

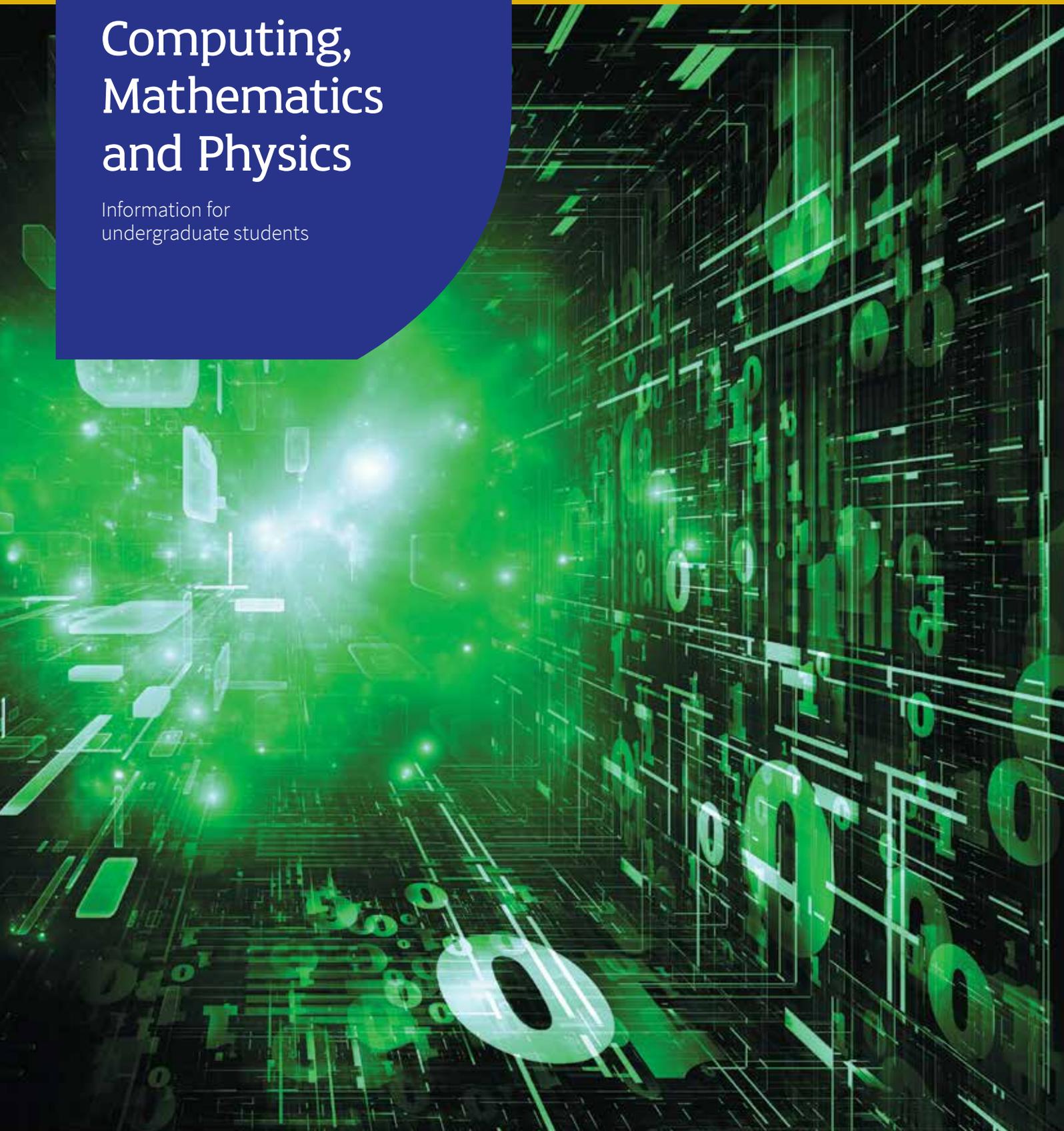


THE UNIVERSITY OF
**WESTERN
AUSTRALIA**

Engineering and
Mathematical Sciences

Computing, Mathematics and Physics

Information for
undergraduate students



Achieve with UWA



The unique combination of computing, mathematics, physics and engineering programs in our Faculty offers students and academics greater opportunities to take on multidisciplinary real-world challenges.

