

<b>Module Title:</b>	Discrete Structures and Algorithms I
<b>Language of Instruction:</b>	English
<b>Credits:</b>	10
<b>NFQ Level:</b>	6
<b>Module Delivered In</b>	No Programmes
<b>Teaching &amp; Learning Strategies:</b>	As well as traditional lectures students will undertake in-class exercises on material presented in class. Small group tutorials will encourage further problem solving and discussion.
<b>Module Aim:</b>	To develop the language of computational structures and to outline a range of algorithms.
<b>Learning Outcomes</b>	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	analyse computer networks using the mathematics of discrete graphs;
LO2	implement a variety of structures and algorithms for storing, searching and sorting data;
LO3	formulate problems using propositional logic and give examples of standard techniques of proof;
LO4	outline a range of algorithms for the basic data structures in the areas of graph theory and cryptography;
LO5	implement some techniques of data analytics.
<b>Pre-requisite learning</b>	
<b>Module Recommendations</b>	
<i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
<b>Incompatible Modules</b>	
<i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
<b>Co-requisite Modules</b>	
No Co-requisite modules listed	
<b>Requirements</b>	
<i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
1st Year Mathematics	

## Module Content & Assessment

### Indicative Content

#### Array Algorithms

review of vectors and matrices, basic array algorithms, maps.

#### Basic Graph Theory

definitions and examples, simple graphs, representing graphs, trees, graph theory algorithms.

#### Data Structures and Algorithms

simple sorting, bubble, selection, insertion Sort, stacks and queues, lists, searching, linear, binary and graph searching.

#### Cryptography

greatest common divisor, the Euclidean algorithm, primes, fundamental theorem of arithmetic, congruences, linear congruences, basic cryptography, Caesar cipher, linear and block ciphers.

#### Mathematical Logic

propositional logic, valid Inferences, methods of proof, resolution principle, formal proofs.

#### Data Analytics

basic statistics, normal distribution, scattergraphs, numerical methods, line and curve fitting, forecasting.

Assessment Breakdown	%
Continuous Assessment	40.00%
End of Module Formal Examination	60.00%

### Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Other	CA marks will be based on the results of in class written tests and take home sheets	1,2,3,4,5	40.00	n/a

No Project

No Practical

### End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	The terminal examination will include questions on all aspects of the course	1,2,3,4,5	60.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

**Module Workload**

<b>Workload: Full Time</b>		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	30 Weeks per Stage	3.00
Tutorial	30 Weeks per Stage	1.00
Estimated Learner Hours	30 Weeks per Stage	1.00
Total Hours		150.00

