THE UNIVERSITY OF AUCKLAND
FACULTY OF SCIENCE

2014

Faculty of Science
Physics Handbook

Contents

Disclaimer

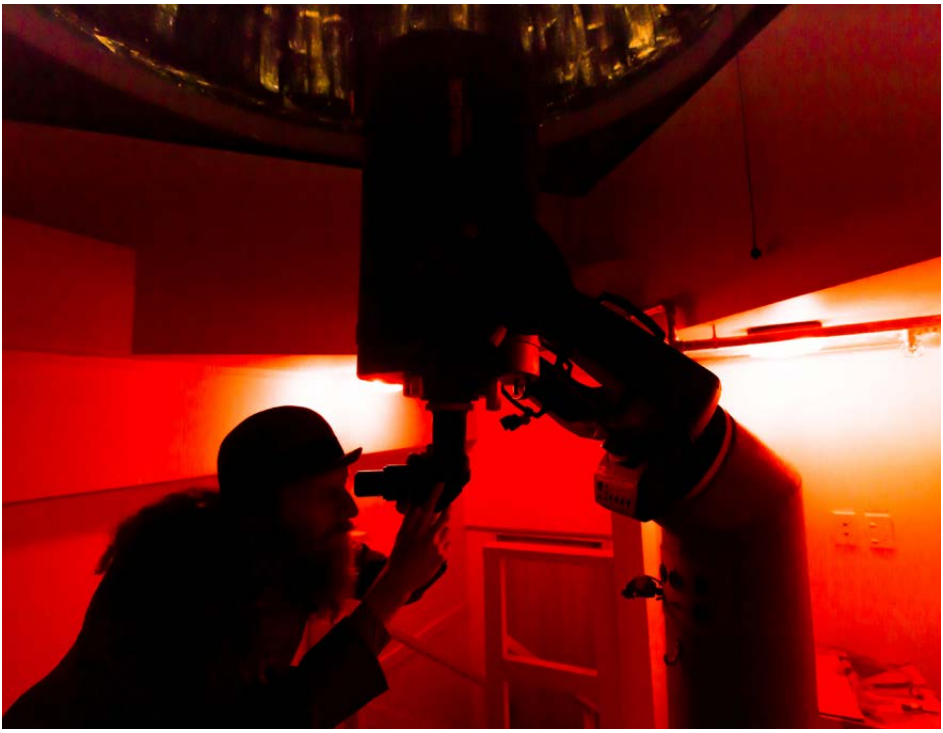
Although every reasonable effort is made to ensure accuracy, the information in this document is provided as a general guide only for students and is subject to alteration. All students enrolling at the University of Auckland must consult its official document, the University of Auckland Calendar, to ensure that they are aware of and comply with all regulations, requirements and policies.

Welcome to the Department of Physics at the University of Auckland

A Physics degree opens the door to a huge range of opportunities, and our vibrant research programme illustrates the enormous variety of topics tackled by physicists – and physics students!

Physicists seek to discover and understand the fundamental laws of nature: at Auckland, we explore the physics of the big bang, participate in particle physics experiments at the Large Hadron Collider in Geneva, and investigate the quantum properties of light and matter.

Physics underpins the natural world and biological systems. Auckland physicists discover planets around distant stars, work on understanding the earth's climate, probe the interior of the earth, and determine how bacterial colonies grow and thrive. We create new tools and technologies, on our own and in close collaboration with industry. Auckland physicists are building new kinds of lasers, diagnosing illnesses in living tissue, measuring airflow around wind turbines, and creating powerful new laser micromachining techniques.



Students in many fields need a sound understanding of the physical world. We are pleased to offer courses for medical and biomedical science students, and courses in astronomy and energy open to any interested student.

Those seeking a deeper understanding of physics pursue the BSc and BSc(Hons) degrees with a major in physics, and the research-based MSc and PhD. The department contributes to the Geophysics major and the Bachelor of Technology (BTech) degree, including the Medical Physics and Imaging Technology (MPIT) and Optoelectronics specialisations.

Our students work in a friendly and supportive environment and we are proud to see our graduates go on to exciting, meaningful jobs in New Zealand and internationally.

The University of Auckland has the largest Department of Physics of any university in New Zealand and several new staff members have recently joined the department, working in astrophysics, theoretical physics, cosmology and geophysics.

We are happy to answer questions from prospective students – contact me, or one of the Level Advisers listed on Pg. 5.

PROFESSOR RICHARD EASTHER
Head of Department
r.easther@auckland.ac.nz

Contacts

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Stage I	Mark Conway	303 G03	88864
Stage II	Prof Stuart Bradley	303.701	88886
Stage III	A-Prof Peter Wills	303.709	88889
Stage IV (Hons, PGDipSci)	Dr David Krofcheck	303.711	88897
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BTech Optoelectronics	Dr Stuart Murdoch	303.621	85871
BTech Medical Physics and Imaging Technology	Dr Frédérique Vanholsbeeck	303.613	88881
Geophysics	Dr Kasper van Wijk	303.705	85754
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Department of Physics
Building 303, 38 Princes Street, Private Bag 92019, Auckland 1142, New Zealand
Email: physics@auckland.ac.nz | www.physics.auckland.ac.nz

Important dates

Closing dates for application for admission in 2014	
1 December 2013	Deadline for new students to submit Application for Admission if 2014 programme includes Summer School courses. Application for Admission also closes 1 December for all students applying to Sport and Exercise Science.
8 December 2013	Deadline for new students to submit Application for Admission if 2014 programme includes Semester One and Semester Two courses only. If you are a new student, only one Application for Admission is required. This form is due on either 1 December or 8 December, depending on whether you want to take Summer School courses as well. Applications received after these dates may be accepted if there are places available.

Academic dates

Semester One begins on Monday 3 March 2014. For a full list of the 2014 academic dates, visit www.auckland.ac.nz/dates.

Admission and enrolment procedures

Entry requirements

For information about admission into Stage I courses in 2014, please see www.auckland.ac.nz/admissions.

