Subject Description Form

Subject Code	AMA488
Subject Title	Simulation
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: Probability and Distributions (AMA269 or AMA2691) or Inferential Statistics (AMA237) or Basic Statistics (AMA261)
Objectives	This subject is to enable students to appreciate the principles and methods of system simulation. Emphasis is placed on the process of translating real-world problems into simulation models, and the model building techniques involved.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students should be able to: 1. identify the basic concepts of simulation and its utility in solving real-world problems; 2. apply statistical knowledge and modelling techniques required to construct simulation models for real-world systems; 3. apply statistical knowledge and techniques to verify and validate simulation models; 4. analyze and interpret simulation outputs; 5. present results of simulation analysis; 6. communicate effectively in a well-structured manner and build up an open-minded attitude.
Subject Synopsis/ Indicative Syllabus	*Fundamental of Simulation Models (2 hours)* Principles of mathematical simulation, advantages and disadvantages of simulation, types of simulation models, steps in a simulation study. *Discrete-Event Simulation (6 hours)* General principles, components and organization of a discrete-event simulation model, simulation examples (e.g. queuing and inventory systems), event scheduling, gathering summary statistics. *Random Numbers (6 hours)* Generation of pseudo-random numbers, mid-square method, congruential methods, statistical tests of randomness. *Random Variates (8 hours)* Generation of random variates, inverse transformation method, acceptance-rejection method, comparison of the methods, generation of random variates of discrete and continuous theoretical distributions. *Tactical Planning in Simulation Models (8 hours)* Starting condition and equilibrium, problem of variability, estimation of population parameters, determination of sample size, variance reduction techniques. *Validity and Analysis (6 hours)* Verification and validation of simulation models, comparisons, appropriate statistical tests, sensitivity analysis, simulation run statistics, replication of runs, elimination of initial bias, batch means, and regenerative techniques.

	Computer Language for Discrete-Event Simulation (6 hours) General-purpose and special-purpose languages (e.g. GPSS, SIMSCRIPT) for simulation, simulation using special-purpose languages, data structures for discrete-event simulation languages.
Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The lectures will be conducted to introduce the simulation concepts of the topics in the syllabus, which are then reinforced by learning activities involving demonstration, tutorial exercise and project.
Assessment Methods in Alignment with Intended Learning Outcomes	

Specific assessment methods	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		1	2	3	4	5	6
a. Project	15%	✓	✓	✓	✓	✓	✓
b. Quizzes/Tests	25%	✓	✓	✓	✓		
c. Examination	60%	✓	✓	✓	✓		
Total	100 %						

Continuous Assessment comprises of a project, quizzes and/or tests. A written examination is held at the end of the semester.

To pass this subject, students are required to obtain Grade D or above in **both** the Continuous Assessment and the Examination components in order to satisfy all the intended learning outcomes.

Student Study Effort Required		
	Class contact:	
	▪ Lecture	28 Hrs.
	▪ Tutorial	14 Hrs.
	Other student study effort:	
	▪ Project	56 Hrs.
	▪ Self-study	22 Hrs.
	Total student study effort	120 Hrs.

Reading List and References

Textbook:

Ross, S.M.	Simulation 5th edition	Academic Press 2012

Reference Books:

Law, A.M. & Kelton, W.D.	Simulation Modelling and Analysis 4th edition	McGraw Hall 2006