

Physics FAQ

We have collected below some common questions from prospective undergraduate students about studying physics. Click on a question below to jump to the answer.

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- [Senior \(3rd Year\)](#)
- [Honours \(4th Year\)](#)

The "Units offered" web page for each year includes links to detailed Unit Outlines which describe the course content. Also see the pages describing "How to Choose your options" for each year.

Information about topics such as HECS fees, scholarships, applying to the university and transferring from other universities may be found on the University's [Future Students - Study at Sydney](#) page.

Frequently Asked Questions:

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1. What is junior (first year) physics like?

Over 1200 students take some of the Junior (first year) Physics units each year. In each unit you will participate in lecture classes that usually contain between 100 and 150 students. That may seem large compared with high school classes, but don't worry — you will have ample opportunity to meet and work with smaller groups of students.

In most Physics units you will work closely each week with a group of two other students to understand and carry out a physics experiment in the first year experimental laboratory. To help you work through the ideas presented in lectures, the School has developed the popular Interactive Tutorial Workshops — for one hour a week you will join a group of three or four other students to examine physics idea together, discuss concepts and "play" with hands-on demonstrations in a relaxed and open atmosphere.

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2. Why should i do physics in my first year of university?

Physics is good training for more than Physics! To quote Dr Karl Kruszelnicki:
"Physics teaches you to be a good scientist. You learn how to work out what the problem is, and then, how to solve it.... You will learn how to design experiments, how to make measurements, and how to analyse your results. Note one very important thing — you are learning how to be any type of scientist, not just a Physicist."

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3. Is junior (first year) physics the same as hsc physics?

Junior (first year) Physics covers many of the subject areas you may have encountered in HSC Physics, but it isn't just a repeat. The university course builds on the interest and understanding promoted by the HSC syllabus. It aims to provide a solid mathematical and theoretical understanding of the core areas of Physics — plus some areas new to you such as Thermal Physics. It also develops your experimental abilities. After a year we hope you will begin to see the relationships between different areas of Physics, be able to use important concepts to solve problems using words, equations and experiments as the situation requires.

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4. What HSC subjects should i take if i want to do physics at university?

Many subjects at university tend to assume you have done those subjects at high school. If you want to do some physics at university, you will probably also be doing some mathematics, so you should study physics and maths for the HSC, along with whatever else interests you. If you intend to major in physics in a BSc degree, it would be a good idea to take another science subject at the HSC.

In junior (first year) physics at university, the Fundamentals stream is designed for students who do not have a strong background in physics. Taking the Fundamentals course in your first year gives you the opportunity to do physics in subsequent years, even without HSC physics.

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5. I haven't done physics at the HSC, what physics can i do? How hard is it?

If you haven't done physics at the HSC, Physics: a Bridging Course, which runs for 7 days before first semester starts, is a good start for you, and also for other students who need to refresh their knowledge after a break from study or who have tried physics and found it difficult. It is not compulsory and is certainly not taken by all students with no background in Physics. However it does provide a general introduction to physics so that you have the skills to understand the lecture and laboratory material presented in the main physics units.

Physics has a reputation for being hard, but the School of Physics offers a variety of units tailored to your interests and abilities. If you haven't done physics at the HSC, the Fundamentals physics unit is your best introduction to university physics. It starts with a module called 'The Language of Physics' which is intended to get you thinking and talking like a physics student, ready to learn more in the following modules. You can be even better prepared by doing the Physics Bridging Course before first semester starts.

Choosing the right option is the first step, but then putting in a consistent effort throughout the semester will produce the right result for you. If you do encounter any problems, you should feel free to ask your lecturers and tutors for some assistance.

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6. Should I do a physics bridging course?

If you haven't done physics at the HSC, Physics: a Bridging Course, which runs for 7 days before first semester starts, is a good start for you, and also for other students who need to refresh their knowledge after a break from study or who have tried physics and found it difficult. It is not the same as the 'Language of Physics' module that introduces the Physics Fundamentals unit of study in semester one.

The Bridging course is not compulsory and costs money and is certainly not taken by all students with no background in Physics. However it does provide a general introduction to physics so that you have the skills to understand the lecture and laboratory material presented in the main physics units.

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7. What is the difference in content between fundamentals, regular and advanced physics units?

