ST218-12 Mathematical Statistics Part A

24/25

Department
     Statistics
Level
     Undergraduate Level 2
Module leader
     Horatio Boedihardjo
Credit value
     12
Assessment
     Multiple
Study location
     University of Warwick main campus, Coventry

Description

Introductory description

This module runs in Term 1 and is core for students with their home department in Statistics and not available for students from other departments.

Pre-requisite: ST115 Introduction to Probability.

[Module web page](#)

Module aims

To develop more advanced probabilistic methods that are used in Statistics.
The module builds the necessary probability background for mathematical statistics. It covers topics such as multivariate probability distributions, conditional probability distributions and conditional expectation, multivariate normal distribution, convergence of sequences of random variables.

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.

Discrete and continuous multivariate distributions. Marginal distributions.
Jacobian transformation formula.
Conditional distributions, conditional expectation and properties.
Moment generating functions for multivariate random variables.
Multivariate Gaussian distribution and properties.
Distributions related to Gaussian distribution: the Chi-squared, Student's and Fisher distributions.
Convergence in distribution, convergence in probability and almost sure convergence. Examples.
Laws of large numbers.
Central limit theorem.

Learning outcomes

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

- Understand more advance notions of probability needed in mathematical statistics including properties of multivariate Gaussian distributions, the law of large numbers, and the central limit theorem.
- Be able to calculate probabilities and expected values in more complex and sometimes multidimensional contexts.
- To be able to manipulate mathematical statements regarding the limiting behaviour of random sequences.

Indicative reading list

[View reading list on Talis Aspire](#)

Subject specific skills

Mathematical, analytical, problem solving

Transferable skills

Analytical, problem solving, investigative skills, communication, good working habits

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Study

Study time

Type	Required
Lectures	30 sessions of 1 hour (86%)
Tutorials	5 sessions of 1 hour (14%)
Total	35 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.

Assessment

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

Assessment group D2

	Weighting	Study time	Eligible for self-certification
Multiple Choice Quiz 1	3%	4 hours	Yes (waive)

A multiple choice quiz which will take place during the term that the module is delivered.

Multiple Choice Quiz 2	3%	4 hours	Yes (waive)

A multiple choice quiz which will take place during the term that the module is delivered.

Multiple Choice Quiz 3	4%	4 hours	Yes (waive)

A multiple choice quiz which will take place during the term that the module is delivered.

Written assignment	10%	12 hours	Yes (extension)

The assignment will contain a number of questions for which solutions and / or written responses will be required. The preparation and completion time noted below refers to the amount of time in hours that a well-prepared student who has attended lectures and carried out an appropriate amount of independent study on the material could expect to spend on this assignment. You will write your answers on paper and submit it as instructed.

In-person Examination	80%		No

Full marks may be obtained by correctly answering Question 1 from Part I and two complete questions from Part II.
Candidates may attempt all questions. Marks will be awarded for the answer to Question 1 from Part I and
the best two answers to questions from Part II only.

- Answerbook Pink (12 page)

	Weighting	Study time	Eligible for self-certification

- Students may use a calculator
- Cambridge Statistical Tables (blue)

Assessment group R1

	Weighting	Study time	Eligible for self-certification
In-person Examination - Resit	100%		No

Full marks may be obtained by correctly answering Question 1 from Part I and two complete questions from Part II.

Candidates may attempt all questions. Marks will be awarded for the answer to Question 1 from Part I and

the best two answers to questions from Part II only.

~Platforms - Moodle

- Answerbook Pink (12 page)
- Cambridge Statistical Tables (blue)

Feedback on assessment

Answers to problems sets will be marked and returned to you in a tutorial or seminar taking place the following week when you will have the opportunity to discuss it.

Solutions and cohort level feedback will be provided. The results of the January examination and cohort level examination feedback will be available in week 10 of term 2.

[Past exam papers for ST218](#)

Availability

Post-requisite modules

If you pass this module, you can take:

- EC338-15 Econometrics 2: Microeconometrics
- ST404-15 Applied Statistical Modelling
- EC306-15 Econometrics 2: Time Series
- ST332-15 Medical Statistics
- ST409-15 Medical Statistics with Advanced Topics

Anti-requisite modules

If you take this module, you cannot also take:

- ST220-12 Introduction to Mathematical Statistics

Courses

This module is Core for:

- Year 2 of USTA-G305 Undergraduate Data Science (MSci) (with Intercalated Year)
- Year 2 of USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics

This module is Optional for:

- Year 4 of UECA-GL12 Undergraduate Mathematics and Economics (with Intercalated Year)