CITIZEN SCIENCE IS HELPING UNCOVER SECRETS OF THE UNIVERSE

Have you ever glanced up at just the right moment and witnessed a flash of bright light dart across the sky and wondered where it came from? Well, you’re not alone, and in fact, you can help scientists discover more about this cosmic phenomenon.

Fireballs are created by meteors as they travel through the Earth’s atmosphere and disintegrate into small pieces. They’re the oldest rocks in existence and the only surviving physical record of the formation and evolution of the Solar System.

Curtin University’s Dessert Fireball Network (DFN) project, a series of high-resolution cameras installed across the Nullarbor, approximately 150 kilometres apart, captures the paths of fireballs in the sky from multiple viewpoints.

Both projects are based upon the principle of ‘triangulating’ the meteorite trajectory, to help scientists identify where they land and where exactly they came from in the Solar System. These observations then help Curtin researchers address some of the biggest questions in planetary science and bring us a step closer to understanding how Earth and the planets are formed.

“The basic principle is simple triangulation. If you observe something from a few different locations, you can work out its orientation in three dimensions,” explains Team Leader of DFN Professor Phil Bland.

But calculating where a meteorite should land is one thing – finding it is entirely another.

A Curtin University student has created a new model that uses advanced tracking algorithms to work out where the meteorite is decelerating through the atmosphere, which gives an idea of its mass. Once the light eventually goes out, the team then has to figure out whether wind could have blown it off course. This is done by using a climate model with a resolution significantly higher than the one used by the Bureau of Meteorology.

“All of that has been completely novel and uses a whole bunch of innovations that have never really been tested before. That’s all ours. No one else has ever done any of that. It’s purely my team’s efforts. And you don’t know whether that’s going to work or not. You’re ticked every single box you can think of… but nature can have a way of tripping you up,” Bland says.

But one day, it all came together.

On 27 November 2019, the cameras picked up a large fireball over Kira Thanda-Lake Eyre in South Australia, and the team realised that there was potential to find the rock on the ground. After a few weeks and a lot of calculations, they began their long-awaited search, spending hours examining the ground to no avail. An aerial spotter eventually identified a potential point of impact on the ground and Bland began to dig through the mud.

“When I finally touched it all of those little pieces in that puzzle fit into place and I felt very excited and emotional,” Bland exclaimed.

The rock was a chromite meteorite and is approximately 4.565 million years old.

Fireballs in the Sky was recently awarded the prestigious Eureka Prize for Innovation in Citizen Science and was named Chevron Science Engagement Initiative of the Year at the Premier’s Science Awards.

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50 years of Curtin

A typical day

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ACADEMIC CALENDAR

SEMMESTERS 2017/2018

SEMESTER 2

| Semester commences | 31 Jul | 26 Feb | 30 Jul |
| Semester closes | 24 Nov | 22 Jan | 23 Nov |
THE CURTIN EXPERIENCE

Curtin offers you the complete package, with our strong international rankings, generous scholarship opportunities and high-tech learning spaces. A science degree from Curtin can help you reveal a whole new world. You will learn to be a problem-solver and innovator of tomorrow through hands-on practical activities that place the student experience first.

You will have opportunities to work in environments where research discoveries abound. And, your learning will be guided by our dynamic team of academics, including world-leading researchers.

NEW COURSES

In recognition of the evolving needs of our workforce, we have created three new courses to develop graduates with the skills necessary to contribute to up-and-coming industries worldwide.

These courses are:
- Data Science.......................... p26
- Financial Mathematics............... p30
- Industrial and Applied Mathematics........ p31

SCIENCE AT CURTIN: THE FACTS

- We offer a range of three- and four-year bachelor degrees to suit your interests and career goals.
- Our courses are recognised internationally and many are accredited by relevant professional bodies.
- Each science major offers a hands-on, industry-focused learning experience with rigorous laboratory practice.
- You’ll enjoy purpose-built learning facilities such as the $116 million Curtin Resources and Chemistry Precinct and new $7 million Biology Superlab.
- There are opportunities to study abroad.
- You can explore additional interests through elective units and double degrees, depending on your chosen course.

Ranked in the top two per cent of universities worldwide in the prestigious Academic Ranking of World Universities 2016

#9 Australian university overall and #4 for Earth and Environmental Sciences in the Nature Index 2016

Top 100 in the world for Earth and Marine Sciences in the QS World University Rankings by Subject 2017

KEEPING OUR EYES ON THE UNIVERSE

The Murchison Widefield Array is a low-frequency radio telescope capable of looking deep into space and far back through time. The Curtin-led project is a precursor to an even larger telescope, the Square Kilometre Array, which will give scientists a greater view of deep space than ever before.

RUNNING A TIGHT SHIP

Associate Professor Ryan Loxton is using smart algorithms to find answers to industrial optimisation problems that even the latest computers are struggling to tackle. Now, his calculations are boosting the productivity of Australian oil and gas operations in WA’s North West Shelf, helping Woodside plan the optimal routes for oil and gas service vessels.

Curtin is leading a future of growth and innovation through Innovation Central Perth, formerly the Cisco Internet of Everything Innovation Centre.

A joint partnership with Woodside and Cisco, Innovation Central Perth brings together start-ups, industry experts, developers and researchers in an open environment to create ground-breaking and innovative solutions. This in turn fosters growth, provides jobs and helps build sustainable economies nationally and internationally.

For Curtin, the capabilities will further progress the University’s research that is pushing the boundaries of scientific knowledge in areas such as radio astronomy, agriculture and engineering.

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GET THE CURTIN EDGE

Studying at Curtin is about more than just earning a degree. We offer a range of outstanding, interdisciplinary services and opportunities to complement our courses, all designed to give you the Curtin edge and improve your career prospects.

REAL-WORLD EXPERIENCE
By studying science at Curtin, you’ll have the opportunity to apply your learning in a real-world industry environment before you graduate.

To achieve this, our facilities are designed to provide an authentic experience of industry workspaces. And through our courses, you’ll have the opportunity to put the theories and concepts you learn in the classroom into practice. Together, this enables you to learn key field skills, engage with local industry and undertake on-the-ground research.

Depending on your chosen course, you may have the opportunity to visit industrial sites or plants, complete real-world projects in collaboration with industry or participate in laboratory work. For example, students studying agribusiness or Earth, environment and marine sciences might go on field trips to the Ningaloo coast, the eastern Pilbara, the southwest of Western Australia’s karri forest biodiversity hotspot or key agricultural zones. Students studying medical radiation science, meanwhile, could even have the opportunity to work on a research project that is directly connected with the needs of a particular employer within the industry, leading to potential job opportunities upon graduation.

CONNECT WITH INDUSTRY
At Curtin, we encourage you to build your industry network before you graduate.

Many of our science courses are designed to include industry advisory panels, site visits and industry guest lecturers so you get exposure to some of the industry’s top employers.

If you undertake honours study, you could even have the opportunity to work on a research project that is directly connected with the needs of a particular employer within the industry, leading to potential job opportunities upon graduation.

LEADERSHIP OPPORTUNITIES
The Curtin Leadership Centre helps you develop your skills in public speaking, project management and self-awareness. You can learn how to apply your new skills through volunteering and community projects.

CURTIN CHALLENGE
This fun, interactive platform lets you develop your leadership skills, build your networks and shape your future.

You can choose from the Curtin Leaders Program and the Careers Illuminate Challenge. The Curtin Leaders Program combines leadership skills modules with volunteering, to help you learn more about yourself, how you work in teams and how to make positive change in your community. The Careers Illuminate Challenge lets you create a personal brand, plan your career path and develop your job application tools.

challenge.curtin.edu.au

JOHN CURTIN LEADERSHIP ACADEMY
The John Curtin Leadership Academy is an intensive co-curricular leadership program. Completed over one semester, the program includes a four-day leadership camp, six leadership workshops and a team project with a not-for-profit organisation.

life.curtin.edu.au/jcla

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"The best part of my degree was learning something theoretical, coding and iterating, and seeing the actual output of the design code we wrote. In my current role, my favourite challenge is realizing that what I just designed and built will become obsolete in less than 12 months. You need to regularly learn new skills and sharpen existing skills in order to go above and beyond in reaching career aspirations."

Matthew Wu Leng
Bachelor of Science (Computer Science)
Project Manager, Google

"I write and use photographs, films and public speaking to help me tell the stories of the Australian bush to people. While I’m passionate about birds, I am deeply interested in other animals, plants and landscapes too, and about sharing these wonders with others. I believe that education is the most important tool in helping make a better world."

Simon Cherriman
Bachelor of Science (Environmental Biology) (Honours)
2010 Young Conservationist of the Year and business founder of Insight Ornithology

"My role is to provide specialist scientific support and technical advice to our groundwater replenishment schemes and advanced water recycling plants. Having completed a Bachelor of Science degree with honours (and then further study with a PhD) has allowed me to compete for diverse employment opportunities in an ‘engineering’ workplace. I was lucky enough to be sponsored by an industry research partner through my honours and PhD. This allowed me to network with other students in the industry Australia wide. Networking is priceless when you want to share ideas and research."

Dr Stacey Hamilton
Bachelor of Science (Chemistry) (Honours)
Advanced Treatment Team Leader
Water Quality Branch, Water Corporation
LEARNING REINVENTED

Curtin is transforming towards technology-rich environments that immerse you in your course like never before. Learning spaces that recreate real workplaces will enhance your studies and help ensure you graduate with the experience you need.

ASTRODOME
The Astrodome houses a 12-inch Meade Refractor telescope located on top of Curtin’s Engineering Pavillon at the main campus in Perth, where it provides a live feed to astronomy students and researchers. The Astrodome also links Curtin with astronomy-related projects such as the International Centre for Radio Astronomy Research and the Curtin Institute for Radio Astronomy.

BIOLOGY SUPERLAB
The new $7 million Biology Superlab will be one of three large PC2 (physical containment level 2) teaching laboratories in Australia and the only one in WA. It will allow students to use cutting-edge technology to investigate human pathogens and genetically modified organisms in an appropriately contained environment. With collaborative learning and informal student areas, the facility represents world-class laboratory design.

LANDGATE SPATIAL SCIENCES STUDIO
The Landgate Studio is a joint venture between Curtin and Landgate, Western Australia’s primary source of land information and geographical data. It combines high-tech computer systems with innovative teaching resources for spatial sciences students.

CURTIN RESOURCES AND CHEMISTRY PRECINCT
The magnificent $116 million Resource and Chemistry Precinct is designed to educate and train the next generation of scientists and engineers. It is a meeting place for researchers and business people, as well as teachers, students and members of the community. Expansive, open-plan laboratories, floor-to-ceiling glass internal walls and full-length, line-of-sight corridors provide an inviting, interactive space to learn in.

The precinct has four floors of laboratory and office space, with the top floor dedicated to undergraduate teaching. The shared aspect of the building, with students mingling with industry, may provide opportunities for students to benefit from industry input or co-supervision on student research projects.

FIELD TRIAL AREA
The Field Trial Area houses a six-room glasshouse, four hoop houses, a poly shade house, a disease nursery and over 1,000 m² of growing area with bird exclusion netting. It also has four temperature- and light-controlled plant growth rooms with physical and biosecurity containment level 2. Students studying crop agronomy, plant diseases and pasture management use this space to carry out experiments under both controlled and real environmental conditions.

FACULTY OF ENGINEERING AND SCIENCE BUILDING, MALAYSIA
The new RM20 million Faculty of Engineering and Science Building at Curtin’s Malaysian campus in Sarawak is a significant addition to the campus facilities. The four-storey building is a signature work of architecture and a landmark for the campus’s Skylark Precinct. It brings together the faculty’s administrative and teaching facilities, housing three lecture halls, four classrooms, meeting and discussion rooms and offices.

It includes learning spaces equipped with the latest technological advances in teaching and learning. These spaces support active student learning and facilitate two-way learning activities between Curtin Sarawak and Curtin’s main campus in Perth.
There is a sense of community both in and out of the classroom, with new collaborative learning spaces replacing traditional classrooms, and outdoor leisure areas with bean bags, hammocks, outdoor games and food trucks to enjoy in-between classes.

**STUDENT GUILD**
The guild offers education, welfare and social services as well as lots of extra-curricular activities such as the Guild Ball, tavern shows, multicultural week, sport and recreation, and market days.

**STUDENT CLUBS**
Get the most out of your time at university and join a student club. You’ll get to meet new people, attend great social and networking functions and make friendships that could extend beyond your university years.

