

Module 3: Discrete Mathematics

Stage	1						
Semester	1						
Module Title	Discrete Mathematics						
Module Number/Reference	3						
Module Status (Mandatory/Elective)	Mandatory						
Module ECTS credit	5						
Module NFQ level (only if applicable)	8						
Pre-requisite Module Titles	None						
Co-requisite Module Titles	None						
Is this a capstone module? (Yes or No)	No						
List of Module Teaching Personnel	Mr Tony Mullins Mr Paddy Fahy						
Contact Hours	Non-contact Hours						Total Effort (Hours)
Lecture	Practical	Tutorial	Seminar	Assignment	Placement	Independent work	
18		18		30		34	100
Allocation of Marks (Within the Module)							
	Continuou s Assessme nt	Project	Practical	Final Examination	Total		
Percentage contribution	30%			70%	100%		

Intended Module Learning Outcomes

On successful completion of this module learners will be able to:

1. Perform numerical calculations involving integers and real numbers that involve indices, logs and modulo arithmetic.
2. Solve algebraic equations
3. Work with Boolean algebra and quantified expressions.

4. Work with sequences and series.
5. Explain the principle of induction and carry out simple inductive proofs over the natural numbers;
6. Use general formulas for the equations of lines, circles, parabolas and ellipses;
7. Solve trigonometric problems

Module Objectives

The main objective of this course is to introduce learners to the concepts, notations and operations of mathematics that provide a basis for working in the field of computing. The material covered extends the knowledge of learners who have completed courses in mathematics at secondary level.

Module Curriculum

- **Number sets:** naturals, cardinals, integers, rationals, reals, complex; basic laws of arithmetic: commutativity, associativity, distribution; indices; logs; modulo arithmetic.
- **Algebra:** algebraic expressions and simplification rules; solving polynomials – quadratic and cubic ; inequalities; solving simultaneous equations in two unknowns.
- **Boolean Algebra:** constants, expressions, operators (and, or, not, implication, equivalence), evaluating expressions, truth-tables; predicate calculus: predicates, quantifiers – forall, exists, +, *, #(counting), writing assertions over sequences.
- **Sequences and Series:** sequences as lists of numbers formed by rules; arithmetic sequences; geometric sequences; arithmetic series; geometric series; infinite geometric series.
- **Induction:** principle of induction; inductive proofs.
- **Predicate calculus:** Boolean operators, algebraic laws, quantification, algebraic calculation and proof.
- **Vectors and matrices:** Vector and matrix definitions Vector and matrix operations
- **Graphs:** Graph definition: edges and vertices; Connectivity Graph isomorphism

Reading lists

Stroud, K.A. Engineering Mathematics, MacMillan, 4th edition 1995.

Thomas & Finney, Calculus & Analytic Geometry, Addison-Wesley, 1979

Stanat & mcAllister, Discrete Mathematics in Computer Science, Prentice-Hall, 1977

Grossman Peter, Discrete Mathematics for Computing, Palgrave, 2002.

Module Learning Environment

Accommodation

Lectures are carried out in class rooms / lecture halls in the College. Lab tutorials are carried out in computer labs throughout the Campus. All have the language software required to deliver the programme.

Library

All learners have access to an extensive range of physical and electronic (remotely accessible) library resources. The library monitors and updates its resources on an on-going basis, in line with the College's Library Acquisition Policy. Lecturers update reading lists for this course on an annual basis as is the norm with all courses run by Griffith College.

Module Teaching and Learning Strategy

The module is delivered through a combination of lectures and tutorials. The learners work on worksheets throughout the module that build on the learning in lectures. The emphasis is on developing practical ability at mathematical reasoning based on sound theoretical knowledge.

Module Assessment Strategy

The module assessment consists of three open book examinations (60%), and a closed book final examination (40%). Each open book examination has a value of 20%. These exams are held when a distinct identifiable piece of work has been completed on the module.

Element No	Weighting	Type	Description	Learning Outcome assessed
1	30%	Class test	Open book examination	1-4
2	70%	Closed Book Examination	End of module examination	1-7