# MODULE **DESCRIPTOR**

| MODULE TITLE | DISCRETE MATHEMATICS | | |
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| MODULE CODE | MA1611 (L4) | CREDIT VALUE | 20 UK CREDITS / 10 ECTS |
| SCHOOL | SCHOOL OF SCIENCES | | |
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## MODULE **AIMS**

The aims of the module are to develop the student's understanding of logic and basic set theory and apply them to problems in discrete mathematics.

## MODULE **CONTENT**

**Indicative syllabus content:**

**Set Theory:** Operations, relations, partitions, functions, countable and uncountable.

**Logic:** Propositional logic, truth tables, predicates and quantifiers, inference, proof.

**Boolean Algebra:** Boolean Functions, representation, logic gates, circuits, Karnaugh Maps.

**Graphs:** Graph models, representation, connectivity, Euler and Hamilton paths, shortest path, planar graphs, colouring.

**Trees:** Types of tree applications, tree traversal, spanning trees, minimal spanning trees.

**Counting:** Pigeonhole principle, generalizations of permutations and combinations, inclusion and exclusion principle.

**Number representation:** Binary, octal, and hexadecimal number representation and conversions between different number representations.

**Number theory:** Divisibility, congruences, prime numbers, greatest common divisors.

## INTENDED **LEARNING OUTCOMES**

On successful completion of this module a student will be able to:

1. Prove logical equivalence of statements using propositional logic.
2. Prove properties about sets and functions.
3. Demonstrate how to use algorithms to solve problems about graphs.
4. Demonstrate how to use algorithms to solve problems about trees.
5. Demonstrate how to simplify circuits using Boolean algebra.

## TEACHING METHODS

The class contact will consist of teaching classes together with workshops. Teaching classes will introduce new material and provide examples. Workshops have no new material introduced. Students will attempt problems during the workshops. Key elements of the learning strategy are regular sessions during which problems are attempted. Throughout the week students will be given a list of problems to attempt. Every two weeks there will be a short test on the recent material covered.

The module will be assessed by short tests and a final examination. To assess and grade how well the students understand all of the topics covered in the module, given the benefit of all the feedback from the short tests, a final examination is used.

## ASSESSMENT METHODS

This module is assessed through test questions and an examination.