MATH 3428
Statistical Computing
2025-26 Fall

https://canvas.ust.hk/courses/65961

Lecture

Time	Monday and Wednesday 09:00AM-10:20AM
Venue	Room 5402
Instructor	**Tang, Rong**
E-mail	martang@ust.hk

Tutorial

Time	Wednesday 05:30PM-06:20PM
Venue	Room 1410
Teaching Assistant	**Li, Rui**
E-mail	rui.li@connect.ust.hk

Course Description

Course outline: This course covers the models, methods and algorithms in computational statistics. Topics include: random variable generation, Monte Carlo integration and inference, resampling methods, Markov Chain Monte Carlo methods, Optimization tools, and Expectation-Maximization (EM) algorithm.

Credits: 3

Prerequisites: : MATH 2411, MATH 2421 and some familiarity with R programming. The R programming language is needed for completing the assignments.

Intended Learning Outcomes (ILOs)

Upon completion of this course, students are expected learn about the commonly used statistical computing methods, including

(1) Understand the application background of statistical computing algorithm and techniques;
(2) Elaborate the theories behind the algorithms in computational statistics;
(3) Implement various types of statistical computing algorithms in R.

Assessment and Grading

Homework: Biweekly assignments that requires using R and Rstudio. Each assignment will contain coding problems and theoretical questions. For the coding problem, you are required to use R Markdown to write your code and generate outputs in pdf format. For the theoretical questions, you have the option to either type the answer using Markdown syntax or handwrite the answer and submit the photo (in .pdf or .png format). Make sure that your handwriting is legible; unclear or indistinguishable handwriting will not be graded. Both the Rmd and pdf (and/or png) file should be uploaded to Canvas.

Examinations: There will be a in-class midterm exam (time TBD), and a final exam arranged by ARO.

Grading Scheme:

This course will be assessed using **criterion-referencing**, and grades will **not** be assigned using a curve. Your course total will be calculated by taking the **maximum of two schemes** in order to encourage students to work harder in the final exam in case the midterm result is not desirable:

	Scheme A	Scheme B
Homework	30%	30%
Midterm	25%	0%
Final	45%	70%
Course Total	100%	100%

Letter Grades: Tentative Cutoff:

A-/A/A+	B-/B/B+	C-/C/C+	D	F
Above 85%	65%	50%	43%	Below 43%

Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	The student has mastered almost all statistical computing algorithms and techniques taught in the course. The theories behind the algorithms are well understood and the statistical computing algorithms can be proficiently implemented in R.
B	Good Performance	The student has mastered most statistical computing algorithms and techniques taught in the course, yet the understanding of some challenging concepts may not be deep enough.
C	Satisfactory Performance	The student meets the minimum expectation of the instructor, has acquired some basic computational techniques of the subject, yet some concepts were not clearly understood.
D	Marginal Pass	The student is only able to recall some fragments of topics and is able to complete some of the easiest computations.
F	Fail	The student does not have sufficient understanding of even some fragments of topics, and is not even able to complete some of the easiest computations.

Academic Integrity

For the homework assignments, you should feel free to consult the lectures, textbook, and online resources. You can also discuss with your classmates, TA, and the instructor. You may not, however, copy answers, computer codes, or written work from your classmates or any forms of outside assistance. The work you hand in must be of your own. For exams, you should work independently. Exams, assignments and solutions of this course are copyright protected and redistribution (e.g., posting online) is prohibited.

Textbooks and References

References: The major reference is the instructor's lecture notes posted on Canvas. In addition, the following references are recommended:

(1) Textbook: *Statistical Computing with R*, Second Edition By Maria L. Rizzo.
(2) Hands-On Programming with R
(3) Getting Started with R Markdown
(4) Basic Syntax of R Markdown
(5) Math Expression in R Markdown
(6) Mathematical Expressions in Latex

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.