PUTTING THE WONDER BACK INTO SCIENCE

DR. DANIEL ELDRIDGE
COURSE DIRECTOR
BACHELOR OF SCIENCE
350 undergraduate students in:

- Applied Mathematics
- Physics
- Chemistry
- Biochemistry
- Biotechnology
- Environmental Science

We also have over 150 research students in science
BACHELOR OF SCIENCE

Course structure (single degree = 24 units)

Core 8 Units + Major 8 Units + 2nd major or Co-Major 8 Units

OR 2nd major or Co-Major 8 Units + Minor (4 units)

OR Minor (4 units) + Elective

OR Elective

OR Elective

OR Elective

OR Elective

OR Elective

OR Elective
SCIENCE AT SWINBURNE

Applied Mathematics
• Provides the tools to model fundamental processes in sciences, industry, social sciences, consumer behaviour and finance.

Physics
• Develop a fundamental understanding of how our natural and technologically driven world works.
• For creative thinkers and problem solvers.
Chemistry

- Fundamental science of how reactions occur, particularly at a molecular level
- Study of matter around us and how we can manipulate it to suit our needs

Environmental Science

- Integrates physical and biological studies towards application to the environment
- Emphasise the underpinning science, including measurement, laboratory testing and management of the environment
SCIENCE AT SWINBURNE

**Biochemistry**

- Chemical and physical-chemical processes and substances that occur in living organisms
- Closely related to molecular biology, the study of biological mechanisms and macromolecules

**Biotechnology**

- Employing living organisms (or parts of organisms) to make or modify products, improve plants or animals
- Emphasis on the cellular and molecular level control of biology
EXAMPLE: BACHELOR OF SCIENCE

Biotechnology major, chemistry minor, environmental science minor

**Core**
- Biology
- Chemistry
- Physics
- Maths
- e-science
- Communication

**Grand Challenge**

**8 Units**

**Biotechnology Major**
- Biotechnology
- Microbiology
- Biochemistry

**Chemistry**

**8 Units**

**Environmental Science**

**8 Units**
EXAMPLE: BACHELOR OF SCIENCE

Physics major, applied mathematics minor, 4 electives

Core
- Biology
- Chemistry
- Physics
- Maths
- e-science
- Communication

Grand Challenge
8 Units

Physics Major
- Physics
- Astronomy
- Quantum

8 Units

Applied Mathematics

8 Units

Elective
Elective
Elective
Elective
Elective
Chemistry major, environmental science major

Core
- Biology
- Chemistry
- Physics
- Maths
- e-science
- Communication

**Grand Challenge**

8 Units

Chemistry Major
- Analytical
- Physical
- Organic

8 Units

Environmental Science Major
- Water Science
- Environmental Biology
- Food Chemistry

8 Units
WHY SCIENCE AT SWINBURNE?

- Small classes
- Personal interactions
- Hands-on experiences
- Easily accessible
- Campus accommodation
- ARWU Top 200 Science
- Strong research exposure
LEARNING AND TEACHING

Students are well supported both on campus and online

“It is so much more helpful to have an actual person explain something to me than go on the internet”

MASH is our drop in centre for one-to-one help

Casting program provides 700+ how to videos
THE SWINBURNE ADVANTAGE

Professional Degrees
Gain the advantage with degrees that incorporate a 12-month full-time professional placement with a leading employer.

Work placements
Get the edge on other graduates with work experience in a paid six or 12-month full-time professional placement.

Professional Internships
Learn from the experts. We pair you with a host organisation for a minimum of 18 full days.

Industry-linked projects
Take the challenge of working in a team to fulfil a client brief from start to finish.

Accreditation placements
Fulfill your degree requirements while getting experience with well-regarded organisations.

Industry study tours
Discover how the world does business.
CAREERS

• Academia (universities and research)
• Agriculture (wine industry, horticulture)
• Analytical labs (drug screening)
• Business (analyst)
• Communications (media, public outreach, museums)
• Defence Science
• Education (primary and secondary teaching)
• Environment (bioremediation, water companies)
• Finance (Data scientist, banking, stock exchange, modelling)
• Food and beverage industry
• Forensics (DNA typing, crime scene investigation)
• Government (policy advisors)
• Health Industry (hospital labs, research labs)
• Industry
• Pharmaceutical industry
• Public health (government departments, hospitals)
• Research and Development
• Technical Sales
RESEARCH OPPORTUNITIES

