

# ST112-6 Probability (Part B)

20/21

**Department**

Statistics

**Level**

Undergraduate Level 1

**Module leader**

Giuseppe Cannizzaro

**Credit value**

6

**Module duration**

5 weeks

**Assessment**

Multiple

**Study location**

University of Warwick main campus, Coventry

---

## Description

### Introductory description

This module runs in Term 2 and follows on from ST111 Probability A and is an optional module which leads to numerous statistical, probabilistic, operational research and econometrics courses. You may be interested in this module if you wish to undertake further statistics modules.

Pre-requisites: ST111 Probability A

Post-requisites: ST104 Statistical laboratory, ST202 Stochastic Processes, ST220 Introduction to Mathematical Statistics

This module is not available to students who have their home department in Statistics, who take an equivalent module. Students who are considering transferring to a course in Data Science, Mathematics & Statistics or MORSE at the end of their first year should take this module.

[Module web page](#)

### Module aims

To lay the foundation for all subsequent modules in probability and statistics, by introducing the key notions of mathematical probability and developing the techniques for calculating with probabilities and expectations.

## 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.

1. The notion of a random variable and its distribution. Examples in both discrete and continuous settings. Probability mass functions and density functions. Cumulative distribution functions.
2. Joint distributions. Independence of random variables.
3. Expectation of random variables. Properties of expectation.
4. Variance and Chebyshev's inequality. Covariance and the Cauchy-Schwartz inequality.
5. Addition of independent random variables: convolutions. Generating functions, Moment generating functions and their use to compute convolutions.
6. Important families of distributions: Binomial, Poisson, negative Binomial, exponential, Gamma and Gaussian. Their properties, genesis and inter-relationships.
7. The law of large numbers and the Central limit theorem.

## Learning outcomes

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

- Apply the theory of probability distributions, expectation, variance and covariance associated with random variables.
- Compute and apply generating functions for univariate random variables.
- Interpret problems and select appropriate distributions to create probability models.
- Apply the law of large numbers and the central limit theorem to probability models.

## Indicative reading list

Durrett, Elementary Probability for Applications.

Grimmett and Walsh, Probability- An Introduction.

Grimmett and Stirzaker, One Thousand Exercises in Probability

[View reading list on Talis Aspire](#)

## Subject specific skills

TBC

## Transferable skills

TBC

---

## Study

## Study time

Type	Required	Optional
Lectures	15 sessions of 1 hour (25%)	2 sessions of 1 hour
Tutorials	2 sessions of 1 hour (3%)	
Private study	37 hours (62%)	
Assessment	6 hours (10%)	
Total	60 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.

Students can register for this module without taking any assessment.

### Assessment group D3

	Weighting	Study time	Eligible for self-certification
Computer Based Assessment 1	5%	3 hours	Yes (waive)
Multiple choice quiz which will take place during the term that the module is delivered.			
Computer Based Assessment 2	5%	3 hours	Yes (waive)
Multiple choice quiz which will take place during the term that the module is delivered.			
Online Examination	90%		No
The examination paper will contain three questions, of which the best marks of TWO questions will be used to calculate your grade.			

~Platforms - Moodle

---

**Weighting****Study time****Eligible for self-certification**

- Answerbook Green (8 page)

**Assessment group R****Weighting****Study time****Eligible for self-certification**

Online Examination - Resit 100%

No

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

~Platforms - Moodle

---

- Answerbook Green (8 page)

**Feedback on assessment**

Answers to problems sets will be marked and returned to students. Tutorials provide opportunities for students to discuss the problem sets.

Solutions and cohort level feedback will be provided for the examination.

[Past exam papers for ST112](#)

---

**Availability****Pre-requisites**

To take this module, you must have passed:

- All of
  - [ST111-6 Probability \(Part A\)](#)

**Anti-requisite modules**

If you take this module, you cannot also take:

- ST115-12 Introduction to Probability

**Courses**

This module is Core for:

- Year 1 of UMAA-GL11 Undergraduate Mathematics and Economics
- Year 1 of UECA-GL12 Undergraduate Mathematics and Economics (with Intercalated Year)

This module is Optional for:

- Year 1 of UPXA-FG33 Undergraduate Mathematics and Physics (BSc MMathPhys)
- Year 1 of UPXA-GF13 Undergraduate Mathematics and Physics (BSc)
- UPXA-FG31 Undergraduate Mathematics and Physics (MMathPhys)
  - Year 1 of GF13 Mathematics and Physics
  - Year 1 of FG31 Mathematics and Physics (MMathPhys)

This module is Option list A for:

- Year 1 of UCSA-G4G1 Undergraduate Discrete Mathematics
- Year 1 of UCSA-G4G3 Undergraduate Discrete Mathematics
- Year 1 of UMAA-G100 Undergraduate Mathematics (BSc)
- UMAA-G103 Undergraduate Mathematics (MMath)
  - Year 1 of G100 Mathematics
  - Year 1 of G103 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-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

This module is Option list B for:

- Year 1 of UMAA-GV17 Undergraduate Mathematics and Philosophy