

## Mathematics and statistics

The Department of Mathematics and Statistics in the Faculty of Science offers a major and honours program which may be undertaken within the Bachelor of Arts degree.

### Faculty of Arts requirements

Students undertaking the Bachelor of Arts are permitted to enrol in a range of subjects offered by other faculties, however students must complete a minimum of 50 points of first year subjects and 100 points of second/third year subjects in areas of study approved by the Faculty of Arts, see *Arts-approved subject requirement (p.37)* for more information.

Combined course students will not usually be eligible to enrol in these subjects. Please consult the Faculty of Arts course adviser for more information.

### Prerequisites

**First year:** First year subjects in mathematics and statistics require VCE Mathematics at level 3/4. Students planning to study mathematics or statistics within the Bachelor of Arts degree should read the description of first year subjects given in the Science Faculty section of this Handbook to understand the available first year selections, before turning to the second/third year entries.

**Later years:** Entry into mathematics and statistics subjects is controlled by a system of prerequisites and corequisites. Students limiting their selection to 12.5 or 25 points in first year mathematics and statistics have limited options in later years, and it is usually preferable for students wishing to pursue substantial studies in mathematics and statistics to select 37.5 or 50 points in mathematics and statistics in first year.

### Requirements for a major

A major in mathematics and statistics usually requires a minimum of nine 12.5 point subjects, totalling 112.5 points. It comprises:

- at least two first year subjects in mathematics and statistics (25 points) and;
- three second year subjects in mathematics and statistics (37.5 points) and;
- four third year subjects in mathematics and statistics (50 points).

### Structuring a major

Options are considerably enhanced by taking more than two first year subjects from the offerings of the Department of Mathematics and Statistics. For information about first year mathematics and statistics options, see page 765 in the Science section of this Handbook.

Students majoring in mathematics and statistics have considerable flexibility in choosing their subjects; for example, there are advanced and standard level versions of several subjects in first and second year. Students are encouraged to speak with a mathematics and statistics course adviser to assist in their course planning. The following examples are for illustrative purposes only.

<b>Emphasising pure mathematics</b>	Sem.
<b>First year</b>	
620-121 Mathematics A (Advanced) (p.839)	1
620-122 Mathematics B (Advanced) (p.840)	1 rep 2
620-123 Applied Mathematics (Advanced) (p.840)	2
<b>Second year</b>	
620-221 Real and Complex Analysis (p.842)	1
620-222 Linear and Abstract Algebra (p.842)	2
620-231 Vector Analysis (p.842)	1 rep 2
<b>Third year</b>	
620-311 Metric Spaces (p.844)	1
620-312 Linear Analysis (p.844)	2
620-321 Algebra (p.845)	1
620-322 Topology (p.845)	2
<b>Emphasising studies in operations research or mathematics education</b>	Sem.
<b>First year</b>	
620-141 Mathematics A (p.840)	1 rep 2
620-142 Mathematics B (p.840)	1 rep 2
and one of:	
620-131 Scientific Programming & Simulation (p.840)	1
620-160 Experimental Design & Data Analysis (p.841)	1 rep 2, Summer
<b>Second year</b>	
620-261 Introduction to Operations Research (p.843)	1
620-262 Decision Making (p.843)	2

### Emphasising studies in operations research or mathematics education

620-270 Applied Statistics (p.844)	1 rep 2
<b>Third year</b>	
620-352 Graph Theory (p.846)	2
620-361 Operations Research: Techniques (p.846)	1
620-362 Applied Operations Research (p.846)	2
620-371 Linear Models (p.846)	1

### Emphasising studies in applied mathematics

<b>First year</b>	
620-121 Mathematics A (Advanced) (p.839)	1
620-122 Mathematics B (Advanced) (p.840)	1 rep 2
620-123 Applied Mathematics (Advanced) (p.840)	2
<b>Second year</b>	
620-231 Vector Analysis (p.842)	1 rep 2
620-232 Mathematical Methods (p.843)	2
and one of:	
620-221 Real and Complex Analysis (p.842)	1
620-252 Analysis (p.843)	2

### Third year

620-331 Applied Partial Differential Equations (p.845)	1
620-332 Integral Transforms & Asymptotics (p.845)	2
620-341 Dynamical Systems & Chaos (p.845)	1
620-342 Industrial & Applied Mathematics (p.845)	2

### Emphasising statistical applications

<b>First year</b>	
620-141 Mathematics A (p.840)	1 rep 2
620-142 Mathematics B (p.840)	1 rep 2
620-160 Experimental Design & Data Analysis (p.841)	1 rep 2, Summer

### Second year

620-201 Probability (p.841)	1
620-202 Statistics (p.841)	2
620-261 Introduction to Operations Research (p.843)	1

### Third year

620-301 Stochastic Modelling (p.844)	1
620-371 Linear Models (p.846)	1
620-372 Applied Statistical Analysis (p.846)	2
620-382 Biostatistics (p.847)	2

**Note:** Advanced Plus versions of some first year subject and advanced versions of some second year subjects are available, see *Standard and advanced subjects (p.837)*.