New students

For ALL students not enrolled at the University of Auckland in 2013, apply online at www.auckland.ac.nz/applynow. If you are unable to access our website, please call 0800 61 62 63 or visit the Student Information Centre.

Student Information Centre
Room 112
Level 1 (Ground Floor)
The ClockTower Building
22 Princes Street
Auckland City Campus

Phone: +64 9 923 1969 or 0800 61 62 63
Email: studentinfo@auckland.ac.nz
Open: Monday to Friday from 8am–6pm, and Saturday 9am–12noon during peak times.

The closing date for most undergraduate science applications is 8 December 2013.

If you want to take courses at Summer School, or wish to apply to Sport and Exercise Science, applications close 1 December 2013.

Only one application is required.

After submitting your application:

Your application will be acknowledged by email. Your application will be assessed and, if successful, you will receive an "Offer of a place in a programme", normally from mid-January. You may receive a conditional offer, but final approval will be dependent on fulfilment of the conditions of admission to the University and the programme.

During the application process, you will be given a Student ID number which will allow you to sign into your Application for Admission. Here you will be able to monitor the progress of your application and check if further documentation is required.

Once you have accepted an offer of place, you will gain access to the Enrolment module on Student Services Online. You can then proceed to enrol in courses online. Postgraduate students may need to contact their department for enrolment to be completed.

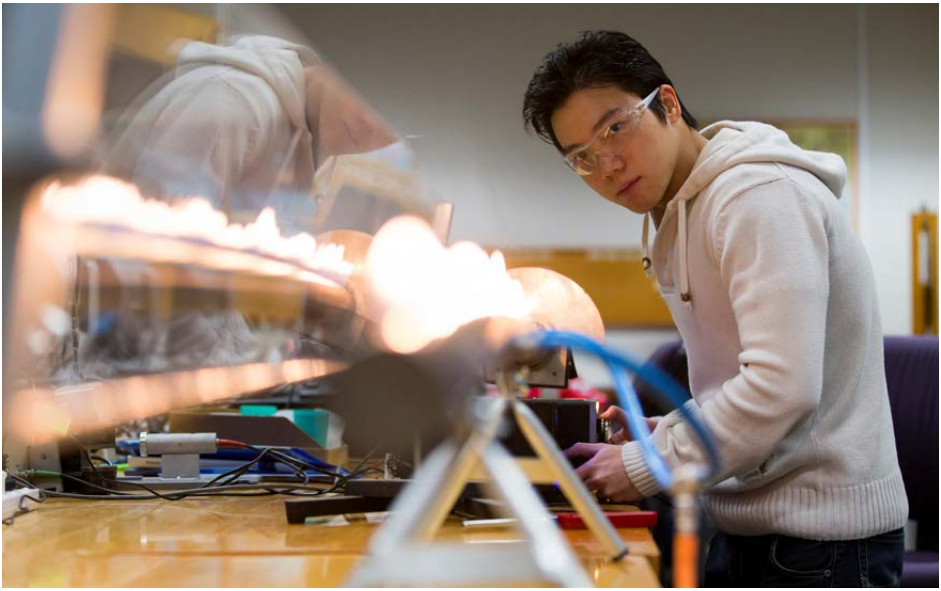
Help with enrolling
If you have accepted an offer of a place in a programme and are ready to enrol, go to www.studentservices.auckland.ac.nz.

You will find all the information you need on enrolling in your courses, as well as tutorials to help you through the process.

Returning students

If you are currently enrolled at the University of Auckland in 2013 and are applying for a new programme (for example MSc after completion of BSc(Hons)), you should apply using Student Services Online. Visit www.apply.auckland.ac.nz.

You will be able to enrol through Student Services Online, but if you would like help, please call 0800 61 62 63, visit the Student Information Centre or the Faculty of Science Student Centre



(Ground Floor, Building 301, 23 Symonds Street). Postgraduate students may need to contact their department for enrolment to be completed.

The University of Auckland will be open for enrolment from November 2013 to the end of February 2014. You are welcome to attend at any time during normal office hours to seek academic or enrolment advice or assistance in completing your enrolment.

Further information

This handbook is intended to answer questions about the Department of Physics and to help students plan their degree programmes.

For specific enquiries about Physics contact:

Department of Physics
The University of Auckland
Phone: +64 9 373 7599 ext 88805
Email: physics@auckland.ac.nz
www.physics.auckland.ac.nz

In addition to this handbook, a variety of publications are available to help students with decision making, enrolling and getting started at the University of Auckland. These are the *University of Auckland Calendar*, the Faculty of Science prospectuses and the *Welcome to the Faculty of Science* brochure. All of these publications are available from www.science.auckland.ac.nz/publications.