Mathematics and strong technology skills drive advances in science and engineering, enabling major innovations from smart phones to GPS systems to the sequencing of the human genome. Our majors in computing, mathematics and

physics provide you with the skills to understand and solve complex problems and will prepare you for a range of exciting careers.

Global reputation

UWA is ranked among the top one per cent of universities in the world and is part of the elite Group of Eight research-intensive Australian universities. Our Faculty has a rich heritage of more than 100 years of achievement and as a student you will benefit from close interaction with our leading researchers and their links to industry.

Winthrop Professor David Blair, an internationally acclaimed Physicist, known for his role in the 'scientific discovery of the century' - gravitational waves, is one example. UWA is also home to Australia's Fornax supercomputer, which allows scientists to explore new realms of high-powered data-intensive research and is expected to support radio astronomy.

Flexible learning

UWA's flexible course structure means that you can combine our computing, mathematics and physics majors with another major within your undergraduate bachelor's degree.

Given that graduates with mathematics and technology skills are in high demand across a range of sectors, I encourage you to explore our computing, mathematics and physics majors to discover how they can enhance your undergraduate studies and broaden your career opportunities. Welcome to our Faculty.

Professor John Dell

Pro Vice-Chancellor and Executive Dean, Faculty of Engineering and Mathematical Sciences

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UWA's spectacular garden campus is located just 4.8km from Perth's CBD and industry partners.



Data Science

One of the most rapidly growing fields in IT, Data Science unearths value and meaning from data. Using techniques from computer science, statistics and information management, it helps businesses and organisations across the globe.

In our data-driven world, information is now being collected electronically at an unprecedented speed and scale. According to IBM, we now generate more than 2.5 quintillion bytes of data a day.

From predicting trends to protecting personal information, companies around the world need data scientists to process, explore and harness meaning from their data. Insights from data drive decision-making on everything from healthcare and product design to marketing and finance.

The Data Science major at UWA focuses on data and scientific computation. Through a combination of practical and theoretical units you will develop an understanding of how to use technology for efficient and effective data collection, conversion, analysis, visualisation and

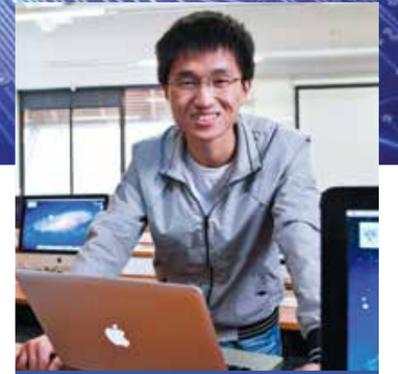
interpretation. You will learn how to integrate new technologies to create science, engineering and business systems, and how to design useful and usable software.

Accreditation

The Data Science major is provisionally accredited by the Australian Computer Society.*

Careers

As organisations around the world implement data-analytics programs, the demand for data scientists is only set to increase. Opportunities exist in areas such as mining and resource engineering; bioinformatics and biochemistry; computational physics and astronomy; transportation; health;



"Studying Data Science has been a great experience, filled with practical exercises and fascinating concepts."

Xiaofan Wu
Data Science student

finance; marketing; geophysics; geographic information systems; and biomechanics.

Course structure

The Data Science major consists of twelve units:

- Eight core units
- four complementary units

Find out more at study.uwa.edu.au/courses/data-science

Data Science major

DEGREE-SPECIFIC MAJOR: BP004 BACHELOR OF SCIENCE/ BP005 BACHELOR OF PHILOSOPHY (HONOURS)

Year	Level	Core Units	Complementary Units	Elective/Second Major Units
YR1	Level 1: Students complete two core units and three complementary units in the Data Science major	Problem Solving and Programming	Global Challenges in Engineering	Statistics for Science
		Relational Database Management Systems	Broadening Unit A or B	Mathematics Fundamentals ¹
YR2	Level 2: Students complete two core units in the Data Science major	Computer Analysis and Visualisation	Analysis of Experiments	Broadening Unit A or B
		Systems Programming	Broadening Unit A or B	Broadening Unit A or B
YR3	Level 3: Students complete four core units in the Data Science major	Data Warehousing	Agile Web Development	Elective/Second Major Unit
		Professional Computing	High-performance Computing	Elective/Second Major Unit

■ Degree-specific Major Unit
 ■ Complementary Unit²
■ Elective/Second Major Unit
 ■ Broadening Unit

Course structure diagrams for illustrative purposes only. Refer to the UWA Handbook (handbooks.uwa.edu.au) for full details.