**STUDENTS’ ACTUARIAL SOCIETY**
The Students’ Actuarial Society (SAS) is directed by student actuaries, under the supervision of faculty staff, with the purpose of improving the overall wellbeing of all actuarial students. They host a number of social events and are also involved in activities that can contribute to your professional development, such as meeting with industry.

**CURTIN ROBOTICS CLUB**
Meet other students who are interested in robotics and electronics development. Get involved in exciting, educational projects as well as local and international competitions.

**PHYSICAL SCIENCES SOCIAL ENTERTAINMENT DIVISION**
The Physical Sciences Social Entertainment Division (PHYSSED) is a guild-affiliated physics club that provides academic support and hosts social events for members.

**WASM WOMBATS**
The WASM Wombats train in various forms of traditional mining techniques and compete overseas at the World Mining Games, which has led to their international reputation for success. The team is based at Curtin’s Kalgoorlie Campus at the Western Australian School of Mines.

**OTHER CLUBS**
Other student clubs for science students include:
- Curtin Astronomy Club
- Curtin Chemistry Club
- Curtin Environment and Agriculture Club
- Curtin Exploration Geophysics Society
- Club RAD (Medical Radiation Science)
- Computer Science Students’ Association.

**SPORT AND RECREATION**
Curtin Stadium is the home of sport, fitness, recreation and events, with a main gym, women’s gym, large group fitness area, indoor cycling studio, sports hall and multi-purpose courts available for hire.

There is a variety of registered and affiliated sports clubs catering for all levels of skill and experience, so you can participate whether you’re new to a sport or aim to compete at an elite level.
As a Curtin student you can explore the world, with opportunities to study for up to two semesters at one of our partner institutions in Europe, Asia or the US. Travelling and experiencing different cultures broadens your horizons and adds international experience and credit to your degree.

EXCHANGE OPPORTUNITIES

Curtin has exchange agreements with a number of partner universities around the world. Going on exchange has a number of benefits, including:
• improving your cultural awareness
• developing your independence and initiative
• boosting your confidence
• broadening your networks and potentially increasing your employability.

Financial assistance may be available to help with travel costs. Types of assistance includes scholarships, travel bursaries, Commonwealth grants or an OS-HELP loan. Conditions apply.

SRI LANKA INSTITUTE OF INFORMATION TECHNOLOGY

Curtin has had a successful partnership with the Sri Lanka Institute of Information Technology (SLIIT) since 2002. The graduates from the partnership programs are well regarded in industry. Through SLIIT, you can study the final year (year 3) of the following courses:
• Bachelor of Technology (Computer Systems and Networking)
• Bachelor of Science (Computing) – Information Technology stream
• Bachelor of Science (Computing) – Software Engineering stream.

These courses have the same structure and curriculum at both SLIIT and Curtin. Because of this, in your final year you can transfer between Curtin’s main campus in Perth and SLIIT to complete your degree with no interruption to your study plan.

STUDY ABROAD

Take yourself on a self-directed study experience to locations around the world. If you want to study overseas at an institution that Curtin doesn’t have a partnership with, you can go on Study Abroad. This is a self-directed experience where you manage your application and study arrangements yourself.

As you’ll be studying at a non-partner university, you may be required to pay international student fees, which you are unable to defer through HECS.

SHORT-TERM OPPORTUNITIES

Depending on your area of study, you may also have short-term opportunities to study overseas.

Ask your course coordinator about international study tours, internships, short courses and practicum opportunities.

STUDYING AT CURTIN

Studying at Curtin doesn’t mean you have to always attend our main campus in Perth. Depending on your course, you could take part of your degree at one of our campuses in Kalgoorlie or Malaysia.

The academic programs, including course materials and examinations, are the same as the equivalent courses offered in Perth, so you can transfer easily with no interruption to your studies.

PERTH

Our main campus in Bentley, located 6 km from central Perth, is a place of inspiration and innovation. With technology-rich learning spaces and opportunities to meet people from around the world, your experience here can be life-changing.

We’ve recently embarked on a 20-year master plan to turn the campus into a cultural hub, bringing together education, business, technology, housing, public transport, the arts and recreation.

KALGOORLIE

Studying in Kalgoorlie puts you in the heart of one of Western Australia’s most renowned mining regions. The Curtin WA School of Mines offers a wide range of internationally recognised courses in mining engineering, metallurgical engineering, geographic information science, surveying, extractive metallurgy, applied geology and exploration geophysics. Recently renovated student housing is located close to the campus.

MALAYSIA

Located near the city of Miri on the island of Borneo, Curtin Sarawak has a beautiful garden campus nestled between the world’s oldest rainforest and the South China Sea. You can enjoy warm weather all year, indulge in the local culture and food, and discover the area’s natural wonders.

You can study computer systems and networking or the petroleum geology stream within applied geology at Curtin Sarawak.
A TYPICAL DAY AT UNIVERSITY

Studying at university is very different to studying at school. To help you navigate university life, we have created a range of online services making it easy for you to keep track of all your important study information while enjoying a more flexible learning environment.

ELSIE: KEEP TRACK OF YOUR UNIVERSITY INFORMATION

Elsie is a new app for Curtin University students. It offers a mobile portal into your Curtin life, giving easy access to your timetable, academic calendar, unit outlines, email, exams and teaching contacts.

BLACKBOARD: GET YOUR LEARNING MATERIALS ONLINE

Blackboard is Curtin’s learning management system. For each unit you’re enrolled in, you’ll be able to access your unit outline, staff contact information, learning materials and interactive tools, as well as your assessment details, submissions and grades.

OASIS: ACCESS STUDENT EMAIL, PLAN YOUR TIMETABLE AND MORE

OASIS is your online student portal and provides access to enrolment details, your timetable, student email and Blackboard.

TIP: Plan your timetable online before the start of each semester. Some units offer multiple class times; meaning that if you get in quick, you can choose the time that suits you best.

ILECTURE: REVIEW YOUR LECTURES ONLINE

The iLecture system is a quick and easy way for you to access recordings of your unit lectures or other video-based resources prepared by your lecturers. Lecture recordings will be made available shortly after the lecture and you can access them through Blackboard.

A TYPICAL DAY… FOR A FIRST-YEAR STUDENT*

7 am
Check your timetable and class locations for the day in Elsie

7.30 – 8.30 am
Morning workout at Curtin Stadium

9 – 10 am
Linear Algebra 1 lecture

10 am – 12 pm
Linear Algebra 1 workshop

12 – 12.45 pm
Grab a bite to eat from one of the pop-up food trucks

12.45 – 12.50 pm
Check your emails in OASIS

12.50 – 1 pm
Science Communications workshop

3 – 4 pm
Access iLecture to review yesterday’s lecture

4 – 6 pm
Log on to Blackboard to begin your readings for next week’s classes.

MEET A LECTURER!

“I love teaching mathematics because it is the language of the sciences, with many and varied applications. My particular interest is in helping students learn and demonstrate their mathematics knowledge in different ways. You may be surprised to find some oral assessment in our maths units, but this is supported by research saying that the person doing the talking is doing the learning! So we have noisy and energetic classes, where students work in groups on whiteboards to talk through the problem-solving process, and as well as promoting learning it also tends to be a lot of fun!”

Dr Heather Lonsdale
Senior Lecturer
Department of Mathematics and Statistics

*example only.
Agribusiness is concerned with developing sustainable production systems under changing climates, shifting markets and increasing consumer awareness.

Curtin offers Western Australia’s only Bachelor of Agribusiness, providing a unique opportunity to understand both science and business as applied to agriculture.

To satisfy the growing demand for food worldwide, we need smarter ways of producing food and fibre using sustainable production methods, innovation and responsible entrepreneurship – exactly what this applied course is about.

In this course you will engage in research-led activities, problem-solving and self-directed experiments using our field trial site and glasshouse facilities.

You will gain the scientific knowledge to develop an understanding of production systems and to apply problem-solving techniques to management strategies. You will work both as an individual and as an integral part of a team to develop your agribusiness risk and farm management skills. You will be introduced to satellite-based technologies for soil, crop and livestock management systems. You will also have opportunities to develop links with industry through engaging with industry experts in classrooms and workshops, and through field trips to research centres and agronomic field sites.

As part of this course you will undertake a work placement to ensure you graduate with the science, technology and business skills you need to thrive in agribusiness. This placement can be with agriculture research, production or business industries both locally and globally.

**PROFESSIONAL MEMBERSHIPS**
Graduates are eligible for membership of the Australian Institute of Agricultural Science and Technology.

**YOUR FUTURE IN AGribusiness**

**CAREER OPPORTUNITIES**
- Agricultural and resource economist
- Agricultural scientist
- Agronomist
- Biotechnologist (including plant and animal breeding)
- Farm management and farm consultancy
- Grain trading

**EMPLOYMENT INDUSTRIES**
- Agricultural industries
- Agriculture marketing and supply chain logistics
- Agricultural product suppliers
- Banking and finance
- Farmer grower groups

**FURTHER STUDY**

**HONOURS**
- Bachelor of Science (Honours)

**COURSEWORK**
- Master of Science (Dryland Agricultural Systems)
- Master of Science (Sustainable Agriculture)
- Master of Science (Sustainability Management)
- Master of Science (Water Quality and Supply Systems)

**RESEARCH**
- Master of Philosophy
- Doctor of Philosophy

**CENTRE FOR CROP AND DISEASE MANAGEMENT**

Launched in 2016, the Centre for Crop and Disease Management (CCDM) is part of a joint initiative co-funded by Curtin and the Grains Research and Development Corporation.

The centre provides access for leading researchers to study current crop diseases and their management, as well as those that pose a biosecurity threat to Australian agriculture. There are also numerous opportunities for undergraduate students to engage with cutting-edge research undertaken by the CCDM. In particular, students interested in a research career who have above average first-year results are encouraged to undertake work placements with the centre researchers in their second and third years.

With Deloitte flagging agribusiness as a growing area for the Australian economy, research and development in the field has never been more critical. Curtin is excited to be helping increase farm business resilience to make the most of this opportunity.

"The outlook is bright for the Australian agribusiness sector, with growing demand for our food and agricultural products in Asia." Deloitte, 2016
The need to sustain Australia’s marine environment is more important than ever as we face an uncertain future driven by climate change, increasing resource extraction and coastal development. Coastal and marine scientists are essential to ensuring the sustainable management of this environment.

This course reflects the growing need to protect Australia’s coastline, with an emphasis on marine biology, oceanographic sciences and resource management. It has been designed with industry input to deliver a learning experience focused on developing scientific and marine research skills. The course is delivered by staff actively researching a variety of fields, including fish ecology, coral reef ecology, marine pollution, coastal geomorphology, sustainable fisheries and aquaculture. The result is a dynamic and engaging learning environment in which teaching is informed by current research.

Throughout this course, you will be challenged to think as a marine scientist, developing your intuitive and intellectual curiosity to help understand and protect the marine environment. You will also interact with people working in marine and coastal science and management, such as the Department of Environment and Conservation, the Department of Fisheries, the WA Environmental Protection Authority, marine science consultancies, the mining and petroleum industries and Curtin’s Centre for Marine Science and Technology.

**YOUR FUTURE IN COASTAL AND MARINE SCIENCE**

**CAREER OPPORTUNITIES**
- Aquaculturalist
- Ecotoxicologist
- Fisheries scientist
- Environmental consultant

**EMPLOYMENT INDUSTRIES**
- Aquaculture
- Coastal management
- Fisheries
- Government policy
- Mining and engineering
- Pollution control

**FURTHER STUDY**

**HONOURS**
- Bachelor of Science (Honours)

**COURSEWORK**
- Master of Science (Dryland Agricultural Systems)
- Master of Science (Sustainability Management)
- Master of Science (Water Quality and Supply Systems)

**RESEARCH**
- Master of Philosophy
- Doctor of Philosophy

**PROFESSIONAL MEMBERSHIPS**
Graduates will be eligible for membership of the Australian Marine Science Association.

**COURSE ESSENTIALS**

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<tr>
<th>INDIQUET ATAR 2018</th>
<th>LOCATION</th>
<th>DURATION</th>
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<tbody>
<tr>
<td>70</td>
<td>Perth</td>
<td>3 years full-time</td>
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</table>

**STUDY MODE**
- Full-time, Part-time*

**INTAKE**
- Feb, Jul

**CROSS CODE**
- 061600D

**PREREQUISITES**
- Mathematics: Applications ATAR, or equivalent

*International students must study full-time.

