ZSTR H3201: Discrete Structures and Algorithms II

Module Title:	Discrete Structures and Algorithms II
Language of Instruction:	English

Credits:	10

NFQ Level:	7

Module Delivered In	No Programmes

Teaching & Learning Strategies:	As well as traditional lectures students will undertake various take home exercises on topics and problems discussed in class. They will be expected to participate in class discussions on the materials covered therein and describe their methods used to solve problems.

Module Aim:	To develop further the language of computational structures with emphasis on the design and analysis of a range of algorithms.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	formulate problems using first order logic and give examples of standard techniques of proof;
LO2	relate mathematical induction to recursion and recursively defined structures;
LO3	recognise the importance of algorithm complexity;
LO4	describe a variety of non-linear structures for storing data;
LO5	outline a range of algorithms for non-linear structures;
LO6	solve problems using basic mathematical techniques of linear algebra and number theory.

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
1st year Programming or equivalent. 2nd year Discrete Structures and Algorithms I

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Module Content & Assessment

Indicative Content
Mathematical Logic review of sets, relations and functions, syllogistic reasoning, predicate logic, methods of proof, resolution principle, formal proofs, mathematical induction.
Recursion and Design Techniques recursive relations, recursive algorithms, algorithm strategies and design techniques, algorithm complexity, analysis of simple algorithms.
Structures and Applications trees, balanced trees, tries, hash tables and collision strategies, maps.
Graphics vectors in 3 dimensions, geometry of lines and planes, transformations and rotations in 2 and 3 dimensions.
Cryptography linear congruences, primes and prime factorisation, Euler-phi function, public-key cryptography, RSA algorithm.

Assessment Breakdown	%
Continuous Assessment	20.00%
Practical	20.00%
End of Module Formal Examination	60.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Other	CA will be made up of a selection classroom exams along with some take home sheets	1,2,3,4,5,6	20.00	n/a

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Lab assignments and Take home sheets	1,2,3,4,5,6	20.00	n/a

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	3 hour written exam	1,2,3,4,5,6	60.00	End-of-Semester

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

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Laboratory	20 Weeks per Stage	1.00
Estimated Learner Hours	20 Weeks per Stage	4.00
Lecture	20 Weeks per Stage	4.00
Tutorial	20 Weeks per Stage	1.00
	Total Hours	200.00