Academic programme structure

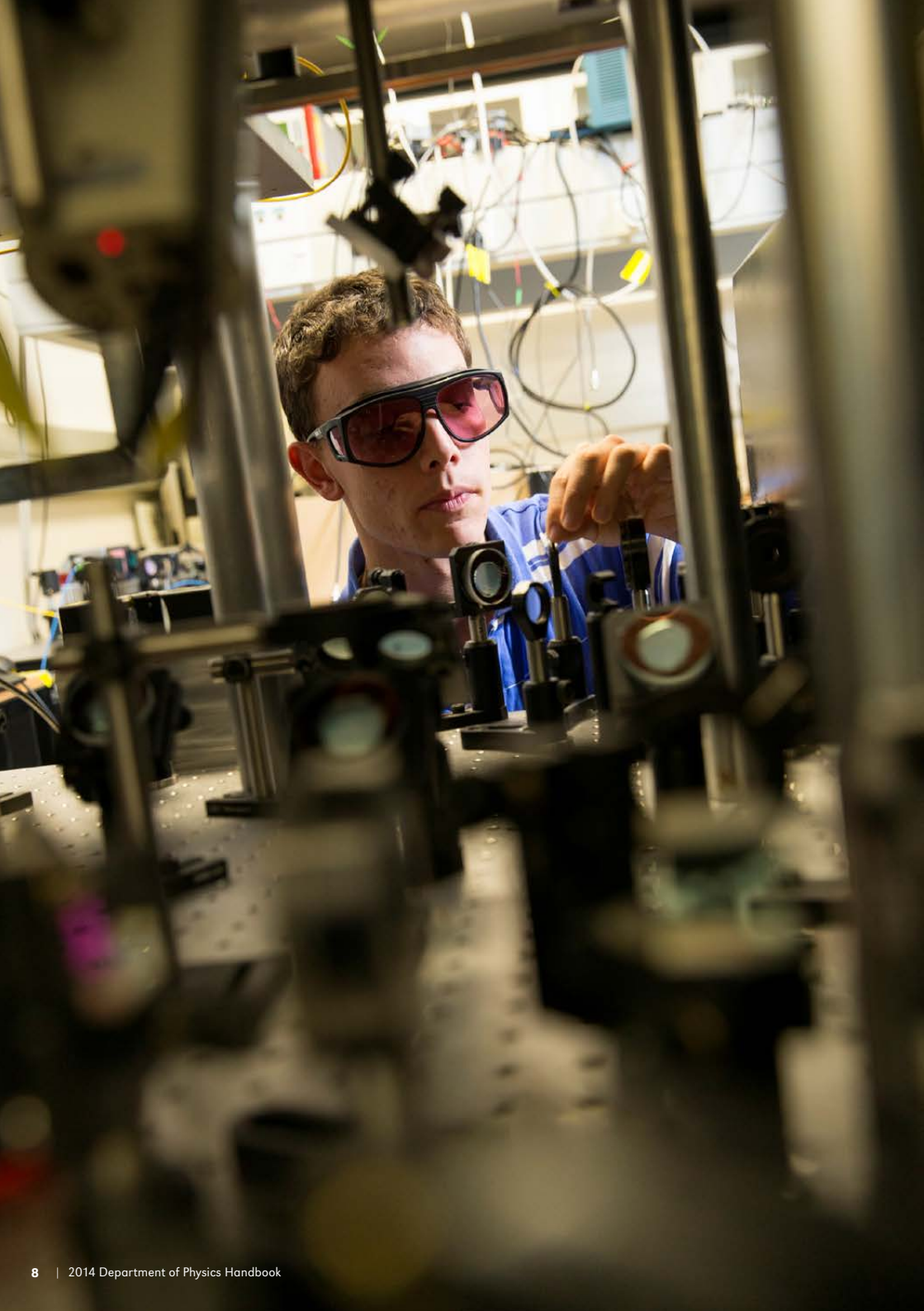
Points Structure

Students enrolled in a normal full time course of study complete 120 points per year. The courses in most undergraduate degrees carry a value of 15 points and a normal full time enrolment is eight courses per year. A total of 360 points passed is required to complete the BSc degree.

General Education

Courses in General Education are a unique feature of University of Auckland bachelors degrees. General Education is aimed at producing graduates with flexibility, critical thinking skills, and an appreciation and understanding of fields outside of their usual area of study.

Most students must take two General Education courses (30 points) in their degree. These can be taken at any time during the degree.



Students will choose General Education courses from schedules which list courses available to their particular degree. The schedules have been developed so that students will take General Education courses that allow them to explore areas of interest outside of their degree subjects.

The General Education courses are organised into six General Education schedules as follows:

- General Education Open Schedule (O)
- General Education Faculty Schedules:
  - Arts (ARTS)
  - Business and Economics (BE)
  - National Institute of Creative Arts and Industries, Law (LN)
  - Education (EDUC)
  - Engineering, Medical and Health Sciences, Science (EMHSS).The Open Schedule is for all undergraduate students and the Faculty Schedules are for undergraduate students in particular faculties.

Students can choose their course(s) from either the Open Schedule (O) and/or their Faculty Schedule.

For the schedules, available courses and the information required for course selection, see www.auckland.ac.nz/generaleducation.

The courses available to students will depend on the subjects in which they are enrolled. For example, students taking a BSc in Biomedical Science wishing to apply to the MBChB after their first year must take one General Education course in Year One. Students admitted to the MBChB will not be able to take a second General Education course.

In some cases, courses are available both as part of the General Education programme and as part of the portfolio of regular degree courses. If students are taking a dual purpose course as part of the General Education programme, they will enrol in the G version of the course (eg, HISTORY 103G). The classes and programme of study will be the same for all students.

Special arrangements will apply to students transferring from another tertiary institution with credit.

Students are encouraged to seek advice on General Education in their degree from the Science Student Centre.

Postgraduate programmes

Most masters programmes are one year degrees preceded by either a one year bachelors honours degree or a postgraduate diploma.

Doctoral Students

Doctoral degrees remain essentially the same in structure and duration. The structure of the PhD is now recorded on the academic transcript in new points in accordance with the 120 points system.

For named doctorates which include courses with points, the courses have been re-weighted as part of the 120 point structure.

Academic Integrity Course

Honesty and integrity are valued in all academic activities at the University of Auckland. For more information about the key principles and practices underlying academic honesty, including advice, resources and information on the Academic Integrity Course, visit www.auckland.ac.nz/honesty.

As part of completing the requirements for General Education students admitted at the University of Auckland from 2014 must also pass the Academic Integrity Course as specified in the Enrolment and Programme Regulations, Academic Integrity, of the University Calendar.

Study in Physics

Careers

A degree in physics can give you the tools you need to tackle jobs in a huge variety of fields. Recent physics graduates are working in marketing, air quality management, medical physics, computing, exploration geophysics, astrophysics, meteorology, telecommunications, risk analysis, insurance, finance, water resource management, oceanography, industrial noise control, vibration analysis, radiation monitoring, and industrial process control – as well as research and teaching. Other physics graduates have started their own businesses in electronics, computing, and scientific instrument manufacture. The job market is international, and many physics graduates pursue opportunities internationally, or continue their education at universities worldwide.

