THE UNIVERSITY OF SYDNEY

Your study guide

Physics

Physics

Physics explores the fundamental structure of the universe, starting with the smallest subatomic particles. It provides the foundation for modern technology, from smartphones and tablet computers to advanced biomedical devices.

A grounding in physics will nurture your curious mind, enabling you to become an expert problem solver no matter what career or industry you choose.

Why study physics at Sydney?

The School of Physics at the University of Sydney is the leading physics department in the country,* with outstanding staff and students undertaking the highest quality teaching and research.

With access to supercomputers, modern laboratories, research facilities and observatories, locally, nationally and internationally, the School of Physics provides an exceptional environment in which to learn, collaborate and thrive.

Launched in 2016, the University of Sydney Nano Institute is an exemplar of investment in the future of technology. The institute has initiated a multi-year partnership with Microsoft, creating an unrivalled setting and foundation for quantum research in Sydney and Australia.

Corporate partnerships are also being established with the University of Sydney spin-off company Q-CTRL, recently chosen to collaborate with IBM. This opportunity will give our staff access to IBM's world-leading quantum technology.

It's an exciting time to study physics at the University of Sydney.

* US News Rankings by Subject, 2018

What study options are available in physics?

To complete a major in physics, you can enrol in our Bachelor of Science degree, combined Bachelor of Science/Bachelor of Advanced Studies or the Bachelor of Liberal Arts and Science.

It is also possible to pick up physics as a second major or minor through many other degrees offered within and outside the Faculty of Science.

You can also study individual physics units of study as electives alongside a different major. This will help you become a well-rounded graduate with strong problem-solving skills.

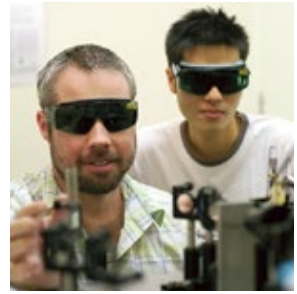
During your first semester, you will take certain types of physics units of study, based on your prior knowledge and achievements. These units include:

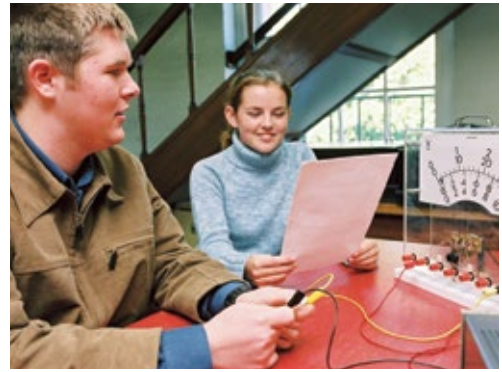
- Fundamentals: for students who have not studied physics before or had difficulty in the HSC. This type of unit of study will teach you the language and style of thinking required for university-level physics.
- Regular: for students who achieved a mark of 65 or more in HSC Physics.
- Advanced: for students wanting to study more challenging topics and who have a strong background in physics, achieving a mark of 85 or more in HSC Physics; and Mathematics Extension 1 or 2.
- Special Studies Program: for advanced students with a mark of 92 or more in HSC Physics.

In your second semester, you will be able to start designing your future career based on the area of physics that interests you most. You can choose between technological physics and environmental physics, or continue in your Advanced or Special Studies Program stream.

While completing your choice of introductory physics units in first year, you will also be required to study mathematics as a compulsory subject.

In second and third year, you can take physics units including quantum physics, special relativity, condensed-matter physics, astrophysics, computational physics, plasma physics, modern optics, biophysics and high-energy physics.





How can I prepare?

If you're planning to enrol in a science degree at the University of Sydney, it is a prerequisite that you study HSC Mathematics (not Mathematics General) and attain a Band 4 or above (or equivalent).

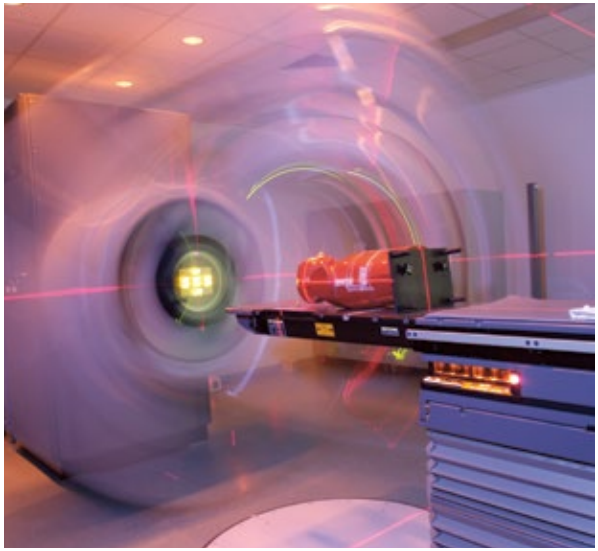
HSC Physics is assumed knowledge for first year units, with the exception of Fundamental units. Studying physics, plus an additional science subject in your senior studies will help to support your study in other areas within the Bachelor of Science.