The choice of first semester units — Fundamentals, Regular and Advanced - should be based on your background in Physics from School. The Fundamentals option is primarily for those who have not studied physics before. The Regular option is for those who studied physics at high school level. Students who have a strong background in physics and an interest in studying more advanced topics should choose Advanced. The content of the different first semester units — Fundamental, Regular and Advanced — is quite similar. All three do lecture modules on Mechanics and Waves. Regular and Advanced do Thermal Physics whereas Fundamental are introduced to university physics in a module called 'The Language of Physics'. The Advanced unit covers a little more material than the Regular, and in greater mathematical detail, so it must move along more quickly. However, in the end, students have covered much of the same areas of Physics and are prepared to make a choice of second semester units based on their interests.

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8. If I enrol in one of the first semester physics streams (fundamentals, regular or advanced) can i change streams later on?

The physics units in first semester run roughly in parallel to each other so transfer from one to the other is possible. At the end of first semester you choose another unit anyway, so a choice at the start of first semester doesn't commit you to one sort of physics for too long.

If you are considering a transfer between streams during semester, talk to your lecturer or tutors for advice. It is in your interests to get into the right unit for you as soon as possible. Note however that a change in units is a change in your university enrolment and therefore must be completed through the student centre.

We expect that most changes in units will be completed within the first week or two of semester. Changes will not normally be permitted after the HECS payment date (3 or 4 weeks into semester).

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9. I've done physics at the HSC. Can I do fundamentals and maximise my mark?

We recommend choices in units based on your background or interests, but in most cases you are free to choose your own units. You should be aware that, just as in the HSC, final marks in Physics units are scaled on the basis of the group of students you study with. This means that more high grades are awarded in the Advanced class than in other streams because Advanced students typically do better on common questions we set in exams. This does NOT mean that you can't get the highest grades in, say, the Fundamentals unit. Hard work in any Physics unit will be rewarded with good results.

The best advice is to choose the Physics unit best suited to your experience and interests. You will find that unit most satisfying and are likely to do best in it.

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10. I'd like to do advanced physics. What do i have to do?

If you are good at Physics and keen to study at a high level, then Advanced Physics may be for you.

To qualify for the Advanced class you must have an HSC Physics mark of 85 or better (or an equivalent standard). It is possible to change your enrolment after your first semester. You may enrol in PHYS 1902 Advanced on successfully completing PHYS 1901 Advanced (or vice versa) or on consultation with the Head of Junior Physics if you gain Distinction or better (75 or above) in the Junior Physics courses at the normal level.

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11. I don't have the marks for advanced physics but my heart is set on majoring in physics. What should i do?

Majoring in Physics does not mean you must do Advanced Physics, although many students do. You can enrol in Regular Physics in semester 1 (Technological or Environmental in semester 2)

and concentrate on doing as well as you can. See how your interest develops from there. If you do very well (Distinction or better) in your first semester you can transfer to the Advanced class, or you may choose to continue in the Regular class.

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12. I have a high ATAR but haven't done physics before. Should I do advanced physics?

Simply having a high ATAR is not all it takes to be ready for Advanced Physics. Some very capable students have been successful in Advanced Physics in the past, despite having no background in HSC Physics. Others have succeeded with only Year 11 Physics behind them. However in general we would recommend you start in the Fundamentals unit. Success in that unit will prepare you well for a subsequent move into Advanced Physics.

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13. I'm doing advanced science and the science handbook advises me not to do more than two subjects at the advanced level. Can I do more?

Our experience is that students with a ATAR above 98 can probably cope with three Advanced subjects, but you need to monitor your own progress carefully. If you find the workload too high, then don't be afraid to move to the Normal level unit. Its far better to do that than let all your subjects suffer. The Physics timetable has parallel Normal and Advanced lectures so changing Physics units can easy.

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14. What maths should I do?