For more information visit scieng.curtin.edu.au/environment

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Environmental exploitation has taken a serious toll on the planet. Environmental biologists are needed to solve issues such as environmental degradation, the impacts of urban and regional development, mining, oil and gas extraction and processing, as well as biodiversity loss and pollution.

In this course you will learn how organisms are structured and how they interact with their surroundings. You will study areas such as environmental management, botany, genetics, ecology and ecotoxicology, which examines the effects of contamination on ecosystems. You will also gain skills in zoology, biomonitoring, conservation biology and environmental management.

Working in both the laboratory and the field, you will develop practical skills combined with a strong scientific foundation. You are encouraged to develop specialist interests through project work and industry-based work experience.

**PROFESSIONAL MEMBERSHIPS**
Graduates will be eligible for associate membership of the Environment Institute of Australia and New Zealand.

**COURSE ESSENTIALS**

<table>
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For more information visit scieng.curtin.edu.au/environment

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For more information visit scieng.curtin.edu.au/environment
Environmental scientists focus on applying scientific techniques to study interactions between people and the rest of the world, including living and non-living environments. Unlike environmental biologists, they focus as much on the physical environment as on the plants and animals that inhabit an ecosystem.

As the human population grows, it takes work to keep the natural environment safe. Environmental scientists ensure the natural environment is effectively managed. They ensure private and public industries follow strict environmental laws, and restore and remediate degraded environments.

Because environmental science is interdisciplinary, this course focuses on both biology and chemistry.

In your first year you will study the physical, chemical and biological conditions of various environments and their effects on organisms.

In your second and third years you will cover a wide range of topics, including conservation biology and sustainability, chemical structure and spectroscopy, ecotoxicology, analytical chemistry, environmental impact assessment, ecology, environmental geoscience and restoration.

YOUR FUTURE IN ENVIRONMENTAL SCIENCE

CAREER OPPORTUNITIES
- Conservation scientist
- Environmental consultant
- Environmental scientist
- Mine restoration consultant
- Natural resource manager
- Remediated lands consultant

EMPLOYMENT INDUSTRIES
- Environmental consultancies
- Government policy and planning
- Research and development
- Urban and regional planning

FURTHER STUDY
- Honours
- Bachelor of Science (Honours)

COURSEWORK
- Master of Science (Dryland Agricultural Systems)
- Master of Science (Sustainable Aquaculture)
- Master of Science (Sustainability Management)
- Master of Science (Water Quality and Supply Systems)

RESEARCH
- Master of Philosophy
- Doctor of Philosophy

CURIOUS ABOUT ENVIRONMENTAL SCIENCE?
Enrol in our free Environmental Studies: A Global Perspective MOOC (massive online open course).

This six-week course will introduce you to some of the basic principles in environmental studies and how these are manifested in urban, rural and natural areas throughout the world.

Our MOOCs are offered in partnership with edX, a world-leading online learning destination founded by Harvard University and MIT. curtin.edu/environmentmooc

CURTIN PROFESSOR NAMED 2016 WA SCIENTIST OF THE YEAR
Curtin University professor and eminent botanist Professor Kingsley Dixon has been named 2016 WA Scientist of the Year in recognition of his efforts in conservation science, restoration ecology and plant science.

Professor Dixon is a professor with Curtin’s Department of Environment and Agriculture and a visiting professor at Kings Park and Botanic Garden.

His work in conservation science, restoration ecology and plant science has been fundamental to conserving threatened species and transforming ecological restoration practice in Australia.

As Foundation Director of Science at the Botanic Gardens and Parks Authority for 32 years, he is acknowledged as the driving force behind the creation of its world-recognised research laboratories.

Curtin’s Deputy Vice-Chancellor Professor Dixon commended the professor’s achievement, saying, “Professor Dixon has an exemplary collaboration history, networking across Western Australia, Australia and globally, and it’s wonderful to see him recognised with this prestigious award.”

For more information visit scieng.curtin.edu.au/environment

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COURSE ESSENTIALS

COURSE STRUCTURE
Correct as at December 2016, but subject to change.

Year 1
- Cell Biology
- Biological Computing
- Science Communications
- Principles and Processes in Chemistry
- Introduction to Environmental Research
- Functional Biology
- Land and Water Resources
- Linear Algebra 1
- Reactivity and Function in Chemistry

Year 2
- Chemical Structure and Spectroscopy
- Terrestrial Ecology
- Quantitative Biology
- Ecosystems
- Analytical Chemistry
- Applied Genetics
- 2 elective units

Year 3
- Atmospheric and Oceanographic Sciences
- Habitat and Landform Mapping
- Environmental Impact Assessment
- Environmental Restoration
- Environmental Geoscience
- Environmental Chemistry
- 2 elective units
Medical radiation scientists use radiation on the human body to help diagnose, treat and monitor medical conditions or provide cancer therapy.

Curtin offers the only on-campus course in medical radiation science in Western Australia. This course allows you to specialise in one of two majors: either Medical Imaging or Radiation Therapy. This course combines subjects from health sciences and science, providing you with a general grounding in the healthcare environment, along with foundation studies required for medical radiation science practice including medical physics, anatomy and physiology, and evidence-based practice.

The first year is interprofessional and taken with other health science and science students. From the second year, your study will focus on your elected major.

You will be prepared to accept responsibility for the care of individual patients by developing the necessary ethical, medico-legal, cultural awareness and communication abilities. These skills will enable you to establish appropriate interpersonal relationships with patients and colleagues so that you can work effectively and sensitively as a healthcare professional.

You will gain essential fieldwork experience throughout the course, including extensive clinical experience in hospitals and private practices, and one rural clinical placement.

**MEDICAL IMAGING**
Medical imaging professionals work with a range of sophisticated diagnostic imaging modalities, including computed and digital radiography, fluoroscopy, computed tomography, magnetic resonance imaging, mammography and angiography equipment. They produce images that are used to confirm or exclude a medical diagnosis, to advise on a treatment or illness, monitor patient progress, or provide medical screening.

**RADIATION THERAPY**
Radiation therapists play an integral role in the treatment, care and management of patients undergoing radiation therapy treatment, primarily in treating a range of cancer types. They design, develop and deliver radiation therapy treatment using a range of complex technologies and equipment.

**PROFESSIONAL ACCREDITATION**

**MEDICAL IMAGING**
This major is currently awaiting accreditation from the Medical Radiation Practice Board of Australia.

**RADIATION THERAPY**
This major is currently awaiting accreditation from the Medical Radiation Practice Board of Australia.

**YOUR FUTURE IN MEDICAL RADIATION SCIENCE**

**CAREER OPPORTUNITIES**
- Medical imaging professional
- Radiation therapist

**EMPLOYMENT INDUSTRIES**
- Biophysics
- Equipment manufacturing
- Medical physics
- Private medical clinics
- Public, private and regional hospitals
- Radiation health
- Research and development

**FURTHER STUDY**
- Master of Philosophy
- Doctor of Philosophy

**FIELDWORK OVER 4 YEARS**

45-55 weeks

"The course is very hands-on, with multiple clinical placements each year. These placements allow for theoretical knowledge learned in class to be applied in the real world. As part of my job, I liaise with Curtin to provide clinical placements for students. Employers today are looking for more than technical abilities - they look at your attitude, integration into the department, how you work under pressure, how you work independently and in a team, and how you communicate with everyone around you (your peers, patients, seniors, doctors and ward staff). My advice is to treat every clinical placement like a job interview."

Rene Forsyth
Bachelor of Science (Medical Imaging Science), Medical imaging technologist, SKG Radiology Subiaco

For more information visit scieng.curtin.edu.au/radiation

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**COURSE ESSENTIALS**

**INDICATIVE ATAR 2018**
90

**LOCATION**
Perth

**DURATION**
4 years full-time

**STUDY MODE**
Full-time

**COURSES CODE**
082158

**PREREQUISITES**

Mathematics: Methods ATAR and Physics ATAR, or equivalent

**DESIRABLE**

Mathematics: Specialist ATAR, or equivalent

This course is highly competitive and has limited places due to clinical placement requirements.

**COURSE STRUCTURE**
Correct as at December 2016, but subject to change.

**Year 1**
- Introduction to Medical Radiation Science
- Foundations for Professional Health Practice
- Evidence Informed Health Practice
- Human Structure and Function
- Radiation Physics and instrumentation
- Indigenous Cultures and Health Behaviours
- Medical Anatomy
- Radiation Therapy Practice 1 OR Medical Imaging Practice 1 OR Ultrasonound Practice 1

**Years 2–4**
Choose either Medical Imaging or Radiation Therapy.

**Medical Imaging major**
- Clinical Medical Imaging Practice 1
- Radiation Therapy Instrumentation 1
- Medical Radiation Sectional Anatomy
- Clinical Medical Imaging Practice 2
- Medical Imaging Practice 1 OR Medical Imaging Practice 2
- Medical Radiation Instrumentation 2
- Medical Radiation Pathology 1
- Medical Imaging Practice 3
- Professional Medical Radiation Practice
- Radiological Imaging Pathology 2
- Medical Imaging Practice 4
- Medical Imaging Science Research Methodologies

**Radiation Therapy major**
- Clinical Radiation Therapy Practice 1
- Medical Radiation Instrumentation 2
- Radiation Therapy Practice 2
- Clinical Radiation Therapy Practice 3
- Radiology and Fracture care
- Medical Radiation Pathology 2
- Clinical Radiation Therapy Practice 4
- Advanced Radiation Therapy Care
- Radiation Therapy Fourth-Year stream DB
- Radiation Therapy Honours stream
BACHELOR OF TECHNOLOGY

COMPUTER SYSTEMS AND NETWORKING

Computer systems and network administrators are responsible for the upkeep, configuration and reliable operation of computer networks, which form the backbone of modern information systems.

This course has been designed to help you fully understand computer network design and development technologies so you can pursue career opportunities in this rapidly expanding field. The course integrates current developments in wired and wireless networking, offering a comprehensive view of the industry.

You will develop skills in network design and management, the convergence of IT and telecommunications, embedded systems, computer hardware and software, real-time systems and IT technical support. Your focus will be on the design and support of distributed computer and telecommunications networks.

A feature of this course is certification-based training with IT leaders such as Cisco, through the Cisco Internet of Everything Innovation Centre at Curtin. By the time you graduate, you will have the skills to expand the capabilities of networks already in place and to build new ones.

PROFESSIONAL RECOGNITION

This course is recognised by the Australian Computer Society. Graduates meet Engineers Australia’s stage 1 competency standard for engineering technologist.

PROFESSIONAL MEMBERSHIPS

Graduates of this course can apply for membership of Engineers Australia as a Graduate Engineer and to build new ones.

YOUR FUTURE IN COMPUTER SYSTEMS AND NETWORKING

CAREER OPPORTUNITIES

- IT professional
- Industrial network technician
- Network and system administrator
- Systems designer
- Telecommunications manager

POTENTIAL EMPLOYERS

- Private businesses
- Public sector
- Government

FURTHER STUDY

HONOURS

Bachelor of Science (Honours)
Graduate Diploma in Cyber Security
Master of Science (Computer Science)
RESEARCH
Master of Philosophy
Doctor of Philosophy

ORDER OF AUSTRALIA FOR CURTIN ACADEMIC

For more than 25 years, Curtin University’s Associate Professor Iain Murray has been dedicated to assisting people with vision impairment through the development of assistive technology. It’s this dedication that has earned him an Order of Australia.

The Curtin alumnus, now academic, was named on the Queen’s Birthday 2016 Honours List for his extensive service to people who are vision impaired and for his contribution to education in assistive technology as an academic and researcher.

“It’s nice to be recognised, and I think it will help raise the profile of employment and equal opportunity for people with vision impairment,” he says.

Murray’s passion for making a difference began decades earlier when he became increasingly aware of the lack of opportunity and restricted education offered to his brother, who was born blind.

“I thought with the advancement of technology there was something I could do as an engineer to improve the situation,” he says.

In 2002, Murray launched the Cisco Academy for the Vision Impaired (CAVI) to deliver Cisco certification training to blind students worldwide. Now, the program has students in 15 countries, including India, Sri Lanka and the UK, with annual enrolments of just over 300 students.

“The impact of CAVI has been life-changing for students involved,” says Murray. “Unemployment in Australia for those with vision impairment is currently at 62 per cent, with underemployment significantly higher. CAVI has successfully prepared vision impaired students for constructive employment with 75 to 90 per cent employment rates for our overseas cohorts.”

