

MODULE DESCRIPTOR

Academic Year: 2021/2	Version Number: 1
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TITLE	ALGORITHMS AND DATA STRUCTURES
MODULE CODE	55-508226
LEVEL	5
CREDITS	20
COLLEGE	Business Technology And Engineering
DEPARTMENT	Computing
SUBJECT GROUP	COMPUTER SCIENCE AND SOFTWARE ENGINEERING
COLLABORATIVE PARTNER / LOCATION (If applicable)	
DOES THIS MODULE COMPLY WITH THE STANDARD ASSESSMENT REGULATIONS?	Yes

MODULE LEARNING OUTCOMES

Design algorithms in an appropriate abstract notation and characterise them and describe their attributes using appropriate metrics.
Compare and contrast similar algorithms and describe their relative merits and demerits.
Design novel algorithms
Optimise implementations of algorithms.
Construct and manipulate the complex data structures required of many algorithms using appropriate programming languages.

MODULE SUMMARY (includes indicative content)

This module aims to build on the introduction to programming provided in the corresponding level 4 module. The module aims to impart key concepts in computer science to students and to further develop important skills in computer-based problem solving and data manipulation.
<div><b>Indicative Content</b><ul style="list-style-type: none"><li>Introduction to algorithms (role and importance of algorithms in computer science).</li><li>Linked lists (Singly linked lists; double linked lists)</li><li>Stacks and Queues</li><li>Recursion</li><li>Tree structures (creating, searching, traversing, merging).</li><li>Graph structures (traversals, activity networks, critical paths, shortest paths)</li><li>Sorting algorithms (merge sort, heap sort, quick sort).</li><li>The theory of algorithms (Big-O notation, Computability; Turing machines).</li><li>Complexity (computational and control flow).</li><li>Optimisation problems (Travelling Salesman Problem, Bin Packing).</li><li>Optimisation search methods (Genetic algorithm, Hill Climbing, Simulated Annealing, Tabu search algorithm, Iterated Local Search).</li></ul></div>

LEARNING, TEACHING AND ASSESSMENT SUMMARY

Students will be supported in their learning through a lecture programme supported by a mixture of tutorials and laboratory-based practical sessions. Undertaking a series of short projects will be the vehicle through which students will demonstrate and achieve the learning outcomes. Each project will cover a small number of teaching topics to ensure that students will be able to maintain their focus and work on the project in an in-depth manner.
Students will be expected to create a portfolio, which will be a collection of artefacts of work incorporating algorithms, data structures and software and critical reflections on such artefacts.
Throughout the module a number of assessment and feedback strategies will be employed with regular formative feedback running through project work. Such timely, formative feedback supports students' development in becoming an independent learner. Students will be expected to reflect upon their working practices during each project and to take ownership of the progress and quality of their work.

ASSESSMENT INFORMATION

Task No.	Assessment Task Description (e.g. essay, artwork, journal etc)	Word Count or Exam Duration	Task Weighting %	Assessment Task Type Coursework (CW) Written Exam (EX) Practical (PR)
001	Portfolio	4000	100	CW

LEARNING RESOURCES FOR THIS MODULE