1: Not required by students with a pass in Mathematics: Methods ATAR or higher.

2: Students who choose to study Data Science as a second major will not be required to complete the complementary units listed above, except for students with Mathematics: Applications ATAR, who will be required to complete Mathematics Fundamentals.

*As is standard practice, courses remain provisionally accredited until the required number of students graduate.

Computer Science

From search engines to smart phones, computer science involves the theory and design behind the intelligent systems and computers that transform the way we all live, work and communicate.

While studying the Computer Science major at UWA, you will learn the theoretical, algorithmic, implementation and systems principles that underpin computer languages and networks, and discover how to develop new technologies and advanced programming.

Accreditation

The Computer Science major is provisionally accredited by the Australian Computer Society.*

Careers

If you wish to play a role in developing new computing technologies for companies like Google and Microsoft, or pursue a career in enterprise-level programming, systems, software engineering or research, then Computer Science is the ideal major with which to start your computing studies.

This major will equip you with lifelong computing skills that will be advantageous for a range of industries and careers. Past students have gone into a wide variety of jobs – from running network systems for local organisations to managing software development and technology infrastructures for large aerospace and energy companies.



“At UWA I’ve experienced some of the coolest aspects of the field – including writing a *Tetris*-playing AI, building a dancing robot and creating video-warping software.”

Michael Martis
Computer Science student

Course structure

The Computer Science major consists of eleven units:

- Eight core units
- Three complementary units

Find out more at study.uwa.edu.au/courses/computer-science

Computer Science major

DEGREE-SPECIFIC MAJOR: BP004 BACHELOR OF SCIENCE/ BP005 BACHELOR OF PHILOSOPHY (HONOURS)

Year	Level	Units	Complementary Unit	Elective/Second Major Unit	Broadening Unit
YR1	Level 1: Students complete two core units and two complementary units in the Computer Science major	Object-oriented Programming and Software Engineering	Global Challenges in Engineering	Broadening Unit A or B	Elective/Second Major Unit
		Relational Database Management Systems	Mathematics Foundations: Methods ¹	Broadening Unit A or B	Elective/Second Major Unit
YR2	Level 2: Students complete two core units and one complementary unit in the Computer Science major	Data Structures and Algorithms	Broadening Unit A or B	Broadening Unit A or B	Elective/Second Major Unit
		Systems Programming	Discrete Structures	Elective/Second Major Unit	Elective/Second Major Unit
YR3	Level 3: Students complete four core units in the Computer Science major	Algorithms, Agents and Artificial Intelligence	Networks and Security	Elective/Second Major Unit	Elective/Second Major Unit
		Professional Computing	Graphics and Animation	Elective/Second Major Unit	Elective/Second Major Unit

■ Degree-specific Major Unit
 ■ Complementary Unit²
■ Elective/Second Major Unit
 ■ Broadening Unit

Course structure diagrams for illustrative purposes only. Refer to the UWA Handbook (handbooks.uwa.edu.au) for full details.

1: Not required by students with a pass in Mathematics Methods ATAR or higher.

2: Students who choose to study Computer Science as a second major will not be required to complete the complementary units listed above.

*As is standard practice, courses remain provisionally accredited until the required number of students graduate.

Mathematics and Statistics

Mathematics is humanity’s most powerful tool for comprehending the universe and is essential in many fields, including science, technology, engineering and finance.

The Mathematics and Statistics major at UWA will equip you with the mathematical tools and techniques of at least two of the three major disciplines of Pure Mathematics, Applied Mathematics and Mathematical Statistics.

Applied Mathematics uses the theory and techniques of mathematics and statistics to understand and deal with the real world. Mathematical Statistics is concerned with the application of statistical methods. Pure Mathematics proves theorems in a wide range of topics usually motivated and illustrated by problems in physics, engineering and computer science.