COURSE ESSENTIALS

LOCATION

Perth, Malaysia
Sri Lanka*
Full-time, Part-time
Feb, Jul
3 years full-time
041280C

PREREQUISITES

At least Mathematics: Applications ATAR, or equivalent
Desirable
Mathematics: Methods ATAR or Mathematics: Specialist ATAR, or equivalent

*Only the final year (year 3) of this course is available to study in Sri Lanka.

Students studying in Sri Lanka and international students studying in Australia must study full-time.

July intake is not available to students studying in Sri Lanka.

COURSE STRUCTURE

Correct as at December 2016, but subject to change.

Year 1
Science Communications
Object Oriented Program Design
Pre and Introductory Calculus OR Mathematics 1
Hardware Fundamentals
Statistical Data Analysis
Computer Systems
Electronics
Database OR Database Systems

Year 2
Advanced Engineering Programming
Real-time Operating Systems
Data Communications and Networking Management
Transmission and Interface Design
Data Structures and Algorithms
Engineering Management
Microcomputers
2 elective units

Year 3
Distributed Networks
Wireless Data Networks
Computer Technology Project 1
Computer Technology Project 2
Network Engineering
2 optional units (see courses.curtin.edu.au)

For more information visit scieng.curtin.edu.au/technology

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This major will provide you with the skills and knowledge you need for a successful career in the rapidly evolving information and communications technology industry.

In your first year, you will develop your programming skills and study the fundamental theoretical knowledge of computing. Topics covered will include C++, Java, Linux and object oriented programming.

In your second year you will specialise in one of the following streams:

**COMPUTER SCIENCE**

In this stream you will develop an in-depth knowledge of software design and algorithm analysis, as well as artificial intelligence, computer communications, databases and graphics. Your study will focus on the knowledge required to build operating systems and design new programming languages. As computer science theory and applications are mathematically based, there is a strong emphasis on mathematics.

**CYBER SECURITY**

This stream focuses on the key concepts and challenges in data and resource protection and computer software security. You will examine the high level (cryptography theory, data access policy development and security program management) and low level (computer forensics, network intrusion detection and incident handling) practical aspects of computer security.

You will develop skills in identifying appropriate applications for specific scenarios, with an understanding of cultural and ethical issues related to protecting individual rights.

**INFORMATION TECHNOLOGY**

In this stream you will learn the technological and applied aspects of computing, with less emphasis on theory.

You will study system programming, software design and engineering, networking (including the internet and the web), cyber security basics and graphics.

**SOFTWARE ENGINEERING**

This stream aims to produce graduates who are well-versed in the principles of design, measurement and analysis applied in the context of the development of software-based systems.

You will receive a strong foundation in computer science, with further emphasis on software requirements gathering, design, implementation and testing. You will also focus on communication skills, professional responsibility, ethics, interpersonal relationships, teamwork and time management. In your final year you will undertake an industry-based project.

**PROFESSIONAL ACCREDITATION**

This course has professional level accreditation from the Australian Computer Society.

**PROFESSIONAL RECOGNITION**

Depending on your specialisation, this course is recognised by the Institute of Electrical and Electronic Engineers, the Association for Computing Machinery or the Australian Computer Society.

**YOUR FUTURE IN COMPUTING**

**CAREER OPPORTUNITIES**

- Computer programmer
- IT professional
- Software engineer/developer

**EMPLOYMENT INDUSTRIES**

- Applications development
- Cyber security
- Game design and development
- IT administration
- IT analysis
- IT support
- Programming
- Software development

**FURTHER STUDY HONOURS**

- Bachelor of Science (Honours)

**COURSEWORK**

- Graduate Diploma in Cyber Security
- Master of Science (Computer Science)
- Research
- Master of Philosophy
- Doctor of Philosophy

**ARMOUR UP FOR THE CYBER-WORLD**

Cyberspace weaves its way through our defence systems, infrastructure, industry, communications, transport, commerce and personal lives.

Through the Internet of Everything, interrelationships between these areas will deepen and, as a consequence, we will need to protect ourselves from threats inherent in a networked, cyber-connected world.

According to Microsoft, in the next ten years the number of internet users will increase to 4.7 billion and mobile internet subscriptions will skyrocket from 1.5 billion to 4 billion.

In Australia, a report by the Australian Department of Defence imagines a future that is critically dependent on ICT, in the same way that we are dependent on electricity. The growth of ICT across all industries creates higher stakes and greater potential for cyber attacks – particularly as ICT races ahead, leaving security huffing and puffing after it.

Chief Information Security Officer for Electronic Arts and former VP for Cybersecurity at Sony Music, Matt Thomson says understanding the importance of cyber security is gaining momentum, particularly in areas such as national security.

“Governments are placing renewed interest in cyberspace and cyber security. It is understood to be one of the key drivers of their own national security, own public safety and economic wellbeing,” says Thomson.

In the future, attacks could be more potent and harder to detect, and our ability to respond to them will require us to consider the complexity and interconnectedness of our ICT systems.

Educating our future cyber security professionals will play a large part in mitigating any damage. Curtin gives computing professionals the option to specialise in cyber security so they may have a working knowledge of cyber security management and policy-making, as well as practical skills in network intrusion detection and computer forensics.

For more information visit scieng.curtin.edu.au/computing

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Data scientists harness the power of data and computation to drive innovation. They work at the interface of computing, statistics, visualisation and media to collate and analyse large volumes of data and then communicate findings to a range of audiences. Their ability to leverage big data to predict future trends is becoming an essential part of decision-making in business and government.

Every industry is using the increasing availability of large volumes of data to grow: from predicting weather patterns and optimising harvesting in agriculture to improving patient diagnosis and treatment in the health industry, enhancing the management of remote infrastructure in mining, optimising supply chain logistics in consumer goods, analysing the impact of policies on economic activities, and enhancing the performance of ultra-high frequency trading algorithms.

This course is multidisciplinary, with fields of study in computing, statistics, emerging internet technologies, data and knowledge visualisation, user-experience studies and media as a means to communicate analytical results.

Foundational studies in programming and statistics form the basis of higher level studies in data mining, data security and computer simulation.

This course will build your capacity to extract, analyse and visualise large volumes of data and communicate analytical outcomes to a range of audiences. You will graduate from this course equipped to enter a range of industries where data science is key to innovation.

YOUR FUTURE IN DATA SCIENCE

CAREER OPPORTUNITIES
- Data analyst
- Data scientist

EMPLOYMENT INDUSTRIES
- Agriculture
- Arts
- Economics, business and finance
- Global business consultancies
- Government
- Health care
- Media
- Supply chain logistics
- Tech companies

FURTHER STUDY
HONOURS
- Bachelor of Science (Honours)

COURSEWORK
- Graduate Diploma in Cyber Security
- Master of Science (Computer Science)
- Master of Predictive Analytics
- Master of Philosophy

RESEARCH
- Doctor of Philosophy

“"The ability to take data – to be able to understand it, to process it, to extract value from it, to visualise it, to communicate it – that’s going to be a hugely important skill in the next decades.”

Hal Varian
Chief Economist, Google

Purdie Dealing with Data, September, 2016

THE HIVE

The HIVE (Hub for Immersive Visualisation and eResearch) is an advanced facility established by Curtin to serve the growing demands of researchers and industry for visualisation, virtualisation and simulation capabilities in Western Australia. Nationally and internationally, data collection is becoming more intensive. Sensor technologies are improving in quality and capacity, delivering a dramatic increase in data volumes. The HIVE enables a new and improved capability in the interpretation, presentation and communication of research data.

Using the HIVE’s visualisation systems, researchers and students from all disciplines can manage and use their data more effectively and imaginatively. From the physical sciences and engineering to the health sciences, and from the humanities and creative arts to business, the HIVE delivers powerful data enrichment capabilities, creating new opportunities for knowledge and a superior teaching and training environment.

For more information visit scieng.curtin.edu.au/computing

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Actuaries analyse mathematical, statistical, demographic, financial and economic data in order to predict and assess the effects of long-term risks involved in financial decisions and planning.

Actuaries are often tasked with solving business problems. For example, they may analyse future financial events, especially when the amount or timing of a payment is uncertain. Actuaries may also assess when and where devastating storms may hit to help predict risks, and their associated costs, for investments or insurance.

In this course, you will develop the mathematical and statistical techniques relevant to model industrial and commercial processes against a financial and economic background. You will also learn to identify the risk factors and determine the price and cost of those risks.

In your third year you will choose to specialise in actuarial science or actuarial and applied statistics. To be eligible for entry to the actuarial science major, there is a minimum course-weighted average mark that you must have achieved.

PROFESSIONAL ACCREDITATION
This course is accredited by the Actuaries Institute (Australia).

YOUR FUTURE IN ACTUARIAL SCIENCE

CAREER OPPORTUNITIES

• Actuary
• Business analyst
• Data scientist
• Mathematician
• Statistician
• Risk manager

EMPLOYMENT INDUSTRIES

• Data analytics
• Education
• Enterprise risk management
• Environment and climate change
• Financial services
• Health
• Public infrastructure

FURTHER STUDY

HONOURS

• Bachelor of Science (Actuarial Science) (Honours)

COURSEWORK

• Master of Science (Actuarial Science)
• Master of Science (Industrial Engineering)

RESEARCH

• Master of Philosophy
• Doctor of Philosophy

"Through the bachelor course, I gained a position as a vacation student in actuarial consulting at PwC. This six-week program taught me what it was like to work in the industry and develop many of the skills I learned at university. After this experience I found that I was more prepared for my studies, and I am sure I will use these skills when I enter the workforce.

After completing my bachelor degree I went on to do honours. After focusing my research on the health insurance industry for my dissertation, I think my dream job would be in this field, I believe private health insurers can have an impact on improving the overall health of Australians and I would love to be a part of that."

Nicole Parrottée
Bachelor of Science (Actuarial Science)
Honours student

"I went on to do my bachelor degree. My choice to specialise in actuarial science was one of the most important decisions I ever made. My love for the subject led me to pursue a career in actuarial consulting."

Nicole Parrottée
Bachelor of Science (Actuarial Science)
Honours student

For more information visit scieng.curtin.edu.au/maths

INDUSTRY SNAPSHOT: GENERAL INSURANCE

The general insurance industry has faced major challenges over the past decade, including the global financial crisis, yet some of the biggest challenges are yet to come.

PwC predicts that five mega-trends will influence the insurance sector. These trends are: social, as the balance of power shifts towards customers, technological, with advances in software and hardware transforming big data into actionable insights; environmental, with the increasing frequency of catastrophic events leading to the rise of more sophisticated risk models; economic, with the rise and interconnectivity of developing markets; and political, as globalisation and standardisation impact the insurance market.

As actuaries well know, change brings challenges and opportunities. For example, the benefit of new technologies will only increase actuaries’ capabilities to predict risks and opportunities resulting from these mega-trends. This in turn benefits insurers to provide better products and services to their consumers.

As these mega-trends affect the insurance industry over the next decade or more, actuaries have the skills and expertise to guide insurers to ride the wave of change to a positive and more rewarding future.

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PwC predicts that five mega-trends will influence the insurance sector. These trends are: social, as the balance of power shifts towards customers, technological, with advances in software and hardware transforming big data into actionable insights; environmental, with the increasing frequency of catastrophic events leading to the rise of more sophisticated risk models; economic, with the rise and interconnectivity of developing markets; and political, as globalisation and standardisation impact the insurance market.

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Financial mathematics apply mathematical models and numerical tools to practical everyday applications, such as financial markets. They gather statistical data on the financial decisions people actually make, rather than what they should make. This provides a critical insight for business and government, helping them to make more informed decisions—especially in uncertain economic climates.

Mathematics is the study of concepts such as quantity, structure, space, and change. It uses these concepts to model and describe the behaviour of real-world complex systems.

Today, mathematics is used in most fields, including technology, natural science, engineering, medicine, finance, and the social sciences, such as sociology and psychology. This course will provide you with a broad range of analytical and mathematical skills in the financial context, with particular relevance to statistical modelling and operations research.

You will receive a strong grounding in corporate finance, financial institutions, financial markets and various branches of the financial services industry, enhancing the employment prospects of graduates in the technological, industrial, and commercial sectors. You may choose to study units in accounting, economics, and business.

In your final year you will undertake a project that will allow you to put your skills into practice. Examples of past projects include forecasting the likelihood of extreme rainfall events, optimising mine site operations and investigating how rumours spread on social networks.