Location

The Department of Physics is located in Building 303, in the Science Centre on the corner of Princes and Wellesley Streets. The department's offices are on Levels Six and Seven and have recently been renovated. Our teaching laboratories are on the ground floor and our research laboratories are in the basement.

Courses

We teach courses for BSc, BSc(Hons), BTech, GradDipSci, and PGDipSci students, while the MSc and PhD are pursued by the department's research students. Physics courses are also taken by students in engineering, computer science, architecture, medicine, surveying and pharmacy. The interfaculty Bachelor of Technology in Optoelectronics degree provides a vocationally oriented specialisation in this fast-developing area of applied technology and high value manufacturing, while the Bachelor of Technology in Medical Physics and Imaging Technology prepares students for careers in medical imaging and its applications.

There are first-year courses for students from other faculties and for science students who want to understand some of the principles of physics. The introductory astronomy course "Planets, Stars and Galaxies" (PHYS 107/107G) gives students an overview of astronomy, and may be taken as a General Education course or as an introduction to the field for students interested in astronomy and astrophysics. "Science and Technology of Sustainable Energy" (PHYS 108) is for both General Education and Physics students, and gives a broad overview of the challenges faced by a world moving away from a petrochemical-based power generation. "Physics for the Life Sciences" (PHYS 160) meets the needs of students majoring in the Biological Sciences and other life sciences programmes (such as Biomedical, Sports Sciences, etc.). Finally, the course "Digital Fundamentals" (PHYS 140) is taken by many Computer Science students, and introduces the physical basis of the electronics behind digital systems and has a strong hands-on laboratory component.

Planning a Degree in Physics

The following information will help you plan a programme of study according to your interests – it does not replace *the University of Auckland Calendar*, which you should consult for the complete regulations.

Preparation

The advancing undergraduate courses PHYSICS 120, 130, and 150 introduce fundamental concepts in physics, and prepare students who wish to specialise in any subfield within physics. These courses assume students have NCEA Level 3 in Mathematics with Calculus and Physics.

Students with an interest in physics who have not achieved a Level 3 standard in NCEA Physics are advised to enrol in PHYSICS 102 or the summer

course, PHYSICS 103, before attempting PHYS 120 and150. PHYS 102 and 103 emphasise basic physical concepts. A pass in PHYSICS 102 or 103 together with suitable courses in mathematics (MATHS 102 or 108) will prepare students wishing to advance to PHYSICS 120 or PHYSICS 160.

The Tertiary Foundation Certificate is a fulltime preliminary programme for students who do not feel sufficiently prepared for study at university level. PHYSICS 91F and 92F prepare students to take advancing courses in the following year. For more information, contact Gill Stringer, tfc@auckland.ac.nz, or see www.auckland.ac.nz/tfc.

At Stage I, students planning to pursue studies in any branch of Physics should take both PHYSICS 120 and PHYSICS 150. PHYSICS 130 is highly recommended for all areas of applied and experimental science, while MATHS 162 is a great introduction to computation and modelling and introduces Matlab, which is used in Physics laboratory work at Stage II and above.

High-achieving students with a strong background in physics and mathematics may ask to skip PHYSICS 120 and enrol directly in PHYSICS 150. Students considering this option should contact the Stage I or II organisers to learn more about this accelerated pathway.

A good grounding in mathematics is essential for Physics majors; MATHS 150 and 250 are recommended preparation for most Stage II Physics courses. However, students who have not achieved 18 credits in calculus at NCEA Level 3, including at least six credits at merit or excellence, should begin with MATHS 108. This provides acceptable mathematical preparation for Stage II Physics courses. The combination of MATHS 108 and 208 provide a basic mathematical training for a Physics major, and an A pass or better in MATHS 108 allows students to take MATHS 250, followed by higher level mathematical courses.

Bachelor of Science

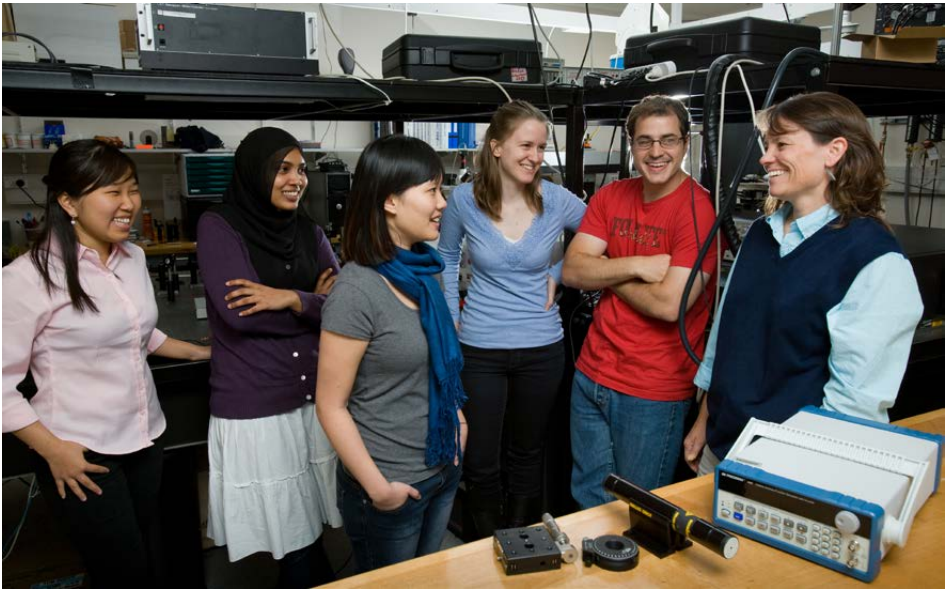
A total of 360 points, the equivalent of three years' fulltime study, is needed for a BSc degree. At least 300 points must be from the BSc programme schedule, covering a minimum of three subjects. At least 180 of these points must be above Stage I of the BSc Programme Schedule, 75 or more in Stage III, and you must complete the requirements of at least one subject major or specialisation. The Geophysics specialisation is interdisciplinary, involving study in both geology and physics.

