

SYE8108: ADVANCED TOPICS IN INFORMATION THEORY

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Advanced Topics in Information Theory

Subject Code

SYE - Systems Engineering

Course Number

8108

Academic Unit

Systems Engineering (SYE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

R8 - Research Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

SEEM8108 Advanced Topics in Information Theory (offered until 2021/22)

ADSE8108 Advanced Topics in Information Theory (offered until 2023/24)

Exclusive Courses

Nil

Part II Course Details

Abstract

This course aims to develop PhD/MPhil students the knowledge and skills in one specialized quantitative analysis technique in statistics, operations research, and other relevant areas. After completing this course, students should be able to use these techniques in their research.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand theories and concepts of a specialized quantitative analysis techniques	50	x		
2	Critique relevant literature relating to the specialized quantitative analysis techniques	15		x	
3	Apply the specialized quantitative analysis techniques and tools in their research	35		x	

- A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.
- A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.
- A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Class (Lecture)	Class activities are made up of seminar style lectures. Activities include assignments, presentation and discussion.	1, 2, 3	2 hours/week

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Coursework (Assignments, presentation and discussion)	100	-	No

Continuous Assessment (%)

100

Examination (%)

0

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

0

Assessment Rubrics (AR)

Assessment Task

1. Coursework 2. Quiz (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

The assessment includes the student's coursework assignments, presentation, and quiz.

Pass (P)

(P) Pass

Failure (F)

(F) Fail

Assessment Task

1. Coursework 2. Quiz (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

The assessment includes the student's coursework assignments, presentation, and quiz.

Pass (P)

(P) Pass

Failure (F)

(F) Fail

Additional Information for AR

Pass or Fail.

Part III Other Information

Keyword Syllabus

This course is for students who wish to pursue research in a particular area of quantitative analysis methodologies. It is designed to provide students with the necessary background training in a specialized quantitative technique for their MPhil/ PhD research. Student will learn the theories and concept, principles and development of theory and empirical research in one or more selected topics in quantitative analysis. Topics vary depending on the interests and background of students.

1. Quantification of Uncertainty
2. Notion of Likelihood
3. Testing of Hypothesis
4. Testing of Hypothesis
5. Subjective Probability
6. Mutual Information& Distance Measures
7. Axiomatization of Information
8. Extropy and Entropy
9. Information as Utility

10. Information in Experimental Design

11. Application to Reliability and Lifetime Data Analysis

Reading List

Compulsory Readings

Title	
1	NIL

Additional Readings

Title	
1	NIL