

# ST116-12 Mathematical Techniques

**20/21**

**Academic year**

20/21

**Department**

Statistics

**Level**

Undergraduate Level 1

**Module leader**

Elke Thonnes

**Credit value**

12

**Module duration**

10 weeks

**Assessment**

Multiple

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

This module runs in term 1 and is core for students with their home department in Statistics. It is NOT available for other students.

[Module web page](#)

### Module aims

Students will develop a deeper understanding of mathematical concepts and relations using problem solving techniques such as visualisation and exploration of patterns. By learning to express mathematical ideas clearly and precisely students will further deepen their understanding and enhance their mathematical reasoning and communication skills.

### 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.

An introduction to mathematical thinking and writing covered through examples and applications

from the areas such as logic, sets, functions, combinatorics, and discrete probability.

## Learning outcomes

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

- Use mathematical notation accurately.
- Apply a selection of mathematical problem solving techniques.
- Visualise mathematical concepts.
- Understand and construct a coherent, rigorous mathematical argument.

## Indicative reading list

K. Houston (2009) "How to think like a Mathematician", Cambridge University Press.

L.Alcock (2013) "How to study for a mathematics degree ", Oxford University Press.

K.Devlin (2003) "Sets, Functions, and Logic: an Introduction to Abstract Mathematics", Chapman & Hall/CRC.

Ross, S. (2014). A first course in probability. Pearson.

[View reading list on Talis Aspire](#)

## Subject specific skills

- familiarity with basic concepts in the foundational core of mathematics and key ideas in discrete probability theory and the ability to perform routine calculation and manipulation within this basic body of knowledge;
- familiarity with basic mathematical approaches to problem solving and the ability to justify chosen solution strategies;
- an appreciation of the structure of logical mathematical arguments and the ability to develop and reproduce simple mathematical arguments and proofs with a degree of clarity and accuracy;
- the ability to persist with simple, non-routine mathematical problems.

## Transferable skills

- the ability to use a learning style and pace appropriate for first year university and to appreciate their strengths and weaknesses as learners;
- the ability to work within a structured environment with some degree of autonomy;
- problem-solving, numerical and analytical skills in routine, possibly abstract, contexts and the ability to communicate appropriate solutions with a degree of clarity and accuracy;
- time-management and organisational skills;
- decision-making skills in standard, well-defined contexts.

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## Study

## Study time

Type	Required
Lectures	30 sessions of 1 hour (25%)
Tutorials	8 sessions of 1 hour (7%)
Private study	58 hours (48%)
Assessment	24 hours (20%)
Total	120 hours

## Private study description

Weekly revision of lecture notes and materials, wider reading and practice exercises, working on problem sets and preparing for examination.

## Costs

No further costs have been identified for this module.

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## Assessment

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

### Assessment group D1

	Weighting	Study time
Problem Sets	20%	24 hours

There will be weekly problem sets, of which up to five will contribute towards your module mark. Each problem set will contain a number of individual questions based on the material delivered in the lectures. You will write your answers on paper and submit it as instructed. A well-prepared student who has attended lectures and carried out an appropriate amount of independent study on the material could expect to spend approximately 24 hours on the problem sets.

2 hour examination (December) 80%

The examination paper will contain four questions, of which the best marks of THREE questions will be used to calculate your grade.

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### Assessment group R

	Weighting	Study time
2 hour examination (September)	100%	

## Weighting

## Study time

The examination paper will contain four questions, of which the best marks of THREE questions will be used to calculate your grade.

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## Feedback on assessment

You will hand in answers to selected questions on the weekly problem sheets. Your work will be marked and returned to you in the tutorial taking place the following week when you will have the opportunity to discuss it.

Solutions and cohort level feedback will be provided for the examination and the results for the exam in December will be available by the end of Week 10 of Term 2.

[Past exam papers for ST116](#)

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## Availability

## Courses

This module is Core for:

- Year 1 of USTA-G302 Undergraduate Data Science
- Year 1 of USTA-G304 Undergraduate Data Science (MSci)
- Year 1 of USTA-G300 Undergraduate Master of Mathematics, Operational Research, Statistics and Economics
- Year 1 of USTA-G1G3 Undergraduate Mathematics and Statistics (BSc MMathStat)
- Year 1 of USTA-GG14 Undergraduate Mathematics and Statistics (BSc)
- Year 1 of USTA-Y602 Undergraduate Mathematics, Operational Research, Statistics and Economics