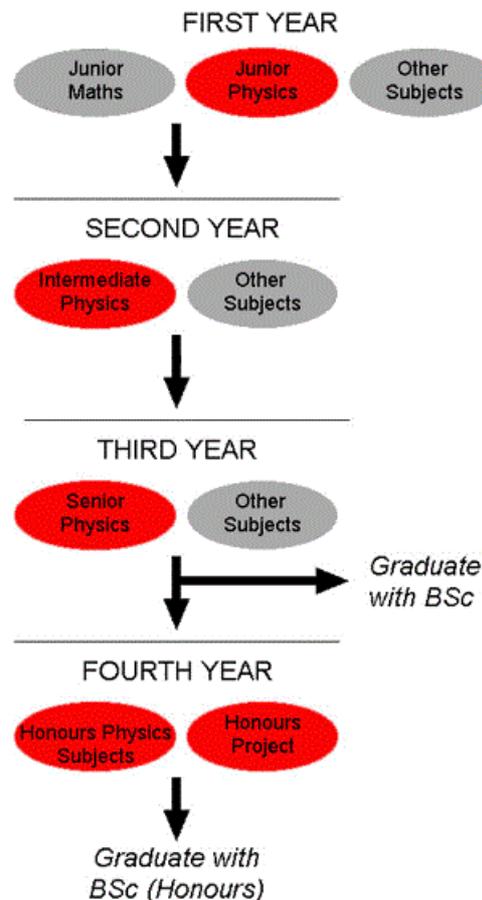
Most science student must do some mathematics in their junior (first) year, and from 2019, mathematics is a prerequisite for most science degrees. Ensure you read the admission requirements for any course you apply for.

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15. What does a Bachelor of Science degree majoring in physics look like?

You can begin a career in physics with a BSc degree majoring in physics. In your first year you will study some physics and mathematics. You will also be able to choose from a range of other subjects — some of these must be science subjects, others can be from other faculties such as Arts and Economics. You can also study physics as part of another subject area such as Engineering or Arts. Choose units based on your interests and you are more likely to do well.

If you continue with physics in second and third year you can then choose either to graduate with a BSc degree, or do a fourth year of physics study involving your own research project. After the fourth year, you graduate with a BSc with Honours in Physics. Your degree will be a solid basis for seeking employment or can lead to further study



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16. Why should I choose Sydney to major in physics?

If you are keen on Physics, we want you to study at the University of Sydney. With a staff of over 20 active researchers teaching you, plus an environment with many postdoctoral research staff and research students, the School of Physics at Sydney provides a dynamic research-driven basis to its teaching programme. If you want to learn about astrophysics or solid state computational physics (to pick two examples), you will do best to be taught by staff keen to describe their own field of research.

We are committed to excellence in teaching (several staff have Excellence in Teaching awards) and our Dalryell Scholars Program is designed to stimulate the highest achievers.

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17. Can i do both science and engineering?

Combined degrees are available with Science paired with other disciplines such as Law or Commerce. One popular choice for physics students is Science/Engineering. The BSc degree emphasises fundamental principles of science and technology, while the BE emphasises applied aspects. Together they expand your scientific or technological career options.

On their own, the BSc takes 3 years to complete and the BE takes 4. However a suitable study programme can give you both degrees in 5 years.

The combined programme allows for major study in two science disciplines, undertaking science

subjects in each year of your course. The double degree path has you taking engineering for the first two years of your course, moving to science in the third year to complete your BSc, and then returning to engineering to complete your BE. This is a popular option for students in the School of Electrical and Information Engineering.

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18. What jobs are there for physicists?

A degree in physics allows you great freedom of choice in your future employment. Instead of preparing you for a narrow career path, studying physics provides you with very desirable skill for a wide range of workplaces — problem solving, information handling, critical reasoning and logical thought, clear communication, computer skills.

After completing a physics degree you may well end up as a professional physicist. You will also discover that the skills you have picked up in the course of your degree are perfectly suited for a job in medicine, IT, finance, communications, journalism, industry management, manufacturing ... and many other rewarding careers.

You can find more information about career options in physics from the jobs in physics web page.

Make yourself employable — get a degree in physics.

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19. What is the physics Dalyell Scholars Program like?

The Physics Dalyell Scholars Program extends the physics course by special seminars and project work, together with a major excursion to a location of interest. The seminar work has a theme each year. The special project work introduces the students to research activities and other staff members in the School. The aim is to broaden your knowledge of physics and give you an insight into how physicists think and how a real research project is tackled. Projects last year included studies of Quantum Teleportation, variation of the Fine Structure Constant, self-organised Clouds, and a variety of Astrophysical projects.

Entry into the program for first year students is via an invitation from the Dean of Science on the basis of ATAR score.

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20. I'm a top physics student. Why should I come to Sydney?

If you are one of the top Physics students (perhaps a Physics Olympiad medallist), we are keen to have you in Physics at the University of Sydney. A programme can be tailored to your interest and abilities, offering for example the possibility of direct entry into Intermediate (2nd year) Physics, special scholarships, plus the TSP programme. More information is available from the School or the Faculty of Science.