### Honours entry

The prerequisites for entry to Fourth Year Honours in Mathematics and Statistics are:

- completion of all the requirements for the BA and;
- completion of a major in mathematics and statistics which must include four third year mathematics and statistics subjects and;
- an average grade of H2B or higher over the second/third year subjects within the major.

Entry to honours must be approved by the mathematics and statistics honours coordinator and the Faculty of Arts honours course adviser.

Because of the prerequisite requirements, the choice of third year subjects is largely determined by the three mathematics and statistics subjects chosen in second year. The range of mathematics and statistics subjects available to Arts students in second and third year is restricted as a double major in mathematics and statistics is not permitted. As a consequence, students wishing to proceed to honours need to choose their first and second year mathematics and statistics subjects with some care as these choices will determine the honours program they may take.

Bachelor of Arts students contemplating pure honours in mathematics and statistics, or any combined honours program involving mathematics and statistics and another Arts discipline, are strongly urged to seek advice from the relevant departments as early as possible, and to obtain written confirmation from the departments and from the Associate Dean (Academic Programs) in the Faculty of Arts that their proposed course of study is acceptable. Bachelor of Arts students with a strong inclination towards honours programs in mathematics or statistics are strongly urged to explore the option of transferring to the Bachelor of Science degree, or to the Bachelor of Science/Bachelor of Arts combined degree program, or the degree of Bachelor of Arts and Sciences.

## Honours requirements

Honours coordinator: Dr Groves

Enquiries about possible honours structures (and in particular combined honours programs) should be directed to the Honours coordinator.

## Career opportunities

Graduates of the Bachelor of Arts who have majored in mathematics and statistics find employment in biology (population modelling); in business (quality management and improvement); in demography and behavioural science (survey sampling, analysis and prediction of human populations); in finance, commerce and economics (the study of forecasting of production, consumer behaviour and stock prices); in engineering (design and testing of structures, flood control and prediction, analysis of computer networks); in education (secondary and tertiary teaching); and in the medical sciences (epidemiology and analysis of medical research data).

Mathematicians and statisticians work for companies of any size, government departments or statutory authorities, educational institutions, or they can work independently as consultants. They assist their employers or clients in making optimal decisions in production, distribution, storage, scheduling, facility planning, pricing, investment, and many other areas of commerce and industry. They model industrial processes, and collaborate with scientists in all areas of research and development. Some will choose to deal with a narrow range of problems, for example economic statistics. Others may be employed by a large company to solve any of a broad range of problems which inevitably arise in the research and development activities of the company. Similar roles exist in medical research institutions and some government authorities.

Mathematicians and statisticians are also valued for their well-developed analytical skills. People with a degree in mathematics and statistics are well qualified as general problem-solvers and for management roles.

## Further study

Postgraduate Diploma, Masters and PhD programs are available in mathematics and statistics. Details of these programs can be obtained from the Department.

## First Year Learning Centre

The Department of Mathematics and Statistics has a First Year Learning Centre through which teaching and administration of its first year subjects is coordinated. This centre is located on the ground floor of the Richard Berry Building. Students with questions about first year mathematics and statistics subjects are encouraged to make enquiries at the First Year Learning Centre.

## Selecting first year options

Arts students wishing to study mathematics and statistics in first year may choose from a range of subjects.

The details of these subjects can be found in the Science Faculty section of this Handbook. The subjects are shown below, with the semester in which they may be taken. Each subject is semester-length, and valued at 12.5 points.