If you haven't studied physics during the HSC, we recommend you enrol in a bridging course before the university year begins. This will help you pick up fundamental ideas and skills needed for first-year lectures and laboratory sessions.

– sydney.edu.au/science/physics-bridging

To find out what your degree might look like, check out these sample course plans that map subjects related to physics as well as other science options.

– sydney.edu.au/science/sample-plans



What's it like studying physics at Sydney?

Studying physics at the University of Sydney exposes you to various learning environments which will enhance your ability to work independently as well as in a group setting.

Lectures introduce important concepts in physics; laboratory experiments teach you how to test theories and interpret data; and interactive workshops and tutorials provide a hands-on opportunity to explore and discuss physics concepts.

What opportunities are available for talented students?

The Dalyell Scholars program is offered to students with an ATAR (or equivalent) of 98+ or more. The program lets you broaden your knowledge of physics and gain insights into the way physicists conduct their research.

You will be assigned an academic mentor who will arrange special activities for you throughout the year. Along with Advanced or Special Studies Program coursework, you will participate in exclusive seminars, projects and excursions, such as to the radio telescope at Parkes or the Tidbinbilla deep-space tracking station in Canberra.

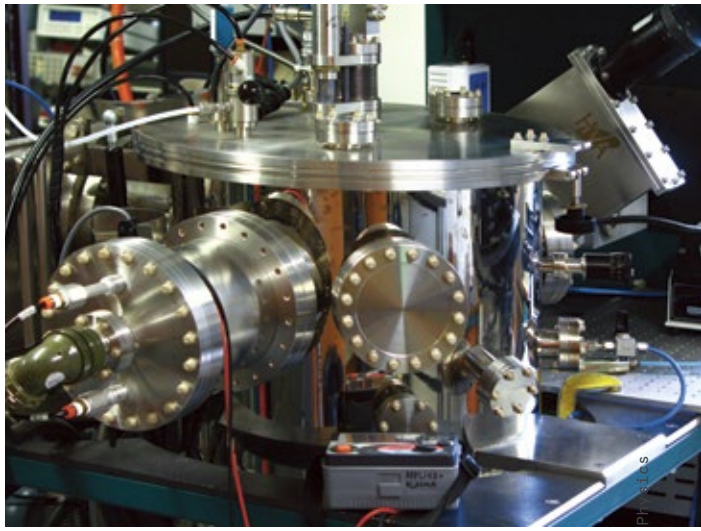
– sydney.edu.au/dalyell-scholars

In addition to the three years of the Bachelor of Science, you may wish to study for an additional fourth year with the Bachelor of Advanced Studies.

Advanced coursework and research pathways (honours) are also available. Honours involves undertaking an original research project with one of the research groups in the School of Physics.

To pursue a career in physics research, you may wish to continue in postgraduate study and complete a master's degree by research or a Doctor of Philosophy (PhD).

– sydney.edu.au/pg-research



What careers await?

As a physics graduate, your choices are extensive. You could conduct research and development in universities or industry, become a high-level analyst or educator, or apply your problem-solving abilities to the world of business. Physics graduates work in next-generation computing, nanoscience, artificial intelligence, medical science and the financial sector, as well as big data and technological companies, such as Google and Spotify.

Our physics graduates have become politicians and business leaders, teachers, journalists, managers, financiers and IT professionals. Many have found employment in companies such as Telstra, BHP Billiton, and Canon, and research organisations such as CSIRO, DSTO and NASA.

Graduate career timeline

Dr Alice Mahoney established her successful career as a quantum engineer after studying at the University of Sydney. Where will physics take you?

2008
Enrolled in Bachelor of Science

2011
Completed honours in quantum physics

2017
Lead author on paper with academics from Stanford and UCLA demonstrating a circuit component for quantum computing.

2017
PhD in experimental physics

2017–present
Quantum engineer with Microsoft at the University of Sydney

Physics is the truly universal science.

From the smallest subatomic particle to the entire universe, physics uncovers a picture of the world that is constantly changing.

Expand your knowledge of this game-changing science and build the foundations for a career that will take you places.

sydney.edu.au/science/physics

sydney.edu.au

The University of Sydney

CRICOS 00026A

18/7534

Produced by Marketing and Communications, the University of Sydney, July 2018. The University reserves the right to make alterations to any information contained within this publication without notice.