Module Guide

Mathematics for Computer Science

CSI_4_MCS

School of Engineering

2018-19

Level 4

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1. MODULE DETAILS

Module Title:	Mathematics for Computer Science
Module Level:	4
Module Reference Number:	CSI_4_MCS
Credit Value:	20
Student Study Hours:	200
Contact Hours:	57 (including 13 weekly support hours)
Private Study Hours:	135
Pre-requisite Learning (If applicable):	none
Co-requisite Modules (If applicable):	none
Course(s):	5109; 5110; 5112; 5113; 4156; 4937; 5197; 5198; 5200; 5201; 5202; 4637; 4638; 4350; 4935; 5199
Year and Semester:	2018-19, Semester 2
Module Coordinator (MC):	Lucia Otoyo
MC Contact Details (Tel, Email, Room):	lucia.otoyo@lsbu.ac.uk, FW-205, +44 (0)20 7815 7480
Teaching Team & Contact Details:	Mr Saptarshi Ghosh, ghoshs5@lsbu.ac.uk +44 (0)20 7815 8989 Dr Daqing Chen, chend@lsbu.ac.uk +44 (0)20 7815 7492 Mr Isakh Weheliye, weheliyi@lsbu.ac.uk Mr Souheil, fenghous@lsbu.ac.uk
Subject Area:	Informatics
Summary of Assessment Method:	Coursework only
External Examiner appointed for module:	Dr Nikolaos Thomos, Lecturer, Univ. of Essex

2. SHORT DESCRIPTION

This module will introduce you to the logical and discrete mathematical structures and models which are commonly used within the fields of Informatics and Computer Science and which underpin any study of these disciplines. The module will emphasise the formulation of problems using mathematical models, the interpretation of solutions, and the identification of problem characteristics to help suggest modelling approaches. The module includes a support element (nominally one hour per week) to allow us to bring students, where necessary, up to a level of confidence and expertise in those areas of essential basic mathematics that should have been covered at earlier levels.

3. AIMS OF THE MODULE

This module aims to provide students with a comprehensive understanding of the basic discrete mathematical concepts that underpin Informatics and Computer Science, and to help them acquire proficiency in the statistical analysis of data using Excel.

4. LEARNING OUTCOMES

4.1 Knowledge and Understanding

On completion of the module you will be able to:

- Apply a range of mathematical approaches such as graph theory, first-order logic, Boolean algebra and Venn diagrams to a range of IT-related problems using valid arguments.
- Simplify and solve a range of equations and select and apply statistical methods appropriately.

4.2 Intellectual Skills

On completion of the module you will be able to:

- Select and apply appropriate mathematical frameworks for solving IT related problems.

4.3 Practical Skills

On completion of the module you will be able to:

- Select and apply a range of mathematical tools and techniques.

4.4 Transferable Skills

On completion of the module you will be able to:

- Present mathematical ideas appropriately to both technical and non-technical audiences.

5. ASSESSMENT OF THE MODULE

The assessment is 100% coursework.

The coursework for this module will consist of:

- two in-class multiple-choice tests (worth a total of 50% of the module marks)
- an individual coursework assignment requiring the selection, application and interpretation of methods taught during the module (also worth 35% of the module marks)
- a “driving test”, as described in sections 7.2 below (worth 15% of the module marks).

Subset selection testing will be used for the phase tests. These are a generalisation of traditional multiple-choice tests that cater for the situation in which a test taker can identify one or two wrong answers for a given question but not the right answer. Subset selection tests yield comparable but more reliable test scores as compared with traditional multiple-choice tests, because the test takers are no longer required to choose between alternative answers which they favour equally. Research has shown that this also makes the test format less stressful for students. The marking scheme is as follows:

- correct answer only selected => 1 mark
- correct answer plus one wrong answer => 0.5
- correct answer plus two wrong answers => 0.33
- no answers selected => 0.25
- any other response => 0

The provisional phase test dates are as follows:

- **Test 1**: Tuesday 5th March 2019
- **Test 2**: Tuesday 2nd April 2019

6. FEEDBACK

Feedback will normally be given to students 15 working days after the final submission of an assignment or as advised by their module leader. Any general feedback applying to all students will also be placed on the module VLE site within 15 working days.

