

CS137-12 Discrete Mathematics & its Applications 2

21/22

Department

Computer Science

Level

Undergraduate Level 1

Module leader

Ramanujan Maadapuzhi Sridharan

Credit value

12

Module duration

10 weeks

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This module is designed to introduce students to language and methods of the area of Discrete Mathematics.

Module aims

The focus of the module is on basic mathematical concepts in discrete maths and on applications of discrete mathematics in algorithms and data structures. One of the aims will be to show students how discrete mathematics can be used in modern computer science (with the focus on algorithmic applications).

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Introduction to combinatorics: counting techniques, pigeonhole principle, inclusion-exclusion. Recurrence relations, solving recurrences using generating functions.

Master Theorem for solving recurrences.

Graphs. Basic graph algorithms. Trees. Applications of graphs.

Applications of linear algebra and matrix algebra in algorithms (e.g., in web searching).

Algorithmic applications of random processes and Markov chains, for example, cover time in graphs and card shuffling.

Partitions, enumerations with symmetries.

Learning outcomes

By the end of the module, students should be able to:

- - Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
- - Understand the basics of discrete probability and number theory, and be able to apply the methods from these subjects in problem solving.
- - Use effectively algebraic techniques to analyse basic discrete structures and algorithms.
- - Understand asymptotic notation, its significance, and be able to use it to analyse asymptotic performance for some basic algorithmic examples.
- - Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.

Indicative reading list

Please see Talis Aspire link for most up to date list.

[View reading list on Talis Aspire](#)

Subject specific skills

Basic knowledge of graph theory and its applications in algorithms

Basic knowledge of discrete probability and its applications in algorithms

Understanding and using asymptotic notations in design and analysis of algorithms

Transferable skills

Communication - Reading and writing mathematical proofs

Critical thinking - problem solving

Technical - Technological competence and staying current with knowledge

Study

Study time

Type	Required
Lectures	30 sessions of 1 hour (21%)
Seminars	9 sessions of 1 hour (6%)
Private study	81 hours (58%)
Assessment	20 hours (14%)
Total	140 hours

Private study description

Revision of lectures
 Going through the problems solved during seminar sessions
 Solving past exam papers

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group D2

	Weighting	Study time
CS137 Coursework	10%	
CS137 Coursework	10%	10 hours
On-campus Examination	80%	10 hours
CS137 exam		

~Platforms - AEP

- Answerbook Pink (12 page)

Assessment group R1

	Weighting	Study time
Online Examination	100%	
CS137 resit exam		

~Platforms - AEP

- Online examination: No Answerbook required

Feedback on assessment

Marked scripts available on students' request

[Past exam papers for CS137](#)

Availability

Courses

This module is Core for:

- Year 1 of UCSA-G4G1 Undergraduate Discrete Mathematics
- Year 1 of UCSA-G4G3 Undergraduate Discrete Mathematics

This module is Option list B for:

- Year 1 of UMAA-G100 Undergraduate Mathematics (BSc)
- Year 1 of UMAA-G103 Undergraduate Mathematics (MMath)
- Year 1 of UMAA-G106 Undergraduate Mathematics (MMath) with Study in Europe
- Year 1 of UMAA-G1NC Undergraduate Mathematics and Business Studies
- Year 1 of UMAA-G1N2 Undergraduate Mathematics and Business Studies (with Intercalated Year)
- Year 1 of UMAA-GL11 Undergraduate Mathematics and Economics
- Year 1 of UECA-GL12 Undergraduate Mathematics and Economics (with Intercalated Year)
- Year 1 of UMAA-GV17 Undergraduate Mathematics and Philosophy
- Year 1 of UMAA-GV18 Undergraduate Mathematics and Philosophy with Intercalated Year
- Year 1 of UMAA-G101 Undergraduate Mathematics with Intercalated Year