# The Hong Kong Polytechnic University

## Subject Description Form

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| **Subject Code** | LGT4102 |
| **Subject Title** | Simulation for Operations and Information Management |
| **Credit Value** | 3 |
| **Level** | 4 |
| **Normal Duration** | 1-semester |
| **Pre-requisite** | AMA1501 Introduction to Statistics for Business |
| **Objectives** | Simulation is a popular technique for modeling real systems in manufacturing and service industries to aid decision-making. Examples of such systems include assembly lines, branch networks of banks, container terminals, accident and emergency departments, and financial derivative trading systems, among many others. Most Fortune 500 firms use simulation in business decisions. Students will gain basic knowledge of simulation concepts and approaches for modeling and analysis of real systems. The subject will introduce various software tools that are popular in different business and engineering systems, and look at a wide variety of successful applications of simulation, all within real contexts. |
| **Intended Learning Outcomes** | Upon completion of the subject, students will be able to:<br>(a) Understand the fundamental principles and methodologies of simulation techniques and apply them to real-world business problems.<br>(b) Analyze practical problems using a modern simulation software, and make informed decisions based on data-driven insights.<br>(c) Evaluate the effectiveness of simulation outcomes and identify opportunities for improvement, with a focus on enhancing overall business performance and decision-making.<br>(d) Adopt a system view in using simulation for real problems, which often requires cross-organizational effort and avoid optimizing local activities at the expense of overall performance.<br>The subject will help students develop critical and creative thinking, and arouse interest in life-long learning to keep abreast of modern computer simulation technology. |
| **Subject Synopsis/ Indicative Syllabus** | Introduction to simulation; types of simulation and Monte Carlo simulation; simulation modeling process; performing simulations on Excel; generation of random numbers and observations; statistical analysis of simulation outputs; techniques for reducing variance; testing and debugging a simulation model; use of popular simulation packages; applications to operations and supply chain management, marketing, and financial and investment management. |
| **Teaching/Learning Methodology** | In the lectures, the general principles of the syllabus topics will be presented and developed, together with guidance on further reading and activities. Lectures may also be used for the presentation and discussion of leading cases. In-class tutorials will help students develop and apply the general principles of the topic in student-centered activities, including simulation model building and programming, |

<table>
<tr><td></td><td>exercises, and case discussions, etc.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td></td><td></td></tr>
<tr><td>Continuous Assessment*</td><td>70%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>1. Attendance and class participation</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Assignment, quiz, case study, etc.</td><td>20 %</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>3. Term project</td><td>40%</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>Final Exam</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="6"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:<br><br>
Assessment of coursework includes homework assignments, quiz, simulation, case study, term project, etc. The final exam will cover all topics in the syllabus, with a focus of testing students' understanding of the basic concepts, approaches of simulation modeling and testing, and methods for the analysis of simulation output, etc. It will also test students' insights into the application of simulation in solving real business issues.<br><br>
To reflect the significant technological content in this subject, 10% (or more) of the overall weighting of this subject is based on individual assessment concerning technology-related knowledge.<br><br>
*Weighting of assessment methods/tasks in continuous assessment may be different, subject to each subject lecturer.
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<tr><td rowspan="6">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>• Lectures & Laboratories</td><td>39 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>• Homework assignments and case studies</td><td>45 Hrs.</td></tr>
<tr><td>• Reading assignments</td><td>42 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>126 Hrs.</td></tr>
<tr><td>Reading List and References</td><td><u>References</u><br>Lecture notes (handouts).</td></tr>
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| | Keith Allman, Josh Laurito, Michael Loh. (2015) Financial Simulation Modeling in Excel: A Step-by-Step Guide, Wiley.<br><br>Jerry Banks, John S. Carson, Barry L. Nelson, David M. Nicol. (2014) Discrete-Event System Simulation, 5th Edition, Pearson Education Limited.<br><br>F.S. Hillier and M.S. Hillier, Introduction to Management Science (5ed/6ed/7ed), McGraw Hill, 2013/2019/2023.<br><br>Kelton, W. David, Sadowski, Randall, Zupick, Nancy. (2014/2023) Simulation with ARENA, 6th/7th Edition, McGraw-Hill.<br><br>Law, A.M. and Kelton, W.D. (2014) Simulation Modelling and Analysis, 5nd Edition, McGraw-Hill.<br><br>Wayne Winston, (2022) Microsoft Excel Data Analysis and Business Modeling, 7th Edition, Pearson Eduction, Inc.<br><br>INFORMS Journal of Applied Analytics |