Consequently, to meet the above requirements, you will need to do courses in subject(s) other than Physics and Mathematics. Since Stage II and Stage III courses have recommended preparation or prerequisites, you can work backwards from the Stage III courses that interest you to find all the courses you will need at Stage I and II. You can then fill out your programme with other courses that interest you. At least 30 points must be from allowed General Education courses, and up to 30 points may be from other faculties at the University.

Bachelor of Technology

This degree offers alternatives for students interested in applied physics, medical technology and high value manufacturing. The BTech is a four-year degree requiring 480 points and an interfaculty combination of courses, along with General Education courses. The BTech courseload is fully prescribed, with the exception of a couple of elective courses, so it is important to check the regulations.

The Optoelectronics BTech emphasises applications of classical optics, electronics and information theory for modern telecommunications and photonics. It involves courses in Physics, Mathematics, and Electrical and Computer Engineering, together with two General Education courses and contributions from Business and Economics staff.

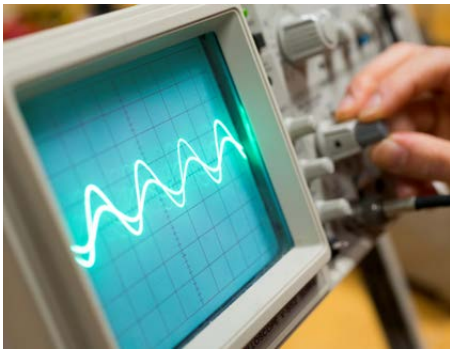


Optoelectronics students complete a major project at Stage IV – these projects often interact directly with industrial partners, and can also lay the groundwork for future graduate study. For information on required courses and enrolment, see www.science.auckland.ac.nz/optoelectronics.

BTech students in the Medical Physics and Imaging Technology (MPIT) specialisation usually begin with the first year of the BSc (Biomedical Science) programme, but it is also open to students with Stage I courses in physical science. Students focus upon modern imaging technologies, along with a sound understanding of the physics and physiology required to develop and exploit these technologies. The MPIT programme equips students for careers in biophotonics, biomedical imaging or instrumentation, with courses in Physics, Physiology, Medical Physics and Biomedical Science, along with two General Education courses and introductory courses in Chemistry. For information on enrolment and course requirements, see www.science.auckland.ac.nz/medical-physics.

Postgraduate Study

Students intending to enrol for postgraduate study in Physics must have majored in Physics, preferably including PHYSICS 325, in their BSc. To be accepted into the BSc(Hons) programme, you need an average grade of B or higher in 45 points from Stage III in courses required for a Physics major. Alternatively, students may enrol in the one year PGDipSci programme. Following either a BSc(Hons) or a PGDipSci, students may apply for an MSc, involving one year of research work for a thesis, or a PhD.



Typical programmes of study

Theoretical and Quantum Physics

PHYSICS	120, 150, 231, 251,261, 315, 325, 350, 355 and a selection from 326, 390, 391
MATHS	150, 250, 253, 260, 361 and possibly 362
COMPSCI	101, 105

Geophysics (see also the BSc in Geophysics)

PHYSICS	108, 120, 130, 150, 211, 213, 231, 240
GEOPHYS	330, 331 and a selection from PHYSICS 107, 270, 315, 325, 340, 390, 391
MATHS	108 or 150, 162, 208 or 250 and possibly 361, 362
STATS	101 or 125
COMPSCI	101, 105

Optoelectronics

CHEM	120 (or similar)
PHYSICS	120, 130, 150, 211, 231, 240, 251, 261, 325, 326, 340, 390 or equivalent
MATHS	150, 250
COMPSCI	101

Students interested in Optoelectronics should consider enrolling in the 4-year BTech-Optoelectronics Specialisation.

Careers in teaching

Students contemplating a programme suitable for a career as a science teacher in a secondary school should include a component of physics. For those interested in the career opportunities in physics teaching, the following combination, with mathematics as a secondary subject, is recommended:

PHYSICS	107, 120, 150, 211, 213, 231, 240, 251, 261, 325, 340 (or 350), 390 or equivalent
MATHS	108 or 150, 162, 208 or 250, 253, 260
STATS	101 or 125
COMPSCI	101, 105

An alternative is to take a wider selection of courses including chemistry, biology, and geology.

Undergraduate Physics Courses: the University of Auckland has taken all steps to ensure that the information on this page is correct but changes may occur. Please also consult *the University of Auckland Calendar* and Student Services Online. All courses are 15 points and are taught on the City Campus.

Course code	Course title
Stage I	
PHYSICS 102	Basic Concepts of Physics
PHYSICS 103	Introductory Physics for Science and Engineering
PHYSICS 107/107G	Planets, Stars and Galaxies
PHYSICS 108/108G	Science and Technology of Sustainable Energy
PHYSICS 120	Advancing Physics 1
PHYSICS 130	Properties of Matter
PHYSICS 140	Digital Fundamentals
PHYSICS 150	Advancing Physics 2
PHYSICS 160	Physics for the Life Sciences
Stage II	
PHYSICS 211	Mathematical Methods for Physics
PHYSICS 213	The Geophysical Environment
PHYSICS 231	Classical Physics
PHYSICS 240	Networks and Electronics
PHYSICS 251	Modern Physics
PHYSICS 261	Optics and Electromagnetism
PHYSICS 280	Medical Physics
Stage III	
PHYSICS 315	Classical and Statistical Physics
PHYSICS 325	Electromagnetism
PHYSICS 326	Optics and Laser Physics
PHYSICS 340	Electronics and Signal Processing
PHYSICS 350	Quantum Mechanics and Atomic Physics
PHYSICS 355	Condensed Matter and Sub Atomic Physics
PHYSICS 371	Special Topics in Physics
PHYSICS 390	Experimental Physics 1
PHYSICS 391	Experimental Physics 2
GEOPHYS 330	Physics of the Earth
GEOPHYS 331	Physics of the Atmosphere and Ocean
GEOPHYSICS 339	Special Topics in Geophysics

Undergraduate course information

Stage I

PHYSICS 102
Basic Concepts of Physics

A course for students with little or no formal experience in physics interested in understanding the physics of everyday phenomena. The course requires a minimal background in mathematics and physics, and stresses the conceptual understanding of important physical ideas. Demonstration experiments are a feature of the course.

