

Majors with a Significant Maths Component

Note

One or two majors will normally be done by students in Science and most other Faculties.

What *Maths* should you study in college?

The first year ANU Mathematics required for all the following Majors is MATH1013 or MATH1115, and then MATH1014 or 1116 in the following Semester.

The prerequisites for MATH 1013 are a satisfactory result in Specialist Mathematics. Students with a good pass in Mathematical Methods will be considered (but usually find it very difficult). The prerequisite for MATH1115 is a satisfactory pass in Specialist Mathematics double major.

Students can “bridge” into MATH1013 from MATH1003, which has a prerequisite of ACT Mathematical Methods. But this can delay progress by a semester or two.

Majors Offered.

The majors described below are offered by the Department of Mathematics in cooperation with other Departments as listed.

New majors likely to be offered next year (2007) include *Mathematical Economics* (with the Department of Economics).

In addition, Mathematics is required in the *Physics* major and *Computer Science* major.

Mathematics Major

Mathematics is the study of universal patterns and structures; it is the quantitative language of the world; it underpins information technology, computer science, engineering, and the physical sciences; and it plays an increasingly important role in the biological and medical sciences, economics, finance, environmental science, sociology and psychology.

You can do a Single or a Double Major in Mathematics. You can combine a major in Mathematics with other Majors. You can continue onto graduate studies in mathematics or in a range of other fields such as those included in the above majors. Or you can work in many different occupations. By 2020 it is estimated up to 70% of all job categories are likely to change, 35% will disappear and be replaced by jobs that do not currently exist. “Employers ... are more likely to hire someone with a good background in mathematics” (Ross Gittins, economics editor, Sydney Morning Herald). The 1999 US Jobs Rated Almanac ranked 250 jobs based on salary, work environment, security, stress level, physical demands, and outlook. The top five jobs were in mathematics or computer science and 9 of the top 10 were maths or computer related.

Quantitative Biology and Bioinformatics Major

*School of Botany and Zoology, School of Biochemistry and Molecular Biology,
Department of Mathematics,*

The intention of the major is to attract students with good quantitative skills into biology, and for these students to keep a quantitative stream going through to third year. The 2003 report from the US National Research Council, the Board on Life Sciences, entitled Undergraduate Biology Education for Future Research Biologists, emphasises “... the importance of building a strong foundation in mathematics and the physical and information sciences to prepare students for research that is increasingly interdisciplinary in character” (Recommendation 1). The importance of mathematics, statistics, computer science, and the physical sciences for future researchers in biology is the fundamental emphasis of this report.

Environmental Modelling Major

Department of Mathematics; School of Resources, Environment & Society

Australia's environmental challenges and technically advanced society have put it at the international forefront of environmental modelling. Because of global climate change, desertification (including salinisation) and deforestation, we face critical environmental problems; for example, allocation of scarce water resources to meet increasing economic, water-quality and ecological demands. This Major combines an introduction to how mathematics and computing are helping to solve these problems together with courses dealing directly with environmental issues.

Career opportunities for graduates include research (CSIRO, universities, International Geosphere Biosphere Program), natural resource management (Murray Darling Basin Commission, Environment Australia, Bureau of Rural Sciences, state government agencies), and the private sector (environmental engineering, environmental impact assessment). Skills in this area provide a solid base for career opportunities also in other fields where mathematical modelling is crucial, such as engineering, finance and the sciences.

Computational Modelling Major

Departments of Computer Science, Mathematics and Physics

Computational Modelling is the application of mathematical models and computational techniques to the analysis of scientific, industrial and financial problems. It involves the formulation and analysis of models, the development and application of software packages and programs, computational simulation and visualization, mathematical and numerical analysis, and high-performance supercomputing. Typical application areas include stock market analysis, car crash simulation, drug design, earthquake prediction, medical imaging and oil recovery.

Most students will choose to specialize in related fields or areas of application, such as biology, chemistry, computer science, economics, mathematics, physics or statistics. Graduates with in the area of the major are highly sought after in industry and corporate IT areas, scientific and financial research, and large government departments or hospitals. Many will continue to post graduate study.

Astronomy & Astrophysics Major

Departments of Mathematics and Physics

Investigating the origins of matter and life is likely to shift in the 21st century from earth bound laboratories to the Universe at large. Stronger links will be made between Astronomy and other sciences such as Biology and Physics. Mathematical modelling will play an ever increasing role in shaping our understanding of the Universe.

Undergraduate Astronomy courses at the ANU are taught by experts in diverse areas including the formation and dynamics of galaxies; quasars; black holes, neutron stars and white dwarfs; dark matter; and cosmology and gravitational lensing. For those not continuing onto astrophysical research, the major gives a grounding in a broad range of mathematical, physical and computational skills. Astronomy graduates are sought-after in careers such as financial derivative training, scientific management, consultancy, defence research, computer systems analysis, and spacecraft engineering.

Mathematics and Statistics Major

School of Finance and Applied Statistics, Department of Mathematics

Mathematics is the quantitative foundation for the sciences, information technology, economics and commerce. Statistics is the science of learning from data; it is critical in determining what information is reliable and which conclusions can be trusted. Statisticians analyse data, design and test statistical models, make predictions, and design and analyse surveys and experiments.

The major provides a way for students to acquire a good mathematics background with a range of statistical skills. Students may continue on to graduate studies and further research. Students with the quantitative skills and knowledge acquired in this major are keenly sought after by employers in insurance and finance companies, and government departments, in fields such as agriculture, census work, consulting, genetics, bioinformatics, marketing, forestry, risk assessment, social and management sciences, and many others. Students may elect to take out a second major in mathematics, or statistics, or one of the other majors involving potential areas of application.

Mathematical Finance Major

School of Finance and Applied Statistics, Department of Mathematics

Mathematical /Quantitative Finance is an important and rapidly growing discipline. Apart from its huge contributions to the theory and practice of Finance, it has proved to be a major attraction both to mainstream Finance students and to Maths/Probability/Statistics students who want to add an interesting and important applications area to their study programme. In addition to this, it has given tremendous impetus to research in and applications of Probability Theory and some other Maths areas over the last 10 years or so. There is a large demand for qualified graduates in the area. Quantitative Finance students need a strong background in all three disciplines: Finance, Probability, and Statistics, as well as a good general mathematical background.

Mathematical Physics Major

Department of Physics, Department of Mathematics

Mathematical physics is concerned with the application of mathematics to problems in physics and the development of mathematical methods suitable for such applications and for the formulation of physical theories. It underpins both theoretical physics and computational physics. Topics range from statistical mechanics and quantum field theory to string theory, representations of quantum algebras and applications to algebraic geometry.

More Information? www.maths.anu.edu.au/DoM

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