CS146-10 Introduction to Discrete Mathematics

25/26

Department
Computer Science
Level
Undergraduate Level 1
Module leader
Charilaos Efthymiou
Credit value
10
Module duration
10 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

The module introduces fundamental concepts in the area of discrete mathematics

Module aims

The focus of the module is on central mathematical concepts in discrete mathematics and on applications of discrete mathematics to algorithms and data structures. The module teaches mathematical and algorithmic tools, and prepares students for later, more specialized modules in their degree, offered by the Computer Science department and Warwick's Mathematics Institute. A particular emphasis is to demonstrate students how discrete mathematics can be used in modern computer science, with a particular 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.

Counting: inclusion/exclusion, binomial coefficients and Pascal's triangle, the twelvefold way

(combinations, permutations, etc.), fundamental counting sequences (Catalan, Fibonacci, etc.), combinatorial proofs ("Proofs that really count")
Elementary number theory: floors and ceilings, modular arithmetic, GCD and Euclid's algorithm, diophantine equations, Chinese remainder theorem
Partially ordered sets: posets and Hasse diagrams, chains and antichains (Dilworth, Sperner), lattices, linear extensions and topological sorting
Graph theory basics: basics, degree sequences, paths and cycles, trees, bipartite graphs, Euler tours
Asymptotic notation: Big-O, little-o, Big-Omega, little-omega, Theta etc., Master theorem
Recurrence relations: characteristic polynomials, generating functions

Learning outcomes

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

- - Understand the role of formal definitions, formal and informal mathematical proofs, and underlying algorithmic thinking, and be able to apply them in problem solving.
- - Understand the role of discrete mathematics in applications in computer science.
- - Understand fundamental concepts of discrete mathematics.

Indicative reading list

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

Subject specific skills

Acquiring fundamental knowledge, skills and tools in the area of discrete mathematics, including familiarity with the concepts of mathematical rigour and formal proof.

Transferable skills

Critical thinking and creativity, problem solving skills, endurance and persistence

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Study

Study time

Type	Required
Lectures	30 sessions of 1 hour (30%)
Seminars	9 sessions of 1 hour (9%)
Private study	61 hours (61%)
Total	100 hours

Private study description

- revision of lecture material
- background reading
- working on problem sheets

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 D1

	Weighting	Study time	Eligible for self-certification
Problem sheet 1	4%		Yes (extension)
Each problem sheet is marked out of 10 and the overall coursework mark is calculated as the average of the five marked assignments. This assessment is eligible for self-certification (extension).			
Problem sheet 2	4%		Yes (extension)
Each problem sheet is marked out of 10 and the overall coursework mark is calculated as the average of the five marked assignments. This assessment is eligible for self-certification (extension).			
Problem sheet 3	4%		Yes (extension)
Each problem sheet is marked out of 10 and the overall coursework mark is calculated as the average of the five marked assignments. This assessment is eligible for self-certification (extension).			
Problem sheet 4	4%		Yes (extension)
Each problem sheet is marked out of 10 and the overall coursework mark is calculated as the average of the five marked assignments. This assessment is eligible for self-certification (extension).			
Problem sheet 5	4%		Yes (extension)
Each problem sheet is marked out of 10 and the overall coursework mark is calculated as the average of the five marked assignments. This assessment is eligible for self-certification			

	Weighting	Study time	Eligible for self-certification
(extension).			
In-person examination In-person written examination (closed book)	80%		No

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- Answerbook Pink (12 page)

Assessment group R1

	Weighting	Study time	Eligible for self-certification
In-person examination - resit In-person written examination - resit (closed book)	100%		No

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- Answerbook Pink (12 page)

Feedback on assessment

Feedback on problem sets in seminars.

Past exam papers for CS146

Availability

Anti-requisite modules

If you take this module, you cannot also take:

- CS130-15 Mathematics for Computer Scientists 1
- CS131-15 Mathematics for Computer Scientists 2

Courses

This module is Core for:

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

- Year 1 of UCSA-G4G4 Undergraduate Discrete Mathematics (with Intercalated Year)
- Year 1 of UCSA-G4G2 Undergraduate Discrete Mathematics with Intercalated Year