Restriction: Cannot be taken either with or after any of PHYSICS 120–160.

PHYSICS 103
Introductory Physics for Science and Engineering

A course for those who require additional background in Physics before undertaking first-year pre-requisites for a BE or proceeding to a BSc or BSc (Biomedical Science). Key concepts required for later enrolment in PHYSICS 120 or 160 will be taught and consolidated in problem-based sessions. No background in calculus will be assumed, but simple applications will be developed and used.

Restriction: Cannot be taken after any of PHYSICS 102, 120–160.

PHYSICS 107, PHYSICS 107G
Planets, Stars and Galaxies

A course for students interested in astronomy. Topics include a survey of astronomical objects in the universe, the tools of observational astronomy, stellar evolution, quasars and black holes, and cosmology. No background in physics is required.

PHYSICS 108, PHYSICS 108G
Science and Technology of Sustainable Energy

The science behind the global and national use of energy and its conservation including various technologies which underpin sustainable energy sources will be discussed. Topics include an introduction to the idea of embedded energy and sustainability as well as the physics of solar, geothermal, biofuel, wind, tidal, and nuclear energy sources.

PHYSICS 120
Advancing Physics 1

A course designed for students either advancing in physical science or with a major interest in field studies. It covers basics aspects of motion and its causes, electrostatics, geometric optics, as well as the production, transformation and propagation of energy in its thermal and mechanical forms.

Restriction: PHYSICS 160

PHYSICS 130
Properties of Matter

Static equilibrium of solids and fluids with an introduction to fluid mechanics. The physical properties of condensed matter including strength, elasticity, and other mechanical characteristics. The electrical, optical and thermal characteristics of materials with technological applications including alloys, ceramics, polymers, glasses and plastics.

Restriction: CHEMMAT 121

PHYSICS 140
Digital Fundamentals

This is a practical starting point for both physics and computer science students wishing to learn about the electronics behind digital systems. It has a strong hands-on laboratory component, and covers logic components, Boolean algebra, combinational logic analysis and synthesis, synchronous and asynchronous sequential logic analysis and design, digital subsystems, computer organisation and design.

Restriction: PHYSICS 219, 243

PHYSICS 150
Advancing Physics 2

Prescribed for students advancing either in the physical sciences or in other science and technology programmes. It covers advanced aspects of mechanics (rotational motion), circuits, fields, optical systems and basic aspects of quantum effects and relativity. High achieving Year 13 students with NCEA level 3 in physics and mathematics may be permitted to enrol directly in PHYSICS 150.

PHYSICS 160
Physics for the Life Sciences

Topics covered will be especially relevant to biological systems: mechanics, thermal physics, wave motion, electricity and medical physics. This course requires knowledge of physics and mathematics to at least NCEA level 2. This course is a component of the common year 1 programme for students intending to progress in life science oriented BTech, BSc, Faculty of Medical and Health Science programmes.

Restriction: PHYSICS 120

Stage I Laboratories

PHYSICS 107, PHYSICS 120, PHYSICS 130, PHYSICS 140, PHYSICS 150 and PHYSICS 160 have a laboratory component as well as lectures. Each compulsory laboratory stream has a supervisor responsible for the allocation of experiments, who decides whether a student has completed satisfactory practical work. Except in PHYSICS 107, a pass in the practical work is required to pass the course. Laboratory manuals are available at the introductory laboratory, or as advised in lectures.

Stage II

Physics courses do not have formal prerequisites, but students are responsible for ensuring they have the background outlined in the Recommended Preparation when they enrol.

As recommended preparation, MATHS 108 and 150 are equivalent; PHYSICS 120 and 160 are equivalent; and MATHS 208 and 250 are equivalent.

PHYSICS 231, 240, 251 and 261 are all 15 point courses with a laboratory component, and constitute the core of most physics majors. A solid Stage I background in physics and mathematics is assumed, with a minimum C+ average being desirable. Students should enrol concurrently in PHYSICS 211 (or MATHS 253) and MATHS 260, as these are recommended preparation for most Stage III physics courses.

PHYSICS 280 is part of the BTech in Medical Physics and Imaging Technology, and provides an introduction to biophysical phenomena and medical applications. It is a 15 point course with a laboratory component and a field trip to hospital.

Students wishing to advance to Stage III are encouraged to seek advice from the department regarding specific courses of study. Students considering graduate studies in Physics normally enrol in PHYSICS 231, 240, 251 and 261, in addition to PHYSICS 211 (or MATHS 253) and MATHS 260.

Other Physics majors and students in other disciplines can consider a smaller selection of courses, and the department is happy to offer advice as you plan your degree.

PHYSICS 211
Mathematical Methods for Physics

Covers mathematical techniques needed for Stage II Physics courses and a minimal preparation in mathematical techniques for Stage III Physics courses. Topics include: functions of complex numbers, vector spaces, Fourier series, the divergence, gradient and curl operators, line surface and volume integrals and key theorems of multivariable calculus, numerical and analytical solution of differential equations describing physical systems, description of physical systems by sets of linear equations.

Prerequisite: No formal prerequisites, but an understanding of the material in MATHS 208 or 250 will be assumed.

Restriction: MATHS 253, ENGSCI 211

PHYSICS 213
The Geophysical Environment

Provides an understanding of the atmospheric, oceanic and solid earth environment in terms of physical principles. Topics include: the shape of the Earth, gravitational variations, seismic waves, global heat balance and atmospheric dynamics, ocean waves and tides, and general properties of fluids applied to the environment. A weekend field trip is a component of the course.

