MODULE DESCRIPTOR

Module Title

Problem Solving and Modelling

Reference	CM1102	Version	5
Created	June 2022	SCQF Level	SCQF 7
Approved	July 2016	SCQF Points	30
Amended	July 2022	ECTS Points	15

Aims of Module

To provide students with the understanding of problems which arise in computing situations and the practical skills for the effective modelling and efficient computational solution of these problems. To develop both the relevant skills for constructive use of conceptual modelling and design in a variety of settings, and a range of transferable skills to be of value in employment.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1	Recognise and solve simple computational problems using appropriate mathematical techniques.
2	Apply basic statistical techniques and derive measures of probability for a given set of data.
3	Describe the steps involved in modelling systems and processes.
4	Apply analytical and modelling skills to a range of problems relevant to computing and digital media domains.
5	Demonstrate skills in problem solving and effective communication in a variety of settings, relevant to future study, research and in the workplace.

Indicative Module Content

Problem solving techniques and the modelling process. Categories of data: discrete, continuous, qualitative. Categories of problem type: analytic, computational, geometric, probabilistic. Coordinate geometry: graph drawing, straight lines, parabolas and other functions. Parameterisation. Distance metrics. Transformations: matrices, vectors, matrix-vector multiplication, types of transformations. Functions: multivariate and iterating functions, computational complexity, logarithms, exponentials, trigonometric. Sets and relationships between sets. Sequences and series and their relationship to iteration and loops. Descriptive statistics: Measures of central tendency and dispersion, linear regression and correlation, rank correlation. Probability: Probability trees, enumeration, commonly used probability distributions, and fault analysis, random number generation. Boolean Algebra: Boolean variables and operators, Boolean identities. Application of Modelling Techniques to real world examples, and for conceptual modelling within a range of situations relevant to computing and digital media domains. Use of computational tools and packages.

Module Ref:	CM1102 v5

Module Delivery

This module is delivered throughout the teaching session using a mixture of lectures, tutorials and computer laboratory sessions (where appropriate).

Indicative Student Workload	Full Time	Part Time
Contact Hours	80	N/A
Non-Contact Hours	220	N/A
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	300	N/A
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Coursework	Weighting:	50%	Outcomes Assessed:	3, 4, 5
Description:	A coursework comprising a report and presentation on modelling exercises.				

Component 2

Type:	Coursework	Weighting:	50%	Outcomes Assessed:	1, 2
Description:	A coursework comprising individual class quizzes.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

The module is assessed on a pass/unsuccessful basis. The Module Grade is based on performance in Component 1 (coursework) and Component 2 (coursework) as detailed below.

Module Grade	Minimum Requirements to achieve Module Grade:
Pass	Pass in Component 1 and pass in Component 2.
Fail	Fail in Component 1 and/or fail in Component 2.
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	None, in addition to course entry requirements.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

1	VINCE, J., 2020, Foundation mathematics for computer science: a visual approach
2	ROSEN, K., 2019. Discrete Mathematics and Its Applications (8th ed). McGraw-Hill.
3	Campbell, M., 2019, Learn RStudio IDE: Quick, Effective, and Productive Data Science
4	E. Wolfgang. 2017. Introduction to Artificial Intelligence. Springer.
5	Yannakakis, G. N., Togelius, J. 2018. Artificial Intelligence and Games. Springer.