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
Mini Projects	40%	02/10/2024, 06/11/2024
Class participation	10%	all lectures
Final Project	50%	13/12/2024

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Mini Projects	ILO1, ILO2, ILO3, ILO4, ILO5, ILO6, ILO7	This task assesses students' ability to explain and apply statistical concepts to analyze data (ILO 1), evaluate their implications (ILO 2-3, 6-7) and catch up with the teaching materials to handle statistical problems individually or with groupmates (ILO 4-5).]
Class participation	ILO1, ILO2, ILO3, ILO4, ILO5, ILO6, ILO7	This task assesses students' understanding in class when statistical skills are taught (ILO 1-7).
Final Project (individual)	ILO1, ILO2, ILO3, ILO4, ILO5, ILO6, ILO7	This task assesses students' ability to explain and apply statistical concepts to analyze data (ILO 1), evaluate their implications (ILO 2-3, 6-7) and catch up with the teaching materials to handle statistical problems individually (ILO 4-5).]

Grading Rubrics

Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

a. Percentage of mini projects, class participation and final project.

Assessment	Assessing Course ILOs
35% by mini projects (4-5 projects)	1, 2, 3, 4, 5, 6, 7
15% by class participation	1, 2, 3, 4, 5, 6, 7
50% by final project	1, 2, 3, 4, 5, 6, 7

*All projects will receive feedback within 10 working days

Related to the policy on GenAI for teaching and learning, there is No restrictions on use of generative AI for an assessment task.

- For project, no late submission will be accepted.

b. Grades will be given by criteria referencing.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates mastery of correct theories and results for statistical skills. The student can appropriately apply the method for prediction, interpret the results accurately, and exhibits strong proficiency in using R, Python or other software for analysis.
B	Good Performance	Shows a solid understanding of statistical skills. The student can effectively apply it for prediction and interpret the results with minor errors. Demonstrates good competency in using R, Python or other software for performing analyses.
C	Satisfactory Performance	Possesses adequate knowledge of statistical skills. The student can address familiar problems and perform basic analyses using R/ Python/ other software, though with some inconsistencies. Shows basic ability to interpret results.
D	Marginal Pass	Has a threshold understanding of statistical methods. The student can perform simple analyses using R/ Python/ other software but the interpretation of results may be limited and occasionally inaccurate.
F	Fail	Does not have sufficient understanding of even the basics components of statistical techniques. The student is unable to effectively apply this model for prediction, nor using R/ Python/ other software for analyses, and fails to interpret results correctly.

Course AI Policy

Students are permitted to consult any person—including the instructor and classmates—for ideas and hints while completing projects. The use of ChatGPT and other generative AI tools is also allowed. However, students are required to write up the solutions independently and are responsible for ensuring that their submissions are correct and comply with University rules and laws, including those regarding plagiarism.

Students are particularly cautioned about the potential inaccuracies and fallacies that may arise from AI-generated answers.

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

There is no textbook. The lecture notes give a concise (to the point) presentation of the course material, usually enough for most students.

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.