Prerequisite: No formal prerequisites, but an understanding of Stage I Physics and Mathematics will be assumed.

PHYSICS 231
Classical Physics

Classical mechanics including rotating reference frames. The properties of materials including elasticity and fluids. Forced and coupled oscillations. Travelling and standing waves on a string. An introduction to the laws of thermodynamics and their application to the properties of materials.

Prerequisite: No formal prerequisite, but an understanding of the material in MATHS 208 or 250 and PHYSICS 120 will be assumed.

Restriction: PHYSICS 230

PHYSICS 240
Networks and Electronics

Covers AC circuit theory with phasors and complex operators, including network theorems, resonance, and operational amplifiers treated as linear components. Principles of semiconductor physics, diodes, transistors and associated analogue and digital applications.

Prerequisite: No formal prerequisite, but an understanding of the material in MATHS 208 or 250 and PHYSICS 150 will be assumed.

Restriction: PHYSICS 242

PHYSICS 251
Modern Physics

An introduction to quantum physics and astrophysics. Foundations of quantum physics. Schrődinger equation treatment of one-dimensional bound systems and quantum tunnelling. Angular momentum and the hydrogen atom. Elementary atomic structure, spin, and the periodic table. Quantum statistics, molecules and solids. Selected topics from stellar astrophysics, gravitational astrophysics and cosmology, including nuclear fusion, white dwarfs, black holes, gravitational lensing, active galaxies and the early universe.

Prerequisite: No formal prerequisite, but an understanding of the material in MATHS 208 or 250, PHYSICS 120 and 150 will be assumed.

Restriction: PHYSICS 250

PHYSICS 261
Optics and Electromagnetism

Development of the principles underlying electric and magnetic field phenomena, and applications of Maxwell's equations in integral form, leading to the wave equation. Discussion of optics and the modern science of photonics using both the

plan wave solution of the wave equation and geometrical optics. Fibre optics, lasers, LEDs, polarisation effects, interference and diffraction.

Prerequisite: No formal prerequisite, but an understanding of the material in MATHS 208 or 250, PHYSICS 120 and 150 will be assumed.

Restriction: PHYSICS 260

PHYSICS 280 (15 points) S2 C Medical Physics

An overview of the field of Medical Physics including the biophysical basis of biomedical measurement, radiation, macromolecular biophysics, biology and dosimetry.

Recommended Preparation: PHYSICS 160

Stage III

The Department of Physics offers a broad range of topics at Stage III, allowing students to plan a course of study that fits their interests. PHYSICS 315–355 involve lectures only, while PHYSICS 390 and 391 are entirely laboratory-based. GEOPHYS 330 and GEOPHYS 331 include laboratories or fieldwork as a practical component.

PHYSICS 315, 325 and 350 provide the conceptual and mathematical basis of fundamental ideas in physics, and a GPA of at least 4.0 (an average grade of B-) in the prerequisites is required. Students planning postgraduate study in Physics usually take at least two of these courses. Students with a lower GPA should select from the other Stage III courses in physics and geophysics.

Physics students are expected to complement their lecture courses with the laboratory courses PHYSICS 390 and 391. A theoretical Physics major might include only one laboratory course, but an experimental Physics major could include both. No more than one laboratory should be taken in a single semester.

The requirement for a BSc major in Physics is:

- 45 points from PHYSICS 315–355, GEOPHYS 330–339
- At least 15 points from PHYSICS 390–391

If Physics is the second major 30 points are needed from PHYSICS 315–355, GEOPHYS 330–339. Students hoping to proceed to postgraduate study in Physics should include PHYSICS 325 and either PHYSICS 390 or 391 in their BSc.

For the purposes of recommended preparation for Stage III Physics courses the combination MATH108 and MATH 208 is equivalent to the combination MATHS 150 and MATHS 250 and PHYSICS 211 is equivalent to MATH 253 or ENGSCI 211, where MATHS 253 or PHYSICS 211 is specified as a prerequisite for a Stage III Physics course, MATHS 260 is recommended preparation.

PHYSICS 315 Classical and Statistical Physics

Statistical physics topics emphasise the description of macroscopic properties using microscopic models and include temperature, the partition function and connections with classical thermodynamics, paramagnetic solids, lattice vibrations, indistinguishable particles, classical and quantum gases. Classical mechanics topics include vector mechanics, coordinate transformations, rotating frames, angular momentum, rigid body dynamics, variational formulation, constraints, Lagrange equations, Hamiltonian mechanics and relationships with quantum mechanics.

Prerequisite: B- average in one of PHYSICS 211, MATHS 253, ENGSCI 211 and either PHYSICS 231 or PHYSICS 220 and 230.

PHYSICS 325
Electromagnetism

A systematic development of Maxwell's theory of electromagnetism and its applications to optics. Topics covered include: electrostatics, dielectrics, polarisation, charge conservation, magnetostatics, scalar and vector potentials, magnetic materials, Maxwell's equations, the wave equation. Propagation of electromagnetic waves in vacuum, dielectrics, conducting media. Energy and momentum in electromagnetic waves.

Prerequisite: B- average in one of PHYSICS 220, 261 and one of PHYSICS 211, MATHS 253, ENGSCI 211.

PHYSICS 326
Optics and Laser Physics

Lasers: electron oscillator model, rate equation model, Einstein coefficients, Fabry Perot etalons and resonators, optimum output coupling, reflection at a dielectric surface, waveguide theory, thin films, matrix techniques for optical elements, active and passive fibre devices, Gaussian beams and applications.

Prerequisite: One of PHYSICS 211, MATHS 253, ENGSCI 211, and either PHYSICS 261 or PHYSICS 220 and 260. Concurrent enrolment in PHYSICS 390 or 391 is recommended.