7. INTRODUCTION TO STUDYING THE MODULE

7.1 Overview of the Main Content

- Graph Theory
- Set Theory
- Propositional Logic
- Predicate Logic
- Valid arguments
- Linear equations
- Plotting and interpreting graphs
- Functions and data
- Statistical data collection, analysis and presentation
- Correlation and linear regression
- Hypothesis testing and modelling using probability distributions.

7.2 Overview of Types of Classes

Lectures will be delivered for the whole cohort in 1.5-hour weekly slots, in which introduction of new material is presented.
Student will be then divided into tutor groups, where each tutorial lasts 3 hours per week, for each group of students. During this session students will be presented with examples and then will be expected to tackle exercises.

The final in-class hour each week will be devoted to the "driving test". The first driving test will be given in Week 2, and will consist of multiple-choice questions grouped into six sections covering the following topics:

1. Arithmetic operations involving negative numbers
2. Expressions involving powers
3. Fractions
4. Percentages and ratios
5. Rounding using decimal places and significant figures
6. Simple Algebra

These are all fairly basic topics that many students will already be very familiar with, and it is expected that many students will pass the driving test at the first attempt. For those who don't, there will be a support session in the final timetabled class hour every odd week, with resits every even week, until all students have (hopefully) passed the driving test.

The driving test will consist of 4 questions on each of the six topics listed above, making a total of 24 questions. To achieve a pass, students must score at least 18 out of 24 with a least 3 questions answered correctly within each group of 4 questions. Once students have passed the test they will be credited with the

maximum mark (i.e. 15% of the module marks). Any students who have not passed the driving test by the end of the module will be credited with the best driving test score achieved.

7.3 Importance of Student Self-Managed Learning Time

Student responsibility in the learning and development process will be emphasised. Students are required to undertake directed self-study and prepare solutions/discussions to questions relative to various topic areas. Students will be encouraged to identify for themselves particular problems of difficulty and to use seminar discussions, where appropriate, for the resolution of these. Students must regularly access the Moodle site for this module. They should download the relevant material from the Moodle site and do any recommended reading before each class.

7.4 Employability

This module will help you to enhance your personal development and your employability prospects. Numeracy is one of the key skills employers look for, and one which they often regard as lacking in many job applicants. By improving your numeracy skills as well as your general mathematical problem solving skills, this module will help to prepare you for employment. The new material that you will come across within this module will support you in your later studies across the various pathways.

8. THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

The following weekly programme is indicative:

Week	Topic	Phase/Driving Tests
1	Set Theory	
2	Propositional Logic	Driving test 1
3	Predicate Logic	
4	Graph Theory #1	Driving test 2
5	Graph Theory #2	
6	Algebra and Linear Equations	Test 1
7	Discrete Optimisation	Driving test 3
8	Linear Programming	
9	Function Notation, Quadratics and Exponentials	Driving test 4
10	Presentation of Tabular Data	Test 2
11	Illustrating Data; Measures of Central Tendency	Driving test 5
12	(Bank holiday - no lecture, tutorial only – assignment support)	
13	Measures of Dispersion, Correlation, Regression	Driving test 6

		Assignment due
14		
15		

9. STUDENT EVALUATION

This module did not run last year.

10. LEARNING RESOURCES

Detailed notes will be provided.

Reading List

There are numerous textbooks that are appropriate for this module, such as:

- Kwong, H. (2015) *A Spiral Workbook for Discrete Mathematics*, Open SUNY Textbooks. ISBN: 1942341180
- Hunter, D.J. (2015) *Essentials of Discrete Mathematics*, Jones and Bartlett
- Grossman, P. (2008) *Discrete Mathematics for Computing*, Palgrave Macmillan
- Bush, J. (2003) *Discrete Mathematics Workbook*, Prentice Hall
- Garnier, R. & Taylor, J. (2001) *Discrete Mathematics for New Technology*, Adam Hilger
- Berenson, M. and Levine, D. (2009) *Basic Business Statistics*, Pearson Prentice Hall
- Parson, R. and Farber, B. (2009) *Elementary Statistics*, Pearson Prentice Hall
- Agresti, A. and Franklin, C. (2009) *Statistics: The Art and Science of Learning from Data*, Pearson Prentice Hall