PROFESSIONAL MEMBERSHIP

Graduates of this course may be eligible for membership of the Statistical Society of Australia, Australian Society for Operations Research and the Australian Mathematical Society.

For more information visit scieng.curtin.edu.au/maths

Information in this publication is correct as at March 2017 and is subject to change at any time. This course may change after this publication is printed, and may not be offered in 2018. Please refer to courses.curtin.edu.au for the most up-to-date information.
Extractive metallurgists extract and purify metals and other products from ores obtained through mining operations. In today’s world that means bringing together chemistry, environmental science, mineralogy, communication and other skills into the discipline of extractive metallurgy.

In this course you will learn to develop, optimise and manage the operation of metallurgical processing plants that transform low-value raw materials into useful, high-value mineral and metal products in an economical and environmentally responsible way. You will cover the chemical, physical, economic, environmental and sustainable principles and practices for the extraction of metals from ores.

Your first year will be taught at the main campus in Perth, the second year at either Perth or the WA School of Mines in Kalgoorlie, and the final year at Kalgoorlie, which can help you maximise your exposure to industry and potential future employers.

PROFESSIONAL RECOGNITION
This course is recognised by the Australasian Institute of Mining and Metallurgy.

KALGOORLIE
Studying In Kalgoorlie puts you in the right place to maximise your industry exposure and increase your networking opportunities. You will have access to mining and metallurgical professionals, including some of Australia’s largest gold and nickel producers, helping you graduate with the skills and industry knowledge that employers look for.

BACHELOR OF SCIENCE
EXTRACTIVE METALLURGY

COURSE ESSENTIALS

INDICATIVE ATAR 2019
70
LOCATION
Perth then Kalgoorlie
DURATION
3 years full-time

STUDY MODE
Full-time, Part-time*
INTAKE
Feb, Jul
COURSE CODE
061600D

PREREQUISITES
Mathematics: Applications ATAR and Chemistry ATAR or Physics ATAR, or equivalent

FURTHER STUDY
HONOURS
Bachelor of Science (Honours)
RESEARCH
Master of Philosophy
DOCTORAL
Doctor of Philosophy

YOUR FUTURE IN EXTRACTIVE METALLURGY

CAREER OPPORTUNITIES
• Metallurgist
• Process metallurgist
• Plant metallurgist
• Processing consultant

EMPLOYMENT INDUSTRIES
• Minerals and mining
• Banking and finance
• Research and development

For more information visit scieng.curtin.edu.au/mining

For more information visit scieng.curtin.edu.au/mining

BACHELOR OF SCIENCE
MINE AND ENGINEERING SURVEYING

COURSE ESSENTIALS

INDICATIVE ATAR 2019
70
LOCATION
Perth then Kalgoorlie
DURATION
3 years full-time

STUDY MODE
Full-time, Part-time*
INTAKE
Feb
COURSE CODE
061600D

PREREQUISITES
Mathematics: Applications ATAR, or equivalent

FURTHER STUDY
HONOURS
Bachelor of Science (Honours)
RESEARCH
Master of Philosophy
DOCTORAL
Doctor of Philosophy

YOUR FUTURE IN MINE AND ENGINEERING SURVEYING

CAREER OPPORTUNITIES
• Engineering surveyor
• Mining surveyor
• Surveyor

EMPLOYMENT INDUSTRIES
• Mining and resources
• Construction

For more information visit courses.curtin.edu.au

For more information visit courses.curtin.edu.au

 Mine and engineering surveying are specialist areas of modern day surveying. Mine surveyors measure underground and open-cut mines in detail, helping mining companies locate new mines safely. Engineering surveyors work on construction and infrastructure projects to ensure challenging building specifications are met.

Curtin offers the only comprehensive degree in mine and engineering surveying in Western Australia. In this course you will develop skills in marking out, measurement and maintenance of direction for all surface and underground workings on a mine site. You will also learn how to prepare and update mine surveying plans for open-pit and underground workings. In your engineering surveying units, you will learn how to ensure civil engineering works are placed in their correct positions and orientations, with respect to all three dimensions.

The first two years of the course are taught at our main campus in Perth, while the third year is taught at the WA School of Mines in Kalgoorlie, with exposure to real-world environments and practices.

This major prepares you with the appropriate practical experience for operational management at the quarry manager level.

PROFESSIONAL MEMBERSHIPS
Graduates of this course are eligible for membership of the Surveying and Spatial Sciences Institute.

KALGOORLIE

Studying in Kalgoorlie puts you in the right place to maximise your industry exposure and increase your networking opportunities. You will have access to mining and metallurgical professionals, including some of Australia’s largest gold and nickel producers, helping you graduate with the skills and industry knowledge that employers look for.

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For more information visit scieng.curtin.edu.au/mining

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Mining continues to enrich many communities in Australia and around the world. Mining professionals help plan and direct the extraction of minerals, petroleum and natural gas from the earth.

In this course you will study mining methods, rock mechanics, geology and mine planning. You will develop the skills necessary to work with mining engineers in the exploitation of minerals from underground or open-pit mines, safely and economically.

Your first year will be taught in Perth, the second year at either Perth or the WA School of Mines in Kalgoorlie, and your final year at Kalgoorlie, which can help you maximise your exposure to industry and potential future employers. You will also have the opportunity to go on field trips to gain real-world experience in mining.

**PROFESSIONAL CERTIFICATION**

This course meets the education requirements of the Western Australian Department of Mines and Petroleum for certification as an underground or open-pit mine supervisor. You will also meet the educational requirements for the quarry manager's certificate of competency.

**PROFESSIONAL RECOGNITION**

This course is recognised by the Australasian Institute of Mining and Metallurgy.

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### COURSE ESSENTIALS

#### INDIATIVE ATAR 2018

<table>
<thead>
<tr>
<th>Location</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perth</td>
<td>Full-time: 70, Part-time: 70</td>
</tr>
</tbody>
</table>

#### STUDY MODE

- Full-time
- Part-time

#### INTAKE

- Feb, Jul

#### CROSS CODE

- 061600D

#### PREREQUISITES

- Mathematics: Applications ATAR or Physics ATAR, or equivalent

#### DESIRABLE

- None

#### STAT

- Not accepted

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### FURTHER STUDY

- Bachelor of Science (Honours)
- Master of Science (Geospatial Science)
- Master of Philosophy
- Doctor of Philosophy

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### YOUR FUTURE IN MINING

#### CAREER OPPORTUNITIES

- Engineering consultant
- Mine manager
- Mine ventilation officer
- Mining engineer
- Mining company director

#### POTENTIAL EMPLOYERS

- International and Australian mining companies

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### MULTIDISCIPLINARY SCIENCE

In many areas of scientific endeavour, knowledge across multiple disciplines has provided innovative solutions to important problems. A bachelor’s degree in multidisciplinary science provides well-rounded and diverse capabilities across traditional science boundaries, and you will be ideally placed to develop a career that can span science, technology and mathematics.

Multidisciplinary science is a flexible course that allows you to design a major that suits your background and particular career goals. You have the freedom to personalise your study plan in consultation with faculty members in the relevant disciplines, while meeting the requirements for a degree in science.

You can combine science disciplines from areas such as agriculture, astronomy, biochemistry, biology, chemistry, computing, environmental geology, geographic information science, mathematics or physics, opening the door to further education or a number of science careers.

Alternatively, you can combine comprehensive study of a science discipline with study from another faculty, for careers in biomedical science, bioinformatics, genetics, food science, digital design, visualisation, management, professional writing or languages.

The success of multidisciplinary, industry-facing research centres at Curtin is evidenced by the value placed on scientists having core knowledge in more than one area of science. Curtin has developed many such centres, including the Curtin Institute for Computation, Centre for Marine Science and Technology, and the Curtin University Sustainability Policy Institute.

### YOUR FUTURE IN MULTIDISCIPLINARY SCIENCE

#### CAREER OPPORTUNITIES

Opportunities exist across a wide spectrum, depending on your choice of units. For example, you could aim to become a professional science writer by combining science units with journalism.

You could also be ideally placed to pursue a career in secondary science education, through the development of a very broad science or mathematics background and the flexibility to include an education minor for a teaching specialisation.

You could also choose to undertake postgraduate study to further expand your career options.

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### A PATHWAY TO OTHER DEGREES

This course can be used as a pathway into other science, engineering and health sciences courses. You can undertake mathematics and science foundation units in order to meet the prerequisites of your desired course.

See pages 48 or 50 for more information.

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For more information visit scieng.curtin.edu.au/multi

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Geochemists study the molecular structures and processes that form the foundation for living matter. They draw upon techniques from biology, chemistry and physics, working in an exciting interface between these fields.

Many of the advances in life sciences rely on an understanding of both chemistry and biology. This course provides a solid foundation in chemistry, based on a molecular-level understanding of biological processes, with second- and third-year units in biological, medicinal and natural product chemistry. You will take complementary units in cell biology, molecular biology and molecular genetics.

You will study the core principles of chemistry, molecular structure and chemical reactivity, and how they are applied to biological molecules. You will also investigate molecular systems that regulate cell growth, including signalling and defence, together with related metabolic pathways. You will study principles of molecular recognition, including their applications in biosensors, drug design and optimisation, and in monitoring the effects that exogenous compounds can have on living systems. You can specialise in one of the following streams.

CHEMISTRY
In this stream you will explore how an understanding of the molecular world can influence areas such as nanotechnology, IT and new biocompatible materials. Depending upon your interests, you can learn to use sophisticated scientific instrumentation to solve complex, real-world analytical problems, or you can learn how to rationalise molecular design and synthesise new molecules for a variety of purposes.

ENVIRONMENT
In this stream you will gain first-hand knowledge of how geochemistry and molecular biology are implemented in an environmental setting. You will gain theoretical knowledge and practical skills in a variety of environmental applications of biochemistry, from detection of biochemical signals of pollution to the genetic sequencing of soil microbial systems to assess the impacts of anthropogenic stressors.

PROFESSIONAL MEMBERSHIPS
Graduates may be eligible for membership of the Royal Australian Chemical Institute.

CAREER OPPORTUNITIES
• Bioclient
• Biotechnologist
• Forensic scientist
• Pharmaceutical scientist
• Medicinal scientist

EMPLOYMENT INDUSTRIES
• Agriculture
• Biotechnology
• Health care

FURTHER STUDY
HONOURS • Bachelor of Science (Honours) COURSEWORK • Master of Science (Geology) RESEARCH • Master of Philosophy • Doctor of Philosophy

For more information visit scieng.curtin.edu.au/biochemistry

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Chemistry is sometimes called the ‘central science’ because it connects other sciences, such as physics, biology and geology. It is science at a molecular level, where major advances are being made in many areas such as medicine, IT, nanotechnology, new materials and the environment.

This course trains you to become a skilled chemist. It also teaches you problem-solving, teamwork and critical analytical skills, which may open the door for many careers within and outside science. You will study theoretical and practical aspects of chemistry, including synthesis, analysis and molecular modelling. Your learning will be largely laboratory-based, in Curtin’s Resources and Chemistry Precinct. You can specialise in the following streams:

**ANALYTICAL AND FORENSIC CHEMISTRY**

In this stream you will learn how to use sophisticated scientific instrumentation in combination with chemical knowledge to solve complex, real-world analytical problems.

You will develop effective problem-solving and decision-making skills within the ethical and professional context of analytical and forensic science, as there are often regulatory or legislative requirements for chemical measurements to be taken.

**BIOLOGICAL CHEMISTRY**

In this crossover field of chemistry you will study the essential processes of life on the molecular level. You will use complex equipment and procedures to understand the bio-molecular world, explore applications in biosensors and drug design, and monitor what effects new substances such as food additives and medicines have on living organisms.

As a qualified biological chemist, you could play a part in diagnosing diseases and investigating potential cures for illnesses such as cancer and HIV/AIDS, through to the design and synthesis of new and improved medicines.

**GEOCHEMISTRY**

In this stream you will study the chemical make-up of the Earth and other planets. You will focus on the chemical reactions and processes that show how various solids and rocks are created.

**MATERIALS SCIENCE**

This stream examines materials from a unified point of view. It looks for connections between the underlying structure of a material, its properties, how processing changes it and what the material can do.

You will study a range of materials, including metals, semiconductors, glasses, ceramics and polymers. You will also learn about analytical instruments and different forms of radiation that materials scientists use to investigate the microstructure of samples.