Careers

Many mathematics graduates become statisticians, actuaries, scientists or accountants. There are opportunities in areas as diverse as banking, insurance and investment, environmental modelling, oceanography, meteorology, medicine, computing, information technology, government, education and research. Past students have gone into a wide variety of jobs – from managing research for telecommunications companies like Telstra and analysing business data for major banking firms like Macquarie Group to planning strategic operations for Australia’s Department of Defence and editing news content for mathematics publications.



“Studying Mathematics and Statistics has allowed me to discover the beautiful symmetry in everyday life that we otherwise take for granted.”

Melissa Lee
Mathematics and Statistics student

Course structure

The Mathematics and Statistics major consists of nine units:

- Eight core units
- One complementary unit

Find out more at study.uwa.edu.au/courses/mathematics-and-statistics

Mathematics and Statistics major

DEGREE-SPECIFIC MAJOR: BP004 BACHELOR OF SCIENCE/ BP005 BACHELOR OF PHILOSOPHY (HONOURS)

Year	Level	Units	Complementary Unit	Elective/Second Major Unit	Broadening Unit
YR1	Level 1: Students complete two core units and one complementary unit in the Mathematics and Statistics major	Multivariable Calculus	Introduction to Scientific Practices ¹	Elective/Second Major Unit	Elective/Second Major Unit
		Mathematical Theory and Methods	Broadening Unit A or B	Broadening Unit A or B	Elective/Second Major Unit
YR2	Level 2: Students complete two core units in the Mathematics and Statistics major	Introduction to Applied Mathematics OR Fundamentals of Probability with Applications	Broadening Unit A or B	Elective/Second Major Unit	Elective/Second Major Unit
		Introduction to Pure Mathematics	Broadening Unit A or B	Elective/Second Major Unit	Elective/Second Major Unit
YR3	Level 3: Students complete four core units (from the units listed) in the Mathematics and Statistics major ²	Dynamics and Control	Random Processes and their Applications	Elective/Second Major Unit	Elective/Second Major Unit
		Scientific and Industrial Modelling Algebraic Structures and Symmetry Analysis and Geometry	Statistical Science	Elective/Second Major Unit	Elective/Second Major Unit

■ Degree-specific Major Unit
 ■ Complementary Unit
 ■ Elective/Second Major Unit
 ■ Broadening Unit

Course structure diagrams for illustrative purposes only. Refer to the UWA Handbook (handbooks.uwa.edu.au) for full details.

1: Students who choose to study Mathematics and Statistics as a second major will not be required to complete the complementary unit listed for Year 1.

2: Students intending to take Honours in Mathematics and Statistics should check that they will have the correct prerequisites for their desired specialisation.

Physics

Physics examines the world around us at the most fundamental level, from the origin and fate of the universe to the behaviour of matter on subatomic length scales and everything in between.

This major gives you access to the frontiers of modern physics via a focus on mathematical skills. These skills are required to access modern physics, including the key pillars of relativity and quantum physics, with applications to atomic, nuclear and particle physics, condensed matter physics, photonics and astrophysics.

The knowledge generated through the study of physics is the driving force behind most new technologies, from radars to lasers, transistors to quantum computers and electron microscopes to advanced medical imaging scanners.

To complement your lectures, you'll have the chance to discuss, apply and expand on the theory of your unit in weekly practical laboratory classes and structured tutorials.

Careers

The Physics major opens doors to a diverse range of careers. As a Physics graduate, your strong problem-solving and critical-thinking abilities will be in demand from employers in industry, government and the business and finance sectors.

Your discipline-specific skills are particularly valued in teaching, research and high-tech industries. Graduates with a strong mathematics and physics background have opportunities in the resources sector modelling big data sets. Further studies will lead to careers in research or academia.

The Square Kilometre Array project will provide a variety of job opportunities for Physics graduates in the astronomy and astrophysics stream.



“Physics is a subject that allows me to put my mathematical and problem solving skills to use solving issues relating to a real world context.”

