Subject Description Form

Subject Code	AMA4670
Subject Title	Modelling of epidemic and pandemic
Credit Value	3
Level	4
Pre-requisite	Probability & Distributions (AMA2691) or equivalent and Multivariable Calculus (AMA2702) or equivalent
Objectives	Enables students to understand the history of epidemic and pandemic, theory and methods to model the spread of diseases in populations, including differential equations, demographic noise and measuremental noise, likelihood-based inference and iterated filtering. Enables students to familiarize themselves with disease modeling environments (the statistical software R)
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) Describe the basic principles of risk analysis in epidemiology; Describe the concepts used in the mathematical modeling of infectious diseases (b) Understand essential characteristics of differential equations type of models (c) Understand how models are used to guide control and prevention measures (d) Construct simple dynamic models and apply generic models to specific disease systems (e) Make predictions about controlling disease based on models (f) Using likelihood-based inference and iterated filtering to estimate unknown parameters.
Subject Synopsis/ Indicative Syllabus	Differential equations and characteristics of epidemic models; Simple compartmental (Susceptible-Infectious-Recovered) models; Dynamics of infectious diseases in populations; Basic reproductive number; Effective reproductive number; Herd immunity and Critical vaccination coverage; Likelihood-based inference and iterated filtering.
Teaching/Learning Methodology	A two-hour lecture will be conducted every week to motivate students with risk analysis and disease transmission examples to understand and learn the theory and techniques. A one-hour tutorial is designed to consolidate and develop students' knowledge through practical examples and discussions.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	f
a. Assignments	25%	√	√	√	√	√	√
b. Project report	25%	√	√	√	√	√	√
c. Examinations	50%	√	√	√	√	√	√
Total	100 %						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

The subject focuses on knowledge, skill and understanding of epidemic and pandemic, thus, Exam-based assessment is the most appropriate assessment method, including 50% examination. Moreover, 25% worth of assignments are included as a component of continuous assessment so as to keep the students in progress. Students will be trained to write reports in project report component (25%).

Student Study Effort Expected		
	Class contact:	
	▪ Lecture	26 Hrs.
	▪ Tutorial	13 Hrs.
	Other student study effort:	
	▪ Assignment and report	45 Hrs.
	▪ Self-study	36 Hrs.
	Total student study effort	120 Hrs.

Reading List and References

References:

Modeling Infectious Diseases in Humans and Animals, Matt J. Keeling & Pejman Rohani, Princeton University Press, ISBN: 9780691116174

Capasso V. Mathematical Structures of Epidemic Systems. Second Printing. Heidelberg, 2008: Springer.