**PROFESSIONAL MEMBERSHIPS**

Graduates are eligible for membership of the Royal Australian Chemical Institute.

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"I think Curtin is the best university for the physical sciences. I learned how to work with a variety of people, as well as learning analytical and problem-solving skills, which I use daily in my job. My favourite practical experience was being a science communicator at Scitech as I was able to meet new people and share my love of science with them.

If you think you want to study chemistry, go for it. You never know where a chemistry degree can take you. It’s not always about the white lab coat; it’s about how the world interacts. You can find chemists in almost any industry." – Lee-Anne Salter

Bachelor of Science (Chemistry)

Process Technician

CSR Lightweight Systems

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**YOUR FUTURE IN CHEMISTRY**

**CAREER OPPORTUNITIES**

- Analytical chemist
- Computational chemist
- Environmental chemist
- Forensic scientist
- Materials scientist and geoscientist
- Medicinal chemist
- Synthetic chemist

**EMPLOYMENT INDUSTRIES**

- Environment
- Forensics
- Health
- Manufacturing
- Petrochemical engineering and mining
- Research and development

**FURTHER STUDY**

**HONOURS**

- Bachelor of Science (Honours)

**COURSEWORK**

- Master of Science (Water Quality and Supply Systems)

**RESEARCH**

- Master of Philosophy
- Doctor of Philosophy

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**COURSE ESSENTIALS**

**INDICATIVE ATAR 2018**

70

**LOCATION**

Perth

**DURATION**

3 years full-time

**STUDY MODE**

Full-time, Part-time

**INTAKE**

Feb, Jul

**CROSS CODE**

06160D

**DESIRES**

- Mathematics: Applications ATAR and Chemistry ATAR, or equivalent
- Mathematics: Methods ATAR and Physics ATAR, or equivalent

**PREREQUISITES**

Mathematics: Applications ATAR and Chemistry ATAR, or equivalent

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**COURSE STRUCTURE**

Correct as at December 2016, but subject to change.

**Year 1**

- Scientific Computing OR Fundamentals of Programming
- Introductory Mathematics OR Linear Algebra 1 OR Accelerated Mathematics 1
- Principles and Processes in Chemistry OR Nanotechnology OR Statistical Data Analysis
- Chemistry OR Science Communications Reactivity and Function in Chemistry

**Year 2 and 3**

- Stream-specific units OR Biological Chemistry stream OR Analytical and Forensic Chemistry stream OR Materials Science stream

**YEARS 2 AND 3**

- Stream-specific units OR Biological Chemistry stream OR Analytical and Forensic Chemistry stream OR Materials Science stream

**CAREER OPPORTUNITIES**

Core units
- Chemical Structure and Spectroscopy
- Chemical Energetics and Kinetics
- Analytical Chemistry
- Chemical Reactions and Mechanisms
- Analytical Chemistry and Spectroscopy
- Synthetic Methods in Chemistry
- Chemistry Research Methods

**OPTIONAL UNITS LIST**

- Cell Biology
- Fundamentals of Physics
- Introduction to Forensic Science
- Introduction to Astronomy
- Introduction to Mining and Metallurgy
- Foundations of Physics A

**OPTIONAL UNITS LIST 2**

- Functional Biology
- Fundamentals of Geology 2
- Biological Chemistry
- Calculus 1
Geographic information scientists are interested in geographic data. They collect, store and analyse geographic data to uncover spatial patterns, information and trends.

YOUR FUTURE IN GEOGRAPHIC INFORMATION SCIENCE

CAREER OPPORTUNITIES
• Geographic database designer/developer
• Geographic information scientist

EMPLOYMENT INDUSTRIES
• Environment and climate change
• Government policy and planning
• International development

FURTHER STUDY
• Bachelor of Science (Honours)

COURSEWORK
• Master of Science (Geospatial Science)

RESEARCH
• Master of Philosophy
• Doctor of Philosophy

*International students must study full-time.

Available as a double degree (see page 46).

COURSE ESSENTIALS

<table>
<thead>
<tr>
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<tr>
<td>70</td>
<td>Perth</td>
<td>3 years, full-time</td>
</tr>
</tbody>
</table>

STUDY MODE
Full-time, Part-time

CROSS CODE
061600D

PREREQUISITES
Mathematics: Applications ATAR, or equivalent

DESIRABLE
Mathematics: Methods ATAR, or equivalent

TAGS
WE and Q

YOUR FUTURE IN GEOPHYSICS

CAREER OPPORTUNITIES
• Geologist
• Geophysicist

EMPLOYMENT INDUSTRIES
• Oil and mineral exploration
• State and federal government

FURTHER STUDY
• Bachelor of Science (Honours)

COURSEWORK
• Master of Science (Geophysics)

RESEARCH
• Master of Philosophy
• Doctor of Philosophy

“I had the opportunity to undertake work experience in my third year for a company called Applied Scientific Services and Technology (ASST). This experience has given me valuable insight into real-world applications of geophysics and how surveys are conducted.” - Mischa Dakshin Ritschny, Bachelor of Science (Geophysics) student

COURSE ESSENTIALS

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<td>Perth</td>
<td>3 years, full-time</td>
</tr>
</tbody>
</table>

STUDY MODE
Full-time, Part-time

CROSS CODE
061600D

PREQUISITES
Mathematics: Methods ATAR and Physics ATAR, or equivalent

DESIRABLE
Mathematics: Specialist ATAR, or equivalent

TAGS
Not accepted

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From the kinetic energy of a speeding car to nuclear fusion energy, from nearby stars to distant galaxies, physicists examine matter and energy in all their forms.

Curtin’s area of physics and astronomy works closely with the Curtin Institute of Radio Astronomy (CIRA), which is involved in the Square Kilometre Array and the Murchison Widefield Array, as well as the investigation of active galactic nuclei and radio galaxies, transient radio phenomena and pulsars, and the birth of the first stars and galaxies in the Universe.

In this course you will study a range of real-world problems through observation, measurement and theoretical analysis. You will develop an understanding of the core concepts of physics and gain hands-on skills with complex technical equipment and computers. You can specialise in one of the following streams:

ASTROPHYSICS
This stream includes units suitable for those interested in radio astronomy, particularly the Square Kilometre Array. You’ll have the chance to grapple with some of the biggest scientific questions, ranging from the origins of the Universe to the nature of ‘dark matter’ and ‘dark energy’. Curtin’s involvement in the International Centre for Radio Astronomy Research (ICRAR) and the Square Kilometre Array project has the potential to provide you with hands-on experience analysing data from cutting-edge radio telescopes, using state-of-the-art supercomputing facilities.

ENVIRONMENTAL PHYSICS
In this stream you will learn how to study and measure matter and energy in the Earth’s natural and managed environments: the atmosphere, hydrosphere (oceans, rivers), land and soils, and living organisms.

You will study a diverse range of topics, including the development of sensors and energy-sparing ‘green’ materials, the interaction of sunlight with particulates in the atmosphere and oceans, disposal and storage of radioactive wastes, and the dynamics of the ocean and atmosphere. This stream includes a strong emphasis on physics principles in an environmental context, applied computer programming, instrument deployment during field excursions, and field and satellite data processing and analysis. It also provides exposure to a number of multidisciplinary activities in fields such as biology, geology and chemistry.

You will have the opportunity to experience applied acoustics first-hand through coursework and projects involving Curtin’s Centre for Marine Science and Technology, which specialises in underwater acoustics and has strong linkages to industries such as defence, offshore oil and gas, fisheries and government. For those interested in underwater optics and related applications or satellite remote sensing of oceans, Curtin’s Remote Sensing and Satellite Research Group also provides opportunities for liaison during your study.

MATERIALS SCIENCE
This stream examines materials from a unified point of view. It looks for connections between the underlying structure of a material, its properties, how processing changes it and what the material can do. You will study a range of materials, including metals, semiconductors, glasses, ceramics and polymers.

You will also learn about the analytical instruments and different forms of radiation that materials scientists use to investigate the microstructure of samples. These include electron microscopes, X-ray scattering facilities including synchrotrons, and neutrons generated in a nuclear reactor. Computer simulation is another key technology used by materials scientists and you will learn how to apply it to your work.

MATHEMATICAL PHYSICS
Mathematical physics is the study of nature using advanced mathematics. This field is advancing in everything from basic physics to quantum mechanics, and on every scale from the quark to the Big Bang. Through mathematical models and powerful supercomputers, we can predict the progress of climatic changes, the flow of oil reservoirs, development of new materials, and nanotechnology.

A degree in this field prepares you to work as a physicist or mathematician, with experience in using supercomputer technology.

PROFESSIONAL MEMBERSHIPS
You will be eligible for membership at the Australian Institute of Physics (AIP). Many international equivalents of the AIP also accept graduates as members.

YOUR FUTURE IN PHYSICS

CAREER OPPORTUNITIES
- Astrophysicist
- Computational physicist
- Environmental physicist
- Materials analyst
- Meteorologist
- Marine physicist
- Satellite remote-sensing scientist

EMPLOYMENT AREAS
- Astronomy
- Defence
- Education
- Environmental consultation
- Finance
- Manufacturing
- Software development

FURTHER STUDY

HONOURS
- Bachelor of Science (Honours)
- Master of Science (Computer Science)
- Master of Philosophy
- Doctor of Philosophy

For more information visit:
scieng.curtin.edu.au/physics
Surveying is a highly-specialised, professional discipline which involves measuring the surface of the Earth and its features.

Surveyors use sophisticated technology and scientific principles to provide practical solutions and services to many areas of government and industry, such as land development, construction, resource development, mining and mapping.

Surveyors have played a crucial role in the development of Australia since settlement, and will continue to do so.

In this course you can study specialist areas such as cadastral studies, geodesy, photogrammetry, surveying and land information systems, as well as related areas such as remote sensing, land development and planning, mine surveying, hydrographic surveying and geographic information systems.

This discipline has also moved into several high-tech areas including satellite positioning, laser scanning, airborne and marine navigation, digital mapping and remote sensing, specialised alignment surveying, analysis of structural deformations, and land and environmental management. Studying modern surveying necessarily calls upon elements from such diverse disciplines as computing, engineering, environmental science, geography, geology, management, mathematics and physics.

Curtin offers the only comprehensive degree in surveying and spatial information systems in the southern hemisphere. Curtin’s School of Geospatial Sciences is the only one in Western Australia to do so.

PROFESSIONAL ACCREDITATION
This course is fully accredited by the Royal Institution of Chartered Surveyors and the Chartered Institution of Civil Engineering Surveyors.

PROFESSIONAL MEMBERSHIPS
Graduates of this course are eligible for membership of the Surveying and Spatial Sciences Institute.

YOUR FUTURE IN SURVEYING
CAREER OPPORTUNITIES
• Engineering surveyor
• Hydrographic surveyor
• Land surveyor
• Mine surveyor

POTENTIAL EMPLOYERS
• Local, state and federal government
• Private practice

FURTHER STUDY
COURSEWORK
• Master of Science (Geospatial Science)
• Master of Philosophy

DRONES TO THE RESCUE FOR CROP FARMERS
Surveying honours student John Long’s research has explored how the use of drones can be used to monitor crop height to determine the best course of disease and pest control.

His research involved flying UAVs – unmanned aerial vehicles – fitted with consumer-grade cameras over 54 trial wheat plots to obtain crop height imagery, data which was then used to compare growth over time.

The plots were seeded with six different wheat varieties and treated with varying herbicides. The resulting height data was illustrated by a scaled colour scheme: red for limited growth and blue for significant growth areas.

Long says this type of UAV usage helped growers to better identify the best treatments to apply to their crops to maximise yields.

“As WA is Australia’s largest grain-producing region as well as one of the biggest pest and disease-free agriculture production areas in the world, it is crucial for the state to maintain clean and ultimate cropping areas and for WA to be able to retain its position as a world-class wheat producer,” Long says.

“To maintain this, improved crop monitoring systems are required to achieve the best potential yields, while having a minimal impact on the environment with non-destructive forms of measurement.”

Long’s research was conducted at a Centre for Crop and Disease Management trial site at the Muresk Institute in WA’s Wheatbelt area.

The project earned Long a Hexagon Geospatial-sponsored award in the field of remote sensing.

Employment for cartographers and surveyors is expected to grow strongly.

For more Information visit scieng.curtin.edu.au/spatial

For more information visit

scieng.curtin.edu.au/spatial

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**SURVEYING**

COURSE STRUCTURE

Correct as at December 2016, but subject to change.