Kai Metzner
Physics student

Course structure

The Physics major consists of eleven units:

- Eight core units
- Three complementary units

Find out more at study.uwa.edu.au/courses/physics

Physics major

DEGREE SPECIFIC MAJOR: BP004 BACHELOR OF SCIENCE/ BP 005 BACHELOR OF PHILOSOPHY (HONOURS)

Year	Semester	Major Unit	Complementary Unit	Elective/Second Major Unit	Broadening Unit
YR1	Semester 1	Physics for Scientists and Engineers	Multivariable Calculus	Broadening Unit	Elective
	Semester 2	Modern Physics	Mathematical Theory and Methods	Broadening Unit	Elective
YR2	Semester 1	Quantum Mechanics 1 and Electromagnetism	Elective	Elective	Elective
	Semester 2	The Physics of Particles	Mathematical Methods 3	Elective	Elective
YR3	Semester 1	Mathematical Physics	Quantum Mechanics 2 and Atomic Physics or Astrophysics and Space Science	Elective	Elective
	Semester 2	Electrodynamics and Relativity	Frontiers in Modern Physics	Elective	Elective

Course structure diagrams for illustrative purposes only. Refer to UWA Handbook (handbooks.uwa.edu.au) for full details

Undergraduate admissions

Domestic applicants

Entry requirements

To be considered for entry into the UWA three-year undergraduate degrees listed in this publication, you must achieve the University's minimum entry score (ATAR of 80, or equivalent), and demonstrate English Language Competence.

To be considered for entry into the Bachelor of Philosophy (Honours) you must achieve an entry score (ATAR or equivalent) of at least 98, in addition to satisfying English Language Competence requirements and prerequisites for your major(s).

study.uwa.edu.au/undergraduate

TISC entry

If you're thinking of studying Data Science, Computer Science, Mathematics and Statistics or Physics as your degree-specific major, you should use the Bachelor of Science code (UWSCI) in your TISC application. If you are considering one of these majors as your second major, simply discuss this when you enrol. Alternatively, you can contact EMS

Student Office for advice at enquiries-ems@uwa.edu.au.

Prerequisites

Data Science
Mathematics: Applications ATAR
Recommended:
Mathematics: Methods ATAR

Computer Science

Mathematics: Methods ATAR or applications ATAR with additional mathematics units taken in the first year
Recommended:
Mathematics: Methods ATAR

Mathematics and Statistics

Mathematics: Specialist ATAR*

Physics

Mathematics: Specialist ATAR, Mathematics: Methods ATAR and Physics ATAR or Mathematics: Methods ATAR with additional specified units taken in the first year.
Recommended:
Mathematics: Specialist ATAR, Mathematics: Methods ATAR and Physics ATAR

International applicants

A minimum Australian Tertiary Admissions Rank (ATAR) of 80 (or 98 for the Bachelor of Philosophy (Honours) or equivalent, if required in addition to satisfying UWA's English Language Competence requirement (see studyat.uwa.edu.au/elc) and meeting the prerequisites for the major in Data Science, Computer Science, Mathematics and Statistics or Physics. Please refer to study.uwa.edu.au for more details on prerequisites and minimum scores. Students with previous tertiary level qualifications will be considered for advanced standing (credit).

Scholarships

UWA offers a range of scholarships to help students reach their full potential. A full list of scholarships is available online at scholarships.uwa.edu.au

*Students with Mathematics: Methods ATAR may complete a Level 1 bridging unit to be eligible for this major.

Further study opportunities

Master of Data Science

Big data and analytics now drive and inform strategic decision-making and innovation, whether it is in relation to engineering, finance, health or other professional areas. The Master of Data Science is ideal for graduates who wish to take on the challenge of big data and pursue a career as a data scientist or data analyst.

Find out more at studyat.uwa.edu.au/mds

Master of Information Technology

The Master of Information Technology equips students with advanced IT skills and the ability to engage at the cutting edge of global technology solutions.

Find out more at studyat.uwa.edu.au/mit

Master of Professional Engineering: Software Specialisation

Undergraduate students who are interested in software engineering should consider the engineering pathway at UWA, which commences with the

Engineering Science major. The software engineering preparation stream leads on to the Master of Professional Engineering and a global career as a professional engineer.

Find out more at study.uwa.edu.au/courses/master-of-professional-engineering-preliminary

Master of Physics

Further study options include the Master of Physics – Astronomy and Astrophysics, Computational Physics, Experimental Physics, Medical Physics and Theoretical Physics.

Find out more at study.uwa.edu.au/courses/master-of-physics-coursework-and-dissertation



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