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.6)* for more information.

BA combined course students are not permitted to enrol in these subjects for credit towards the arts component of the degree. Please consult a Faculty of Arts course adviser for more information.

Prerequisites

First year: First-year subjects in mathematics and statistics require VCE Mathematical Methods 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 14 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.

Emphasising pure mathematics		Sem.
First year		
620-121	Mathematics A (Advanced) *(p.4)*	1
620-122	Mathematics B (Advanced) *(p.4)*	1 rep 2
620-123	Applied Mathematics (Advanced) *(p.4)*	2
Second year		
620-221	Real and Complex Analysis *(p.7)*	1
620-222	Linear and Abstract Algebra *(p.7)*	2
620-231	Vector Analysis *(p.7)*	1 rep 2
Third year		
620-311	Metric Spaces *(p.9)*	1
620-312	Linear Analysis *(p.9)*	2
620-321	Algebra *(p.9)*	1
620-322	Topology *(p.9)*	2

Emphasising studies in operations research		Sem.
First year		
620-141	Mathematics A *(p.5)*	1 rep 2
620-142	Mathematics B *(p.5)*	1 rep 2
620-160	Experimental Design & Data Analysis *(p.5)*	1 rep 2
Second year		
620-261	Introduction to Operations Research *(p.8)*	1
620-262	Decision Making *(p.8)*	2
620-270	Applied Statistics *(p.8)*	2
Third year		
620-352	Graph Theory *(p.10)*	1

Emphasising studies in operations research		Sem.
620-361	Operations Research: Techniques *(p.11)*	1
620-362	Applied Operations Research *(p.11)*	2
620-371	Linear Models *(p.11)*	1

Emphasising studies in applied mathematics		Sem.
First year		
620-141	Mathematics A *(p.5)*	1 rep 2
620-142	Mathematics B *(p.5)*	1 rep 2
620-143	Applied Mathematics *(p.5)*	1 rep 2, Summer
Second year		
620-231	Vector Analysis *(p.7)*	1 rep 2
620-232	Mathematical Methods *(p.7)*	2
and one of:		
620-221	Real and Complex Analysis *(p.7)*	1
620-252	Analysis *(p.8)*	2
Third year		
620-331	Applied Partial Differential Equations *(p.10)*	1
620-332	Integral Transforms & Asymptotics *(p.10)*	2
620-342	Industrial & Applied Mathematics *(p.10)*	2
620-381	Computational Mathematics *(p.12)*	1

Emphasising statistical applications		Sem.
First year		
620-131	Scientific Programming & Simulation *(p.4)*	1
620-141	Mathematics A *(p.5)*	1 rep 2
620-142	Mathematics B *(p.5)*	1 rep 2
620-143	Applied Mathematics *(p.5)*	1 rep 2, Summer
Second year		
620-201	Probability *(p.6)*	1
620-202	Statistics *(p.6)*	2
Third year		
620-301	Stochastic Modelling *(p.9)*	1
620-302	Chance and Options Pricing *(p.9)*	2
620-371	Linear Models *(p.11)*	1
620-372	Applied Statistical Inference *(p.11)*	2

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 satisfying one of the seven specialisations offered by the Department of Mathematics and Statistics; 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 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.

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 and 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.

Mathematics and Statistics Learning Centre

The Department of Mathematics and Statistics has a Learning Centre through which teaching and administration of its first-year and second-year subjects is coordinated. This centre is located on the ground floor of the Richard Berry Building. Students with questions about first-year and second-year mathematics and statistics subjects are encouraged to make enquiries at the 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.
620-113	Applied Mathematics (Advanced Plus) *(p.3)*	2
620-121	Mathematics A (Advanced) *(p.4)*	1
620-122	Mathematics B (Advanced) *(p.4)*	1 rep 2
620-123	Applied Mathematics (Advanced) *(p.4)*	2
620-131	Scientific Programming & Simulation *(p.4)*	1
620-140	Intermediate Mathematics *(p.4)*	2
620-141	Mathematics A *(p.5)*	1 rep 2
620-142	Mathematics B *(p.5)*	1 rep 2
620-143	Applied Mathematics *(p.5)*	1 rep 2, Summer
620-160	Experimental Design & Data Analysis *(p.5)*	1 rep 2
620-161	Introductory Mathematics *(p.6)*	1

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.4)*

620-141 Mathematics A *(p.5)*

620-161 Introductory Mathematics *(p.6)*

Students with VCE Specialist Mathematics 3/4 should enrol in 620-121 Mathematics A (Advanced) *(p.4)* or 620-141 Mathematics A *(p.5)* in Semester 1. They are not usually permitted to enrol in 620-161 Introductory Mathematics *(p.6)*. 620-121 Mathematics A (Advanced) *(p.4)* is designed for high-achieving students in Specialist Mathematics 3/4. A mathematics and statistics course advisor 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.4)* or 620-160 Experimental Design & Data Analysis *(p.5)*.

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.5)* or 620-161 Introductory Mathematics *(p.6)*.

Second-year subjects

The following list shows second-year subjects offered in 2007. 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 *(p.6)*	1
620-202	Statistics *(p.6)*	2
620-211	Mathematics 2 (Advanced) *(p.6)*	1
620-221	Real and Complex Analysis *(p.7)*	1
620-222	Linear and Abstract Algebra *(p.7)*	2
620-231	Vector Analysis *(p.7)*	1 rep 2
620-232	Mathematical Methods *(p.7)*	2
620-233	Vector Analysis (Advanced) *(p.7)*	1
620-234	Mathematical Methods (Advanced) *(p.8)*	2
620-252	Analysis *(p.8)*	2
620-261	Introduction to Operations Research *(p.8)*	1
620-262	Decision Making *(p.8)*	2
620-270	Applied Statistics *(p.8)*	2

Third-year subjects

The following list shows third-year subjects offered in 2007. 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 *(p.9)*	1
620-302	Chance and Options Pricing *(p.9)*	2
620-311	Metric Spaces *(p.9)*	1
620-312	Linear Analysis *(p.9)*	2
620-321	Algebra *(p.9)*	1
620-322	Topology *(p.9)*	2
620-331	Applied Partial Differential Equations *(p.10)*	1
620-332	Integral Transforms & Asymptotics *(p.10)*	2
620-342	Industrial & Applied Mathematics *(p.10)*	2
620-351	Number Theory *(p.10)*	2
620-352	Graph Theory *(p.10)*	1
620-353	Discrete Mathematics *(p.11)*	2
620-361	Operations Research: Techniques *(p.11)*	1
620-362	Applied Operations Research *(p.11)*	2
620-371	Linear Models *(p.11)*	1
620-372	Applied Statistical Inference *(p.11)*	2
620-374	Sampling and Forecasting *(p.12)*	2
620-381	Computational Mathematics *(p.12)*	1

For more information

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