Year 1

Introductory Mathematics OR Linear Algebra 1
Plane and Spherical Surveying
Survey Computations
Cartographic Statistics
Spatial Mapping
Spatial Computations
Foundations of Calculus OR Mathematical Modelling
Foundations of Physics A
Science Communications

Year 2

Engineering Surveying
Calculus 1
Applied Cartography
Geographic Information Systems
Coordinate and Mapping Systems
Vector Calculus
Spatial Data Processing
Integrated Surveying
Remote Sensing

Year 3

Satellite and Space Geodesy
Measurement and Adjustment Analysis
Land Planning
Photogrammetry
Survey Law Ethics Practice
Surveying Using Global Navigation Satellite Systems
Advanced Photogrammetry
Mine Surveying

Year 4

Honours Surveying stream
OR
Surveying Fourth-Year stream

*COURSE ESSENTIALS

**INDICATIVE ATAR**

70

**LOCATION**

Perth

**DURATION**

4 years
time

**COURSES**

BACHELOR OF SURVEYING

**INTAKE**

Feb, Jul

**CRICOS CODE**

00392m

**PROPRIETIES**

Mathematics: Applications ATAR, or equivalent

**DESIRED**

Mathematics: Methods ATAR, or equivalent

**STAT**

WA and Q discretion

*International students must study full-time.
**These applying on the basis of the Special Tertiary Admissions Test (STAT) may be required to meet prerequisites by completing existing units. This may extend the course duration.

For all courses, scroll to the end of the course information to find the details of the full course name, and the CRICOS code.
Studying a double degree is a smart choice if you are interested in more than one learning area. With two separate qualifications and a more diverse set of skills and knowledge, you could expand your career options upon graduation. You’ll study units from both courses, but the condensed program structure means you will complete two degrees quicker than if you studied them separately.

### Course Title
- **BACHELOR OF SCIENCE**
  - majors: Biomedical Sciences, Data Science, Environmental Biology, Geophysics, Mathematics, Physics
  - available science majors: Environmental Biology, Geographic Information Science, Geophysics

- **BACHELOR OF ENGINEERING**
  - majors: Computer Science, Computer Systems Engineering, Electrical and Electronic Engineering, Geophysics, Mathematics, Physics
  - available science majors: Computer Science, Geophysics, Mathematics, Physics

- **BACHELOR OF COMMERCIAL STUDIES**
  - available commerce majors: Accounting, Economics, Entrepreneurship, Finance

### Relevant Information
- **ATAR requirements:** At least Mathematics: Applications ATAR, or equivalent
- **Eligibility:** Only available to domestic students and requires special approval. Please contact the University for more information.
- **Duration:** 4 years, full-time
- **Location:** Perth
- **Studying units:** 120 credit points
- **Contact:** courses.curtin.edu.au

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### Double Degree Course Essentials

<table>
<thead>
<tr>
<th>COURSE TITLE</th>
<th>INDCODE</th>
<th>ATAR</th>
<th>DURATION</th>
<th>INTAKE</th>
<th>STAT</th>
<th>DURABLE</th>
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</thead>
<tbody>
<tr>
<td><strong>Bachelor of Science / Bachelor of Science</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Applied Geology and Environmental Biology</td>
<td>70</td>
<td>52655G</td>
<td>Perth</td>
<td>4 years, full-time</td>
<td>Feb, Jul*</td>
<td>Full-time, Part-time*</td>
</tr>
<tr>
<td>Applied Geology and Geographic Information Science</td>
<td>70</td>
<td>333837G</td>
<td>Perth</td>
<td>4 years, full-time</td>
<td>Feb, Jul**</td>
<td>Full-time, Part-time*</td>
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<tr>
<td>Applied Geology and Geophysics</td>
<td>75</td>
<td>527180</td>
<td>Perth</td>
<td>4 years, full-time</td>
<td>Feb</td>
<td>Full-time, Part-time*</td>
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<tr>
<td><strong>Bachelor of Science / Bachelor of Engineering</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Chemistry and Chemical Engineering</td>
<td>80</td>
<td>505336F</td>
<td>Perth</td>
<td>5 years, full-time</td>
<td>Feb, Jul</td>
<td>Not accepted, Full-time, Part-time*</td>
</tr>
<tr>
<td>Computer Science and Computer Systems Engineering</td>
<td>80</td>
<td>547742B</td>
<td>Perth</td>
<td>5 years, full-time</td>
<td>Feb, Jul</td>
<td>Not accepted, Full-time, Part-time*</td>
</tr>
<tr>
<td>Computer Science and Electronic Communication Engineering</td>
<td>80</td>
<td>547771H</td>
<td>Perth</td>
<td>5 years, full-time</td>
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<td>Not accepted, Full-time, Part-time*</td>
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<tr>
<td>Extractive Metallurgy and Chemical Engineering</td>
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<td>543732C</td>
<td>Perth</td>
<td>5 years, full-time</td>
<td>Feb, Jul</td>
<td>Not accepted, Full-time, Part-time*</td>
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<tr>
<td>Mining and Civil and Construction Engineering</td>
<td>80</td>
<td>5051666</td>
<td>Perth</td>
<td>5 years, full-time</td>
<td>Feb, Jul</td>
<td>Not accepted, Full-time, Part-time*</td>
</tr>
<tr>
<td>Physics and Electronic and Communication Engineering</td>
<td>80</td>
<td>601900F</td>
<td>Perth</td>
<td>5 years, full-time</td>
<td>Feb, Jul</td>
<td>Not accepted, Full-time, Part-time*</td>
</tr>
</tbody>
</table>

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**Footnotes:**

1. *Full-time or part-time study depends on the course.
2. **July intake is only available to international students.
3. ^Available for domestic students only.
4. Refer to individual majors at courses.curtin.edu.au for prerequisites and eligibility.

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Information in this publication is correct as at March 2017 and is subject to change at any time. These courses may change after this publication is printed, and may not be offered in 2018. Please refer to courses.curtin.edu.au for the most up-to-date information.
ENTRY REQUIREMENTS AND PATHWAYS: DOMESTIC STUDENTS

AM I A DOMESTIC STUDENT?
You are a domestic student if you are:
• an Australian citizen or Australian dual citizen
• a permanent resident of Australia
• a holder of an Australian permanent humanitarian visa
• a New Zealand citizen.

ENTRY REQUIREMENTS
To be eligible to study a bachelor degree at Curtin, you normally need to have achieved the following:
• graduated from high school and met the requirements of the Western Australian Certificate of Education (WACE) or equivalent interstate high school certificate
• obtained an ATAR equal to or above the cut-off score of the course you wish to study
• achieved a scaled mark of at least 50 in one of the following:
  – English ATAR
  – Literature ATAR
  – English as an Additional Language/Dialect ATAR
• achieved a scaled mark of at least 50 in each prerequisite for your chosen course.
Your year 12 WACE results are valid indefinitely. Scores dating back to 1992 can be converted to the current ranking via the TISC ATAR calculator: tisc.edu.au/calculator/ATAR-calculator.tisc
Entry can be competitive and you may need to achieve scores higher than the minimum indicative ATAR requirements for admission to some courses. You can apply to Curtin before you sit for your WACE exams.

IF YOU DON’T MEET THE ENTRY REQUIREMENTS
There are a number of different ways to gain entry into a Curtin course. If you don’t meet the entry requirements outlined above, consider one of the entry pathways listed here, or visit futurestudents.curtin.edu.au/ug/entry to explore other pathways.

ENTRY PATHWAYS
STAT
The Special Tertiary Admissions Test (STAT) is for people who are at least 20 years of age by 1 March (semester one intake) or 1 August (semester two intake) of the intended year of study. To be eligible for entry to Curtin, you will need to achieve a score of at least 135 in either the Quantitative (Q) and/or Verbal (V) components, and at least 140 in Written English (WE).

COURSE SWITCHING
If you are eligible for entry to Curtin but do not meet the prerequisites or the competitive requirement for a particular course, you may be eligible for entry to a related course. If you achieve high enough marks in this course, you may be able to switch to your preferred course after a period of time.

For example, the Bachelor of Science (Multidisciplinary Science) can be an entry pathway into several of Curtin’s engineering and science courses. By selecting appropriate units in your first year, the multidisciplinary science major can be used as a stepping-stone to catch up on course prerequisites and to demonstrate your capacity to complete your preferred course.

Similarly, the Bachelor of Science (Financial Mathematics) can be used as a pathway to gain the prerequisites needed to enter the Bachelor of Science (Actuarial Science).

futurestudents.curtin.edu.au
ENABLING COURSE IN SCIENCE, ENGINEERING AND HEALTH
The Enabling Course in Science, Engineering and Health runs for one year and starts in February, although in some cases you may start in July. It’s designed for students who don’t meet the minimum university entrance requirements, but who wish to undertake foundation studies that can lead to a degree course at Curtin with specific subject prerequisites.

Successfully completing this enabling program will guarantee you a place in a science course in the Faculty of Science and Engineering or in the Bachelor of Science (Health Sciences) offered in the Faculty of Health Sciences.
A number of places are also available on a competitive basis in engineering, medical radiation science, occupational therapy, pharmacy, physiotherapy, and speech pathology for high-achieving students.

This program is free for domestic students.

curtin.edu.au/science-health-enabling/PORTFOLIO-ENTRY
Alternative entry is available for selected courses for those who can demonstrate equivalence to Curtin’s ATAR entry through the submission of a portfolio of work. The portfolio should demonstrate evidence of your academic achievements, qualifications and ability.

If your desired course allows portfolio entry and your submission is successful, you’ll be eligible for entry into that course.

curtin.edu.au/portfolio-entry
AQF QUALIFICATIONS
You may meet our minimum academic entry requirements if you have evidence of English competency and you’ve received a TAFE or other Australian Qualification Framework award. This includes certificates, diplomas and advanced diplomas such as those offered through Curtin College, higher education providers and other training or education institutions, including Tuart College and Canning College.

curtin.edu.au/AQF
CURTIN COLLEGE
Curtin College offers various courses, ranging from Certificate IV to Diploma level, that can help you gain eligibility to apply to Curtin University.

curtincollege.edu.au

CREDIT FOR PREVIOUS LEARNING OR EXPERIENCE
You may be able to complete your degree in a shorter amount of time. At Curtin we grant credit for units within your course based on your previous study or work experience. It’s called credit for recognised learning.

curtin.edu.au/ug-ctl

TAKING A GAP YEAR
Once you have been offered a place at Curtin, you can delay starting your course for up to a year. This gives you the opportunity to take a break after high school, travel or get some work experience in your field of interest.

curtin.edu/defer

HOW TO APPLY
FIRST SEMESTER INTAKE
If you have never studied at Curtin before, you will apply through the Tertiary Institutions Service Centre (TISC).

tisc.edu.au
If you have studied at Curtin before or are wishing to switch courses, you will need to apply directly to Curtin.

howtoapply.curtin.edu.au/undergraduate
SECOND SEMESTER INTAKE
To apply for second semester, whether as a new student or a returning one, you will need to apply directly to Curtin.

howtoapply.curtin.edu.au/undergraduate

SCHOLARSHIPS
A scholarship at Curtin can offer you great opportunities. The financial, academic and career support you could receive will help you graduate with the skills and networks to make tomorrow better.

A scholarship is a sum of money or other financial assistance given to students to help support their study. Scholarships are not loans – the money is given to you provided you fulfil key requirements such as academic performance, work experience or volunteer commitments.

Scholarships are more than just financial support – they can enhance your portfolio of achievements.

WHO IS ELIGIBLE FOR A SCHOLARSHIP?
We offer a range of scholarships for students who are:
• from low-income backgrounds
• from Indigenous backgrounds
• high-achievers
• from regional areas
• studying specific courses.
Each scholarship has different eligibility criteria, application procedures and closing dates, so check these early in the process.

Visit our scholarships website for up-to-date information and eligibility criteria for available scholarships, and tips for writing a good scholarship application.

SCHOLARSHIP EMAIL ALERT
Get an email alert whenever a scholarship that matches your criteria is open for applications.
scholarships.curtin.edu.au

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ENTRY REQUIREMENTS AND PATHWAYS: INTERNATIONAL STUDENTS

AM I AN INTERNATIONAL STUDENT?
You’re considered an international student if you’re required to hold a student visa to study in Australia. This includes temporary residents and non-residents of Australia and New Zealand.

