CS137-12 Discrete Mathematics & its Applications 2

22/23

Department
Computer Science
Level
Undergraduate Level 1
Module leader
Ramanujan Maadapuzhi Sridharan
Credit value
12
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 modem 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

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Study

Study time

Type	Required
Lectures	30 sessions of 1 hour (77%)
Seminars	9 sessions of 1 hour (23%)
Total	39 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
In-person Examination	80%	10 hours
CS137 exam		

~Platforms - AEP

- Answerbook Pink (12 page)

Assessment group R1

	Weighting	Study time
In-person Examination - Resit	100%	
CS137 resit exam		

- Answerbook Pink (12 page)

Feedback on assessment

Marked scripts available on students' request

Past exam papers for CS137

Availability

Courses

This module is Option list B for:

- UMAA-GV17 Undergraduate Mathematics and Philosophy
  - Year 1 of GV17 Mathematics and Philosophy
  - Year 1 of GV17 Mathematics and Philosophy
  - Year 1 of GV17 Mathematics and Philosophy
- UMAA-GV18 Undergraduate Mathematics and Philosophy with Intercalated Year
  - Year 1 of GV18 Mathematics and Philosophy with Intercalated Year
  - Year 1 of GV18 Mathematics and Philosophy with Intercalated Year