UFUG2104 (L01) - Applied Statistics

Jump to Today ✎ Edit

Course Title: Applied Statistics

Course Code: UFUG2104

No. of Credits: 3

Any pre-/co-requisites: UFUG 1102 Calculus I or UFUG 1105 Honors Calculus I

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Teaching Assistant

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Course Description

This course covers the basic concepts of statistics and probability theory, gives a systematic introduction to statistical inference, hypothesis testing, regression, and Bayesian Statistics, and deepens the understanding of these theories and techniques through practical applications.

Intended Learning Outcomes (ILOs)

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

CILO 1. Understand the basic concepts of statistics and probability Theory.

CILO 2. Understand the relevant applications of Statistics and Probability Theory.

CILO 3. Differentiate various statistical techniques and understand their superiority and limitations.

CILO 4. Formulate statistical solutions when facing practical problems and interpret the results.

CILO 5. Analyze real-world data and implement basic statistical algorithms with MATLAB/Python.

Weekly schedule & Weekly ILOs

The schedule is tentative and subject to change.

Week	Topics	Weekly ILOs
1	Basic Concepts + Discrete Random Variables	CILO 1, CILO 4
2	Discrete Random Variables + Practical Applications	CILO 1, CILO 2, CILO 4, CILO 5
3	Continuous Random Variables	CILO 1, CILO 4
4	Continuous Random Variables+ Practical Applications	CILO 1, CILO 2, CILO 4, CILO 5
5	Statistical Inference: Covariance, Point Estimation	CILO 1, CILO 2, CILO 3, CILO 4
6	Statistical Inference: Interval Estimation (PCA)	CILO 1, CILO 2, CILO 3, CILO 4
7	Midterm Examination + Hypothesis Testing	CILO 1, CILO 2, CILO 3, CILO 4
8	Hypothesis Testing	CILO 1, CILO 2, CILO 3, CILO 4
9	Hypothesis Testing+ Practical Applications	CILO 1, CILO 2, CILO 3, CILO 4, CILO 5
10	Simple Linear Regression + Practical Applications	CILO 1, CILO 2, CILO 3, CILO 4, CILO 5
11	Intro Bayesian Inference (1)	CILO 1, CILO 2, CILO 3, CILO 4
12	Bayesian Inference （2） Loss/ Decision Making + Practical Applications	CILO 1, CILO 2, CILO 3, CILO 4, CILO 5
13	Advanced Topics: MCMC+ EM // MDP MAB+RL	CILO 1, CILO 2, CILO 3, CILO 4

Assessment and Grading

Detailed rubrics for each assignment will be provided, outlining the criteria used for evaluation.

Assessments:

Assessment Task	**Contribution to Overall Course grade (%)**	**Due date**
Written assignments	30%	In the end of each topic
Midterm examination	30%	Week 7
Project report	10%	Dec 8
Final examination	30%	TBA

* 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**
Written assignments	CILO 1, CILO 2, CILO 3, CILO 4, CILO 5	This task assesses students' understanding of the basic concepts and their applications (CILO 1, CILO 2, CILO 3). This task also assesses students' ability to formulate statistical solutions, interpret and analyze the results and real-world data, and solve the problems with software tools (CILO 4, CILO 5).
Midterm examination	CILO 1, CILO 2, CILO 3, CILO 4	This task assesses students' understanding of the basic concepts

		and their applications (CILO 1, CILO 2, CILO 3). This task also assesses students' ability to formulate statistical solutions and interpret and analyze the results (CILO 4).
Project report	CILO 1, CILO 2, CILO 3, CILO 4, CILO 5	This task assesses students' understanding of the basic concepts and their application applications (CILO 1, CILO 2, CILO 3). This task also assesses students' ability to formulate statistical solutions, interpret and analyze the results and real-world data, and solve the problems with software tools (CILO 4, CILO 5).
Final examination	CILO 1, CILO 2, CILO 3, CILO 4	This task assesses students' understanding of the basic concepts and their applications (CILO 1, CILO 2, CILO 3). This task also assesses students' ability to formulate statistical solutions and interpret and analyze the results (CILO 4).

Grading Rubrics

Detailed rubrics for each assignment will be provided. These rubrics clearly outline the criteria used for evaluation. Students can refer to these rubrics to understand how their work will be assessed.

Project report rubrics: **Final_Report_Rubric.xlsx (https://hkust-gz.instructure.com/courses/3049/files/590017?wrap=1)** **(https://hkust-gz.instructure.com/courses/3049/files/590017/download?download_frd=1)**

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in

		thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Course AI Policy

In this course, students are allowed to use generative artificial intelligence (AI) to aid you in any manner. However, students must cite the AI generated contents with IEEE citation.

Communication and Feedback

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

Resubmission Policy

Late submission is allowed. However, any late submission will receive a 50% deduction per day late.

Required Texts and Materials

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, and Keying Ye, *Probability and Statistics for Engineering and Scientists*, Prentice Hall, 9th, 2015.
2. Alberto Leon-Garcia, Probability, Statistics and Random Processes for Electrical Engineering, Pearson/Prentice Hall, 3rd ed., 2008 (Available in HKUST(GZ) library).
3. Osvaldo Simone, *A Brief Introduction to Machine Learning for Engineering*, Now Publishers, 2018.

Academic Integrity

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

Course Summary:

Date	Details	Due
Fri Mar 6, 2026	Written Assignment 1 (https://hkust-gz.instructure.com/courses/3049/assignments/20916)	due by 11:59pm
Fri Mar 20, 2026	Written Assignment 2 (https://hkust-gz.instructure.com/courses/3049/assignments/21700)	due by 11:59pm
Tue Mar 24, 2026	Programming Assignment 1 (https://hkust-gz.instructure.com/courses/3049/assignments/20918)	due by 11:59pm
Sat Mar 28, 2026	Midterm Exam (https://hkust-gz.instructure.com/courses/3049/assignments/22757)	due by 10:50am
Fri Apr 17, 2026	Written Assignment 3 (https://hkust-gz.instructure.com/courses/3049/assignments/22597)	due by 11:59pm
Fri Apr 24, 2026	Programming Assignment 2 (https://hkust-gz.instructure.com/courses/3049/assignments/22769)	due by 11:59pm
	Written Assignment 4 (https://hkust-gz.instructure.com/courses/3049/assignments/22768)	due by 11:59pm

Date	Details	Due
Fri May 1, 2026	**Written Assignment 5 (https://hkust-gz.instructure.com/courses/3049/assignments/23057)**	due by 11:59pm
Mon May 11, 2026	**Project Report (https://hkust-gz.instructure.com/courses/3049/assignments/20205)**	due by 11:59pm