First year options	Sem.
620-112 Mathematics B (Advanced Plus) ( <i>p.839</i> )	2
620-113 Applied Mathematics (Advanced Plus) ( <i>p.839</i> )	2
620-121 Mathematics A (Advanced) ( <i>p.839</i> )	1
620-122 Mathematics B (Advanced) ( <i>p.840</i> )	1 rep 2
620-123 Applied Mathematics (Advanced) ( <i>p.840</i> )	2
620-131 Scientific Programming & Simulation ( <i>p.840</i> )	1
620-141 Mathematics A ( <i>p.840</i> )	1 rep 2
620-142 Mathematics B ( <i>p.840</i> )	1 rep 2
620-143 Applied Mathematics ( <i>p.841</i> )	1 rep 2, Summer
620-160 Experimental Design & Data Analysis ( <i>p.841</i> )	1 rep 2, Summer
620-161 Introductory Mathematics A ( <i>p.841</i> )	1

Subject to demand and staff availability one or both of the subjects 620-143 Applied Mathematics (*p.841*) and 620-160 Experimental Design & Data Analysis (*p.841*) may be offered (as full-fee subjects) in the Summer Semester. Permitted combinations of subjects are controlled by prerequisites and corequisites. Incoming students will usually include one of the following subjects covering calculus and linear algebra in Semester 1, listed in decreasing order of difficulty:

620-121 Mathematics A (Advanced) (*p.839*)

620-141 Mathematics A (*p.840*)

620-161 Introductory Mathematics A (*p.841*)

Students with VCE Specialist Mathematics 3/4 should enrol in 620-121 Mathematics A (Advanced) (*p.839*) or 620-141 Mathematics A (*p.840*) in Semester 1. They are not usually permitted to enrol in 620-161 Introductory

Mathematics A (*p.841*). 620-121 Mathematics A (Advanced) (*p.839*) is designed for high-achieving students in Specialist Mathematics 3/4. The director of first year will advise as to which of the two subjects (620-121 or 620-141) should be selected.

Students wishing to pursue studies in probability and statistics should include one of 620-131 Scientific Programming & Simulation (*p.840*) or 620-160 Experimental Design & Data Analysis (*p.841*).

Students who wish to have a limited introduction to tertiary-level mathematics and statistics at first year, but do not anticipate continuing studies in this discipline should consider taking one or both of 620-160 Experimental Design & Data Analysis (*p.841*) or 620-161 Introductory Mathematics A (*p.841*).

## Second year subjects

The following list shows second year subjects offered in 2000. Further details of these subjects may be found in the Science Faculty section of this Handbook.

Second year mathematics and statistics subjects	Sem.
620-201 Probability ( <i>p.841</i> )	1
620-202 Statistics ( <i>p.841</i> )	2
620-203 Probability (Advanced) ( <i>p.842</i> )	1
620-204 Statistics (Advanced) ( <i>p.842</i> )	2
620-211 Mathematics 2 (Advanced) ( <i>p.842</i> )	1
620-221 Real and Complex Analysis ( <i>p.842</i> )	1
620-222 Linear and Abstract Algebra ( <i>p.842</i> )	2
620-231 Vector Analysis ( <i>p.842</i> )	1 rep 2
620-232 Mathematical Methods ( <i>p.843</i> )	2
620-233 Vector Analysis (Advanced) ( <i>p.843</i> )	1
620-234 Mathematical Methods (Advanced) ( <i>p.843</i> )	2
620-252 Analysis ( <i>p.843</i> )	2
620-261 Introduction to Operations Research ( <i>p.843</i> )	1
620-262 Decision Making ( <i>p.843</i> )	2
620-270 Applied Statistics ( <i>p.844</i> )	1 rep 2

## Third year subjects

The following list shows third year subjects offered in 2000. Further details of these subjects may be found in the Science Faculty section of this Handbook.

Third year mathematics and statistics subjects	Sem.
620-301 Stochastic Modelling ( <i>p.844</i> )	1
620-302 Chance and Options Pricing ( <i>p.844</i> )	2
620-311 Metric Spaces ( <i>p.844</i> )	1
620-312 Linear Analysis ( <i>p.844</i> )	2
620-321 Algebra ( <i>p.845</i> )	1
620-322 Topology ( <i>p.845</i> )	2
620-331 Applied Partial Differential Equations ( <i>p.845</i> )	1
620-332 Integral Transforms & Asymptotics ( <i>p.845</i> )	2
620-341 Dynamical Systems & Chaos ( <i>p.845</i> )	1
620-342 Industrial & Applied Mathematics ( <i>p.845</i> )	2
620-351 Number Theory ( <i>p.846</i> )	1
620-352 Graph Theory ( <i>p.846</i> )	2
620-361 Operations Research: Techniques ( <i>p.846</i> )	1
620-362 Applied Operations Research ( <i>p.846</i> )	2
620-371 Linear Models ( <i>p.846</i> )	1
620-372 Applied Statistical Analysis ( <i>p.846</i> )	2
620-381 Computational Mathematics ( <i>p.847</i> )	1
620-382 Biostatistics ( <i>p.847</i> )	2

## For more information

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