Hong Kong Baptist University
Faculty of Science
Department of Mathematics

Title (Units): ORBS7040 Simulation Modelling (3,3,0)

Course Aims: The aim of the course is to give students hands-on experience in using industry-standard simulation modelling software in order to structure and solve complex and large-scale managerial decision problems for industrial development.

Prerequisite: No

Prepared by: Luo Dehui

Remark: This course is delivered by staff of HKBU or University of Kent.

Course Intended Learning Outcomes (CILOs):

Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
1	Explain the theoretical foundations of stochastic simulation, including random number generation, sampling from discrete and continuous distributions, and statistical analysis of transient/steady-state outputs.
2	Build realistic discrete-event simulation models using industry-standard software.
3	Apply simulation model building and analysis skills to systematically frame and solve complex business planning problems to evaluate industrial performance.

Teaching & Learning Activities (TLAs):

CILO	TLAs will include the following:
1,2,3	New concepts will be introduced in lectures, together with instructions and any requisite theory. Where possible, theory will be demonstrated using practical examples.
1,2	Computer terminals will afford students the opportunity of putting theory into practice and will include learning how to model, analyse, and solve discrete-event systems.

Assessment:

No.	Assessment Methods	Weighting	CILO Addressed	Remarks
1	Project	100%	all	The course will be assessed 100% by a written report (~2000-4000 words) on the use of simulation modelling applied to a realistic case-study problem. The coursework will assess students' comprehension of key topics introduced in the course, as well as require them to demonstrate their model building and analytical skills.

Course Intended Learning Outcomes and Weighting:

Content	CILO No.	Teaching (in hours)
1. Queuing theory	1,3	18
2. Discrete-event simulation	1,2,3	21

References:

1. Winston, W.L. (2004) *Operations Research: Applications and Algorithms (4th Edition).* Duxbury Press.
2. Pidd, M. (2004) *Computer Simulation in Management Science*. John Wiley & Sons.
3. Robinson, S. (2014) *Simulation: The Practice of Model Development and Use (2nd Edition).* Palgrave Macmillan.

Course Content in Outline:

- Queuing theory: Students will be introduced to the basic underpinnings of queuing theory, including key assumptions, benefits, and limitations.
- Discrete-event simulation: Core theory of discrete-event simulation will be covered, including a review of simulation mechanics, how to incorporate randomness into a simulation, and the systematic analysis of simulation model results. This will be supplemented with practical training in how to build and run simulation models using commercial software. Example applications will be drawn from a variety of sectors, such as manufacturing/production, transportation, healthcare, and other service industries (e.g. banking, retail, customer service).

(Approved by the Science Faculty Board Meeting by circulation in August 2024)
(Approved by the Department Management Committee on 7 August 2024)

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(Approved by the Department Management Committee on 5 September 2023)