# H6DISMTHS: Discrete Mathematics

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| **Module Code:** | H6DISMTHS |
| **Long Title** | Discrete Mathematics APPROVED |
| **Title** | Discrete Mathematics |
| **Module Level:** | LEVEL 6 |
| **EQF Level:** | 5 |
| **EHEA Level:** | Short Cycle |
| **Credits:** | 5 |
| **Module Coordinator:** | MICHAEL BRADFORD |
| **Module Author:** | MICHAEL BRADFORD |
| **Departments:** | School of Computing |
| **Specifications of the qualifications and experience required of staff** | Master's degree in mathematics, computing or cognate discipline. May have industry experience also. |

**Learning Outcomes**

*On successful completion of this module the learner will be able to:*

| # | Learning Outcome Description |
|---|---|
| LO1 | Construct logical mathematical arguments and proofs. |
| LO2 | Apply set algebra and logic operations to demonstrate problem solving and mathematical reasoning capabilities. |
| LO3 | Associate the rules of sets and operations to the areas of Relations and Functions. |
| LO4 | Construct and investigate a range of functions and describe their representations. |
| LO5 | Apply set theoretical concepts and methods of counting to solve combinatorial problems. |
| LO6 | Apply graph theory concepts to represent a set of finite objects and their inter-relationships. |

**Dependencies**

***Module Recommendations***

No recommendations listed

***Co-requisite Modules***

No Co-requisite modules listed

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| ***Entry requirements*** | See section 4.2 Entry procedures and criteria for the programme including procedures recognition of prior learning |

# H6DISMTHS: Discrete Mathematics

## Module Content & Assessment

| Indicative Content |
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| **Logic & Proof**<br>Propositional Logic. Boolean Operators. Truth Tables. Boolean Expressions |
| **Logic & Proof**<br>Predicates and Quantifiers. Methods of Mathematical Proof |
| **Set Theory**<br>Naïve Set Theory. Finite and infinite sets. Set Operations |
| **Set Theory**<br>Partitions . Product Set and Power Set |
| **Relations & Functions**<br>Binary Relations. Properties of Relations. Equivalence Relations . |
| **Relations & Functions**<br>Partial Orders. Properties of Functions. Composition of Functions. Inverse Functions |
| **Recurrence Relations & Generating Functions**<br>Polynomials. Ordinary and Exponential Generating Functions |
| **Recurrence Relations & Generating Functions**<br>Sequences and Recurrence Relations. Solution of Recurrence Relations. Linear Homogeneous Recurrence Relations. Linear Non-Homogeneous Recurrence Relations |
| **Combinatorics**<br>The Sum Rule and the Product Rule. The Pigeonhole Principle. The Inclusion-Exclusion Principle |
| **Combinatorics**<br>The Factorial Function. Permutations and Combinations |
| **Graph Theory**<br>Definition and Examples. Directed Graphs. Walks, Trails, Paths, Circuits, and Cycles |
| **Graph Theory**<br>Trees. Planar Graphs. Colouring and Matching Graphs. |

| Assessment Breakdown | % |
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| Coursework | 40.00% |
| End of Module Assessment | 60.00% |

**Assessments**

### Full Time

**Coursework**

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|---|---|---|---|
| **Assessment Type:** | Formative Assessment | **% of total:** | Non-Marked |
| **Assessment Date:** | n/a | **Outcome addressed:** | 1,2,3,4,5,6 |
| **Non-Marked:** | Yes | | |

**Assessment Description:**
Ongoing independent and group class activities and feedback.

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|---|---|---|---|
| **Assessment Type:** | Continuous Assessment | **% of total:** | 40 |
| **Assessment Date:** | n/a | **Outcome addressed:** | 1,2,3,4,5 |
| **Non-Marked:** | No | | |

**Assessment Description:**
A set of questions relating to Logic, Set Theory, Relations & Functions, and Recurrence Relations & Generating Functions, and Combinatorics.

**End of Module Assessment**

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|---|---|---|---|
| **Assessment Type:** | Terminal Exam | **% of total:** | 60 |
| **Assessment Date:** | End-of-Semester | **Outcome addressed:** | 1,2,3,4,5,6 |
| **Non-Marked:** | No | | |

**Assessment Description:**
Written examination with questions from all module topic areas.

No Workplace Assessment

**Reassessment Requirement**

**Repeat examination**
*Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.*

**Reassessment Description**
The repeat strategy for this module is an examination. All learning outcomes will be assessed in the repeat exam.

# H6DISMTHS: Discrete Mathematics

## Module Workload

**Module Target Workload Hours 0 Hours**

**Workload: Full Time**

| *Workload Type* | *Workload Description* | *Hours* | *Frequency* | *Average Weekly Learner Workload* |
|---|---|---|---|---|
| Lecture | Classroom & Demonstrations (hours) | 24 | Per Semester | 2.00 |
| Tutorial | Other hours (Practical/Tutorial) | 36 | Per Semester | 3.00 |
| Independent Learning | Independent learning (hours) | 65 | Per Semester | 5.42 |
| | | | Total Weekly Contact Hours | 5.00 |

**Workload: Part Time**

| *Workload Type* | *Workload Description* | *Hours* | *Frequency* | *Average Weekly Learner Workload* |
|---|---|---|---|---|
| Lecture | No Description | 24 | Every Week | 24.00 |
| Tutorial | No Description | 36 | Every Week | 36.00 |
| Independent Learning | No Description | 65 | Every Week | 65.00 |
| | | | Total Weekly Contact Hours | 60.00 |

## Module Resources

*Recommended Book Resources*

**Ferland K.. (2017), Discrete Mathematics and Applications (2nd ed), Chapman and Hall/CRC.**

**Kenneth H. Rosen. (2018), Discrete Mathematics and Its Applications, 8th Edition. McGraw-Hill Education, [ISBN: 978-1260091991].**

*Supplementary Book Resources*

**Oscar Levin. (2016), Discrete Mathematics, Createspace Independent Publishing Platform, p.342, [ISBN: 978-1534970748].**

**Jonathan L. Gross,Jay Yellen,Mark Anderson. (2018), Graph Theory and Its Applications, Chapman & Hall/CRC, p.577, [ISBN: 978-1482249484].**

*This module does not have any article/paper resources*

*This module does not have any other resources*

| **Discussion Note:** | |
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