The Hong Kong University of Science and Technology

UG Course Syllabus

MATH4429 – Credibility Theory and its applications

[No. of Credits] 3

[Any pre-/co-requisites] Probability (MATH2421/MATH2431). A good knowledge in multivariable calculus.

Lecture

Time: Monday and Wednesday, 9:00-10:20

Venue: Room 1410

Name: Qian, Shuaijie

Email: sjqian@ust.hk

Office Hours: By appointment at office

Tutorial 1

Time: Friday, 18:00-18:50

Venue: LSK1027

Course Description

The course aims to provide a rigorous mathematical treatment on Credibility theory and study its application in actuarial mathematics. The Topics include limited fluctuation credibility theory, greatest accuracy credibility theory, credibility premium, Buhlmann models, Buhlmann-Straub models and application of credibility theory in insurance problem.

(*The course will cover the part of the materials (Bayesian Analysis and Credibility Theory) that covered in Exam FAM and ASTAM offered by Society of Actuary (SOA).

Intended Learning Outcomes (ILOs)

Upon successful completion of this course, you should be able to

1. Understand the basic idea of credibility theory. Be able to apply Limited fluctuation credibility theory and understand the criteria for both full and partial credibility

2. study the solution of credibility problem using Buhlmann model and Buhlmann-Straub model

3. apply empirical Bayes estimation in non-parametric model and semiparametric model. Understand the strengths and weaknesses of nonparametric model and semiparametric model.

4. apply Bayesian analysis and credibility theory in insurance problem

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 (if applicable)
Homework	40%	
Final Exam	60%	

* 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
Homework	ILO 2, 3, 4	
Final Exam	ILO 1, 2, 3, 4	

Grading Rubrics

Marks for each problem will be specified. Full marks will be awarded for completely correct answers. Partial credit will be given for answers that are on the right track but not fully complete.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	The student has mastered all knowledge and techniques on credibility theory. In particular, the student is able to understand all concepts taught and is able to apply those knowledge in solving various real life problems involving the use of credibility theory.
B	Good Performance	The student has good understanding on knowledge and techniques on credibility theory. The student is able to apply the knowledge in solving some common real life problems related to credibility theory
C	Satisfactory Performance	The student meets the minimum expectation of the instructor: The student has acquired good understanding on basic concepts and techniques involved in credibility theory. In addition, the student is able to apply the knowledge in solving some simple real life problems related to credibility theory.
D	Marginal Pass	The student only know some very basic concepts in credibility theory. He is able to complete some simple calculation only.
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

This course allows use of generative AI, if any student finds it helpful.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include scores. 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

The resubmission before deadline is always allowed.

Required Texts and Materials

No required textbook. I will provide lecture notes. But the following books may be helpful.

1. "Klugman, Panjer and Wilmot, "Loss models: From data to decisions", 4th edition, SOA. (Chapter 15, 17-19)

2. Buhimann, H., Gisler, A., (2005) "A course in Credibility Theory and its Applications", Springer

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.