MODULE DESCRIPTOR

Module Title

Search and Optimisation

Reference	CMM545	Version	1
Created	October 2024	SCQF Level	SCQF 11
Approved	February 2025	SCQF Points	15
Amended		ECTS Points	7.5

Aims of Module

This module aims to enable students to design, implement, and apply search and optimisation algorithms using appropriate AI techniques, and understand their significance in solving complex problems within AI systems.

Learning Outcomes for Module

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

1	Design appropriate solutions for search and optimisation problems using standard representations.
2	Solve search and optimisation problems using well-known heuristic algorithms.
3	Evaluate the performance of different search strategies and optimisation methods via appropriate metrics and benchmarks.
4	Make informed judgements about the suitability of specific search and optimisation methods for given AI tasks.

Indicative Module Content

Principles of search algorithms and optimisation techniques; heuristic search methods; local search techniques; constraint satisfaction problems and solutions; multi-objective optimisation; performance evaluation metrics and benchmarking; applications of search and optimisation in AI.

Module Delivery

Lectures are used to deliver the main principles and techniques. Practical sessions are used to acquire practical skills and reinforce knowledge from the lectures.

Indicative Student Workload	Full Time	Part Time
Contact Hours	30	30
Non-Contact Hours	120	120
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
Actual Placement hours for professional, statutory or regulatory body		

Module Ref:	CMM545 v1

ASSESSMENT PLAN

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

Component 1

Type:	Coursework	Weighting:	100%	Outcomes Assessed:	1, 2, 3, 4
Description:	A coursework consisting of designing, implementing and testing a solution to a search and optmisation-based AI problem.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

The calculation of the overall grade for this module is based on 100% weighing of C1. An overall minimum grade D is required to pass the module.

Module Grade	Minimum Requirements to achieve Module Grade:
A	The student needs to achieve an A in C1
B	The student needs to achieve a B in C1
C	The student needs to achieve a C in C1
D	The student needs to achieve a D in C1
E	The student needs to achieve an E in C1
F	The student needs to achieve an F in C1
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	None.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

1	Chopard, B. and Tomassini, M. (2018) An Introduction to Metaheuristics for Optimization. Cham: Springer.
2	Rothlauf, F. (2006) Representations for genetic and evolutionary algorithms. 2nd edn. Heidelberg: Springer.
3	Bansal, J.C., Singh, P.K., and Pal, N.R. (Eds.). (2019) Evolutionary and swarm intelligence algorithms. Cham: Springer.
4	Mirjalili, S. (2018) Evolutionary algorithms and neural networks: Theory and applications. Cham: Springer.
5	Yu, X., and Gen, M. (2010) Introduction to evolutionary algorithms. Heidelberg: Springer.