- Big Bang Cosmology
- Galaxies and Globular Clusters
- Pulsars
- Stars and Planet Formation
- Supermassive Black Holes
- Gravitational Wave Astronomy
- Access to Keck observatories
- Access to Parks radio telescope
- Physical applied mathematics
- Dynamical systems
- Mathematical biology

- Microfabrication
- Nanofabrication facility
- Neuroimaging facility
- Nanophotonics and nanoplasmonics
- Laser assisted manufacturing
- Solar cell fabrication plant
- Ultrafast laser spectroscopy
- Ultracold Atomic Physics
- Theoretical Physics
- Quantum Gases
- Biophysics
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RESEARCH OPPORTUNITIES

• Nanomaterials
• Drug delivery
• Nanobiotechnology
• Antimicrobial materials and surfaces
• Biointerface science and biomaterials
• Tissue engineering /regenerative medicine
• Smart coatings

• Surface Science
• Analytical chemistry
• Electrochemistry
• Molecular modelling
• Theoretical chemistry
• Spectroscopy
• Inorganic catalysis
• Polymers
SPACE TECHNOLOGY
AT SWINBURNE

PROF. VIRGINIA KILBORN
DEAN, SCHOOL OF SCIENCE
THE NEW SPACE INDUSTRY – WHAT DOES IT ENCOMPASS?

- Earth and moon, planetary exploration
- Earth observation & communications via satellites
- Solar weather
- Astronomy (except space telescopes)
SPACE INDUSTRY LANDSCAPE

STRATEGIC SPACE PILLARS

INTERNATIONAL
Open doors
Leverage international bilateral and multilateral partnerships that, where consistent with our national interests, open the door for Australian innovators and grow a connected, respected, and globally competitive space industry in Australia.

NATIONAL
Increase capability
From our areas of strength and addressing our challenges, transform and grow an Australian space sector that lifts the broader economy, and leaps into areas of future competitive advantage.

RESPONSIBLE
Regulation, risk, and culture
Promote a space sector culture that is globally respected, ensures national safety and security under an appropriate regulatory framework, and meets international obligations and norms.

INSPIRE
Build future workforce
Partner in a vision to build an Australian space sector that inspires industry, researchers, government and the Australian community to grow the next generation of the space workforce.

FORECAST: GLOBAL SPACE INDUSTRY WORTH

2018
US$350 billion

2040
US$1.1 trillion

2018
A$3.9 billion

2030
30,000 JOBS

A$12 billion

Image credits: Australian Space agency
WEATHER MONITORING

Image Credit: NASA
Digital Earth Australia Hotspots

Australian Government
Geoscience Australia
Digital Earth Australia
Goverment of Western Australia
Landgate

Bushfire Monitoring
RESOURCE MANAGEMENT: WATER

Image credit: Digital Earth Australia
COMMUNICATIONS
SATELLITE TRACKING - GPS

7 billion GPS devices currently - accuracy 5-10m
Expected >10 billion devices, accuracy a few m by 2023
AUTONOMOUS FARM VEHICLES

Image credit: ASI

Image credit: John Deere
SATELLITE LIVESTOCK MONITORING

Image credit: Globalstar

Image Credit: Hayley Warden/The Courier
SPACE TOURISM
NASA AIMS TO RETURN TO THE MOON BY 2024

Artemis program to send a man and woman to the moon

Image credit: NASA
SPACE TECHNOLOGY CO-MAJOR: ANYONE CAN STUDY SPACE AT SWINBURNE

- 8-unit co-major available from 2021
- Designed to prepare students to contribute to the growing space industry in Australia and internationally
- Provides students real industry projects, working with the space industry in 3 projects
- Applying their degree (e.g. Science, IT, Engineering – even marketing) to the space industry
- Opportunities to work with researchers at Swinburne – and even to launch experiments into Space
Swinburne University & Haileybury College

Secondary Students

University Students

University Staff
Work Experience

Project Management

Teamwork

Image credits: Swinburne
*Short Courses  
*Outreach and education  
*Industry projects  
*Space Consultation  
*Fundamental research  

Email: spacevic@swin.edu.au
PANEL

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- DR ANT EDWARDS SENIOR LECTURER
- NICOLE DARMAN ANALYTICS LEARNING AND DEVELOPMENT COORDINATOR, NAB
- SIMONE WISNIEWSKI, TALENT AND DESIGN ANALYST, NAB