ENTRY REQUIREMENTS
To apply for an undergraduate course, you must satisfy Curtin’s academic requirements and English prerequisites. Entry is competitive and you may need to achieve scores higher than the minimum requirements for admission to some courses. You can apply to Curtin before you take your final high school exams.

Academic requirements: international.curtin.edu.au/apply/academic

English prerequisites: international.curtin.edu.au/apply/english-requirements

IF YOU DON’T MEET THE ENTRY REQUIREMENTS
There are a number of different ways to gain entry into a Curtin course.

- If you don’t meet the entry requirements outlined above, consider one of the entry pathways listed here, or visit international.curtin.edu.au/pathways to explore other pathways.

ENTRY PATHWAYS

COURSE SWITCHING
If you are eligible for entry to Curtin but do not meet the prerequisites or the competitive requirement for a particular course, you may be eligible for entry to a related course. If you achieve high enough marks in this course, you may be able to switch to your preferred course after a period of time.

For example, the Bachelor of Science (Multidisciplinary Science) can be an alternative entry pathway into several of Curtin’s engineering and science courses. By selecting appropriate units in your first year, the multidisciplinary science major can be used as a stepping-stone to catch up on course prerequisites and to demonstrate your capacity to complete your preferred course.

Similarly, the Bachelor of Science (Financial Mathematics) can be used as a pathway to gain the prerequisites needed to enter the Bachelor of Science (Actuarial Science).

Curtin College

Located at Curtin’s main campus in Perth, Curtin College offers various courses, ranging from Certificate IV to Diploma level, that can help you gain eligibility to apply to Curtin University.

Tel: +61 8 9266 4888
curtincollege.edu.au

AQF QUALIFICATIONS
You may meet our minimum academic entry requirements if you have evidence of English competency and you’ve received a TAFE or other Australian Qualification Framework award. This includes certificates, diplomas and advanced diplomas such as those offered through Curtin College, higher education providers and other training or education institutions, including Tuart College and Canning College.
curtin.edu/qaq

Curtin English

If you don’t meet the English language entry score required for your course, consider taking a study program at Curtin English. Curtin English is located at the Curtin University campus in Perth and gives you access to University facilities and support services.

Your Curtin English course can be packaged together with your chosen undergraduate program to streamline your enrolment and visa application process.

english.curtin.edu.au

HOW TO APPLY: INTERNATIONAL STUDENTS

HOW TO APPLY
You can apply to Curtin yourself or through a registered Curtin agent.

To apply for a course at Curtin University, you will need to provide certified copies of your previous qualifications and English proficiency documents.

Additional documentation may be required for particular courses or personal circumstances. See international.curtin.edu.au/apply/application-documents.

STEP 1: APPLY FOR A PLACE
This step is only relevant if you are applying to Curtin yourself. If you are using the services of a Curtin registered agent, you should lodge your application with the agent and contact them if you have any questions throughout the admission process.

Option 1: Online
Complete the online application form at curtin.edu/international-application. Please attach certified copies of the required application documents.

If your documents are not in an electronic format or cannot be scanned in, submit your application via email, mail or fax (see option 2).

Option 2: Email, mail or fax
Download and complete the International Application for Admission form (see international.curtin.edu.au/apply/how-to) and email, mail or fax it to Curtin, together with certified copies of the required application documents. The email address, postal address and fax number are provided at the end of the application form.

STEP 2: RECEIVE YOUR OFFER
Assessing your application will take approximately two weeks. Some applications may take longer to assess, dependent on course specifics. You will be notified if further documents are required and your assessment may be delayed until we receive these documents.

If your application is successful, you will receive an offer package containing:
- a Letter of Offer
- Simplified Student Visa Framework form (if applicable)
- an Acceptance of Offer form
- a Payment Options form
- the Terms of Offer
- an International Student Refund Agreement flyer
- Curtin’s Pre-departure Guide
- Curtin Housing Services flyer
- Overseas Student Health Cover Information

STEP 3: ACCEPT YOUR OFFER
When you receive your offer package, carefully review your Letter of Offer and make sure your name, course title and semester details are correct.

Once you meet all the conditions on your Letter of Offer, submit the Acceptance of Offer form along with your deposit for tuition fees, the Overseas Student Health Cover fee and a photocopy of your passport details page.

Students under 18 years of age
If you will be under 18 years old when you apply for your Australian student visa, you will need to nominate an approved carer who will have responsibility for your welfare in Australia until you turn 18, after which you are considered an adult by Australian law.

You will also need to complete a local carer form and other documentation required by the relevant Australian authorities when you apply for your Australian student visa.

Visit immi.gov.au for more details.

Note: the documentation required for students aged under 18 can take up to six weeks to process. If the correct documentation is not provided, you will not be able to enrol at Curtin.

STEP 4: APPLY FOR A STUDENT VISA
You will receive an email confirming your enrolment, called an electronic Confirmation of Enrolment (eCoE). You should apply for a student visa once you receive your eCoE.

SCHOLARSHIPS
A scholarship can offer you financial, academic and career support, giving you more opportunities to gain new skills and expand your horizons.

Scholarships are not loans – the money is given to you provided you fulfill key requirements such as academic performance, work experience or volunteer commitments. They are offered through a competitive process.

Curtin Scholarships

There are a variety of scholarships available from Curtin. Some are offered for academic achievement, while others are designed to make university possible for students who face financial hardship.

scholarships.curtin.edu.au

Government Scholarships

The Australian Government may also provide scholarships to international students intending to study in Australia. These include the Australia Awards Scholarships and the Endeavour Scholarships.

international.curtin.edu.au/scholarships

Scholarship Email Alert
Get an email alert whenever a scholarship that matches your criteria is open for applications.

scholarships.curtin.edu.au
The following notes on fees should be read in conjunction with the course fees table on page 54. This information is only for international students. Domestic students seeking fee information should visit fees.curtin.edu.au.

**FEE INFORMATION**
The tuition fees (shown in Australian dollars) are based on a normal full-time workload of 100 credits per semester (200 credits per year) unless otherwise stated. If you study more than 100 credits per semester, you will have a higher annual tuition fee. The tuition fee is calculated and charged on a semester basis.

Individual unit (subject) fees are listed at fees.curtin.edu.au/course_fees.cfm.

Note: all listed fees are subject to annual increases.

**OFFER LETTER (100 CREDIT) PUBLISHED FEE**
As an international student, you need to pay the fees for your first study period (one semester or 100 credits) before arriving in Australia in order to receive a confirmation of enrolment. The fee quoted on the international offer letter is only an approximation and may differ slightly in accordance with the units you choose to study upon your enrolment.

**INDICATIVE ESSENTIAL INCIDENTAL FEES**
Some courses require compulsory additional payment for retrollable materials and course-related fees, known as essential incidental fees. Some individual units may have optional fees for course materials and other course-related items.

The indicative essential incidental fees listed in this guide are correct for 2017 and may be subject to change.

**REFUND AGREEMENT**
The categories under which the University Fees Centre will assess an application for refund are laid out in the University’s International Student Refund Agreement. The agreement is supplied to you with your Letter of Offer and can also be accessed online at fees.curtin.edu.au/refunds.cfm, where you can also view the most up-to-date information as the policy is subject to change.

**UNDERGRADUATE CUT-OFF SCORES KEY**

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<th>Score conversion for GCE A-Level</th>
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<tr>
<td>A grade</td>
<td>5 points</td>
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<tr>
<td>B grade</td>
<td>4 points</td>
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<td>C grade</td>
<td>3 points</td>
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<tr>
<td>D grade</td>
<td>2 points</td>
</tr>
<tr>
<td>E grade</td>
<td>1 point</td>
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<table>
<thead>
<tr>
<th>Subject grades conversion for STPM</th>
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<tbody>
<tr>
<td>A</td>
<td>5 points</td>
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<tr>
<td>A- or B+</td>
<td>4 points</td>
</tr>
<tr>
<td>B</td>
<td>3 points</td>
</tr>
<tr>
<td>B- or C+</td>
<td>2 points</td>
</tr>
<tr>
<td>C</td>
<td>1 point</td>
</tr>
</tbody>
</table>

Please note: Scores for individual prerequisites may be taken into consideration for assessment purposes.
## COURSE FEES AND PREREQUISITES: INTERNATIONAL STUDENTS

<table>
<thead>
<tr>
<th>COURSE</th>
<th>CHICOS-CODE</th>
<th>DURATION</th>
<th>LOCATION</th>
<th>INTAKES</th>
<th>COURSE PREREQUISITES</th>
<th>GCE A-Level/ STPM/Best of 3 subjects</th>
<th>HKDSE</th>
<th>IB</th>
<th>Ontario G12 (Best of 6)</th>
<th>ATAS (incl. IELTS/HK/TOEIC)</th>
<th>SALADI (VPS)</th>
<th>INCIDENTAL (A$)</th>
<th>TOTAL INCOME (A$)</th>
<th>OFFER LETTER (10-14 DAYS)</th>
<th>PUBLISHED</th>
<th>INDICATIVE 1 YEAR FEE (A$)</th>
<th>INDEED INFLATION INCOME (A$)</th>
<th>INDEED INFLATION FEE (A$)</th>
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<tr>
<td>Bachelor of Science and Bachelor of Business</td>
<td>033285G</td>
<td>3 years</td>
<td>Perth</td>
<td>Feb, Sep</td>
<td>Mathematics and one science subject is desirable</td>
<td>5, 15, 24, 60, 70</td>
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<td>65</td>
<td>5</td>
<td>17,500</td>
<td>13,300</td>
<td>196,800</td>
<td>145,100</td>
<td>1,340</td>
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<tr>
<td>Bachelor of Science and Bachelor of Arts (law</td>
<td>076650F</td>
<td>3 years</td>
<td>Perth</td>
<td>Feb</td>
<td>Mathematics and one science subject is desirable</td>
<td>5, 15, 24, 60, 70</td>
<td>33</td>
<td>65</td>
<td>5</td>
<td>17,500</td>
<td>13,300</td>
<td>196,800</td>
<td>145,100</td>
<td>1,340</td>
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<tr>
<td>Bachelor of Science and Bachelor of Commerce (see page 4 for available options)</td>
<td>076654F</td>
<td>3 years</td>
<td>Perth</td>
<td>Feb</td>
<td>Mathematics and one science subject is desirable</td>
<td>5, 15, 24, 60, 70</td>
<td>33</td>
<td>65</td>
<td>5</td>
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</tbody>
</table>

*Due to limited unit availability, July intake is only available for international students who have sufficient credit for recognised learning.

**The following science subjects satisfy the requirements: animal production systems, aquaculture, chemistry, engineering, environmental science, human biology, integrated science, marine biology, marine studies, physics, plant production systems, psychology, computer science or applied information technology.

†For students intending to go to Singapore, the cut-off mark is 70%

‡For students intending to go to Malaysia, the cut-off mark is 65%
Perth is consistently ranked as one of the world’s most liveable cities. As the capital of Western Australia, Perth is safe, prosperous and multicultural – an ideal destination for students and tourists alike.

The city is set against the stunning backdrop of the Indian Ocean and combines natural beauty with period architecture. Browse for fashion along the Murray Street mall, learn to surf at the iconic Scarborough Beach or enjoy a cappuccino in historic Fremantle.

A CONVENIENT TIME ZONE
As Perth is located in the same time zone as cities like Hong Kong, Singapore, Beijing and Kuala Lumpur, it’s easy to stay in touch if you have friends and family living there.

FOOD AND ENTERTAINMENT
Perth offers a huge range of dining and entertainment options that reflect the cultural diversity of the city. In Northbridge, the city’s cultural precinct, the restaurant and small bar scene is growing rapidly. Beyond Perth there are areas of outstanding beauty, where you can experience diverse wildlife and natural wonders.

CAREERHUB
CareerHub is our comprehensive job search engine displaying part-time and full-time vacancies, tailored career resources and access to a suite of on-campus, discipline-specific workshops and employer events. careerhub.curtin.edu.au

GLOBAL CAREERS
Global Careers connects you with employers around the world. You can view hundreds of job opportunities advertised by some of the world’s largest and most prestigious employers, and can search for jobs based on your course of study, citizenship and individual working rights.

globalcareers.curtin.edu.au

CAREERWHILE YOU STUDY
If you are an international student, some student visas will allow you to work up to 40 hours per fortnight during semester and full-time during holiday periods.

For more information on moving to Perth to study, see international.curtin.edu.au.

Our 30,194 science and engineering alumni live in more than 114 countries around the world.