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21. What astronomy can I do in the physics course?

There is no "Astronomy degree" at the University of Sydney or most Australian universities (and even where there is, they are largely "re-badged" Physics courses). Astronomy is integrated into our Physics course, with Astronomy units in each undergraduate year, building on the School of Physics' internationally recognised research strength in Astronomy/Astrophysics. The junior astronomy unit (PHYS 1500) is an introduction to astronomical ideas for both science and

non-science students and may be taken alone or in combination with another junior physics unit. Units and projects in later years integrate astronomy into the Physics programme and can lead into the School's research programme. Students become closely involved in astronomical research in the Honours (4th) year and during a postgraduate MSc or PhD.

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22. How do I become an astronomer/astrophysicist?

One place to start with this question is the [Astronomical Society of Australia's](#) Information Sheet — [How to Become an Astronomer](#). The usual path is via a BSc majoring in Physics, an Honours year and then a PhD. Of course these different stages might be completed at different universities in Australia or even overseas.

You should concentrate on doing as well as possible in your various courses. Good results in Physics (preferably Advanced) and Maths will leave you well placed to pursue astronomy/astrophysics when choices need to be made in 3rd and 4th year.

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23. What is medical physics?

Medical Physics is the field in which physical scientists apply their knowledge and training in many different areas of medicine including the treatment of cancer, medical imaging, physiological monitoring and medical electronics. There are good job prospects within Australia and overseas for people with a qualification (usually a Masters degree) in Medical Physics.

The School of Physics offers units related to Medical Physics in each year after first year and a coursework Master of Medical Physics degree (M.Med.Phys.) or a Graduate Diploma in Medical Physics (Grad.Dip.Med.Phys.) as postgraduate courses. See the School's web pages on Courses in Medical Physics web pages for more information.

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24. What is computational science (COSC)?

Computational science (COSC) is the application of computers to the solution of scientific problems. It covers the formulation and analysis of problems, the use of software packages and programs to solve these problems computationally, simulations and modelling, mathematical and numerical analysis, high-performance supercomputing, graphics, visualisation, and programming. Computational science differs from computer science in that the emphasis is on solving problems in the natural sciences, i.e. physics, chemistry, biology, geology, etc.

The School of Physics offers a COSC unit at Junior level that you may wish to choose alongside other Physics units. For information see Sydney Courses website.

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25. What is nanoscience?

Nanoscience is the emerging science of working with and building structures to the scale of 10 – 10,000 atoms (nanometre to micrometre sizes). Nanoscience includes concepts of how to analyse, measure and visualise structures of molecular dimensions, the design of new materials with specific properties and the study of how molecules interact with each other to form stable structures.

Nanoscience and Technology is an interdisciplinary Major comprising units of study offered by

several Schools and Departments in the faculties of Science and Engineering. As for all majors, it is defined by choices in your Senior (3rd) year but these depend on your choices in earlier years. In your first year you will be studying units in Physics, Maths, Chemistry and Engineering. By your third year you will probably be majoring in Physics and Chemistry.

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26. How do I become an astronaut?

We will assume you mean a NASA astronaut, since it's probably impossible for a non-Russian to get into the cosmonaut corps (paying passengers are not professional cosmonauts), and the other nations have few astronauts (and fly even fewer). Becoming a flight commander or astronaut pilot requires lots of fast-jet experience, which means a military flying career; forget that unless you want to do it anyway. So we'll assume you want to become a shuttle "mission specialist".

Get a PhD. Specialize in something that involves getting your hands dirty with equipment, not just paper and pencil. Physics is an excellent choice, and you may wish to emphasise Astronomy/Astrophysics. An alternate path might be through Engineering. For example there is a course at the University of Sydney called Aeronautical/Space Engineering.

Other suggestions frequently made:

If you aren't a US citizen, become one. Be in good physical condition, with good eyesight. Practise public speaking. Get a pilot's license and make flying your number one hobby. Work for NASA. Think space: they want highly motivated people, so lose no chance to demonstrate motivation. Keep trying — many astronauts didn't make it the first time.

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27. Who can i ask if I can't find my question answered here?

If you have a question — about undergraduate physics or anything else - that is not answered here or elsewhere on our web pages, please let us know. Contact Physics Student Services at physics.studentservices@sydney.edu.au or phone +61 2 9351 3037.