PHYSICS 340
Electronics and Signal Processing

An introduction to analogue and digital electronics. Topics will be selected from: linear circuit theory, analytical and numerical network analysis, steady state and transient response of networks, feedback and oscillation, transistor circuits, operational amplifier circuits, sampling theory, digital filter design, the fast Fourier transform and digital signal processing.

Prerequisite: PHYSICS 240

Corequisite: one of PHYSICS 211, MATHS 253, ENGSCI 211. Concurrent enrolment in PHYSICS 390 or 391 is recommended.

Restriction: PHYSICS 341

PHYSICS 350
Quantum Mechanics and Atomic Physics

Non-relativistic quantum mechanics will be developed using the three dimensional Schrödinger equation, and will be applied particularly to the physics of atoms and molecules. The interaction of like particles and the quantisation of angular momentum will be studied.

Prerequisite: B- average in one of PHYSICS 250, 251 and one of PHYSICS 211, MATHS 253, ENGSCI 211.

PHYSICS 354
Condensed and Soft Matter Physics

This course will introduce modern condensed matter physics, from the solid state through disordered systems to soft condensed matter. The quantum and statistical mechanical foundation of solid state physics will be covered including: crystal structures, phonons, electronic band theory, semiconductors, magnetism, ferroelectrics, superconductivity and amorphous solids. Glasses, liquids and soft condensed matter topics will include colloids, emulsions and foams.

Prerequisite: PHYSICS 231, 251 and one of PHYSICS 211, MATHS 253, ENGSCI 211. Concurrent enrolment in PHYSICS 390 or 391 is recommended

Restriction: PHYSICS 355

PHYSICS 356
Particle Physics and Astrophysics

Topics covered will be relativistic dynamics and application to fundamental particle interactions, the properties of strong, weak and electromagnetic interactions and the particle zoo. Nuclear astrophysics and the origin of the elements. Astrophysics topics will include the Big Bang, "concordance cosmology", redshifts, theories of dark matter, extra-solar planets, supernovae and nuclear astrophysics.

Prerequisite: One of PHYSICS 250, 251 and one of PHYSICS 211, MATHS 253, ENGSCI 211. Concurrent enrolment in PHYSICS 390 or 391 is recommended

PHYSICS 371
Special Topics in Physics

PHYSICS 390 and 391
Experimental Physics 1 and 2

Students may select experiments appropriate to the lecture courses being taken from PHYSICS 315–355.

Prerequisite: At least one of PHYSICS 220–261.

GEOPHYS 330
Physics of the Earth

Discussion of the Physics of the solid Earth including the gravitational field, the rotation and figure of the Earth, seismology and the internal structure of the Earth, the Earth's internal heat, the geomagnetic field, paleomagnetism and geodynamics. The applied geophysics section covers the theoretical basis of geophysical exploration techniques, including seismic, potential field and electrical methods.

Prerequisite: No formal prerequisite, but it will be assumed that students have passed either (PHYSICS 213, 230 or 231, and 15 points in Geology) or (GEOLOGY 204, MATHS 108 or 150, and 15 points in Physics).

GEOPHYS 331
Physics of the Atmosphere and Ocean

The application of fluid dynamics to the motion of the atmosphere and oceans. Marine topics include ocean structure, oceanic circulation, underwater acoustics, tides and waves. Atmospheric topics include boundary layer meteorology and the microphysics of clouds and precipitation. A weekend field trip is a component of the course.

Prerequisite: PHYSICS 230 or 231, and one of PHYSICS 211, MATHS 253, ENGSCI 211. PHYSICS 213 is recommended preparation.

GEOPHYS 339
Special Topics in Geophysics

Not expected to be offered in 2014

BSc in Geophysics

Most of the important and exciting processes in the earth, oceans and atmosphere cannot be measured directly, but require some sort of remote sensing to further our understanding. The 3-year BSc in Geophysics teaches you the origins of these physics-based processes and the corresponding remote-sensing techniques. The Geophysics degree shows us what a dynamic world we live in, and prepares students for an exciting future in seismology, meteorology, volcanology, oceanography, exploration geophysics or hydrology.

The major in Geophysics is run jointly by the School of the Environment and the department of Physics. Courses in Geology, Physics and Mathematics provide the central core of the Geophysics. At Stage III students must include at least two of GEOLOGY 361, GEOPHYS 330 and GEOPHYS 331. Students wanting to advance to a BSc(Hons), MSc, or PGDipSci in Geophysics should take all three. The combination of courses you choose will reflect your specific interests in geophysics with courses in subjects such as Marine Science, Environmental Science, Chemistry, Computer Science and Geography being included where relevant.

Samples of possible BSc Geophysics pathways are

Solid Earth Geophysics

PHYSICS	108, 120, 150, 211, 213, 231, 240
GEOLOGY	103, 104, 201, 202, 203, 204, 301, 305, 361
GEOPHYS	330
MATHS	108 or 150, 208 or 250
CHEM	110, 120

Ocean and Atmospheric Physics

PHYSICS	108, 120, 150, 211, 213, 231, 240, 340, 390
GEOLOGY	103, 104
GEOPHYS	330, 331
MATHS	108 or 150, 208 or 250, 361
CHEM	110, 120
COMPSCI	101
GEOG	360

Course requirements for this major are:

- At least 15 points from GEOLOGY 103,104
- 30 points: PHYSICS 213, 231
- 15 points from MATHS 253, PHYSICS 211
- 30 points from GEOLOGY 201, 204, MATHS 260, PHYSICS 231, 240, 261
- 30 points from GEOLOGY 361, GEOPHYS 330-339
- 30 further points at Stage III from GEOLOGY 301-372, GEOPHYS 330-339, MATHS 302-389, PHYSICS 315-391

For information on required courses and enrolment, see www.science.auckland.ac.nz/geophysics-ug.

Prospective students are encouraged to contact the adviser:

Dr Kasper van Wijk
Phone: +64 9 373 7599 ext 85754
Email: k.vanwijk@auckland.ac.nz

BTech in Optoelectronics

The BTech in Optoelectronics combines a solid grounding in Physics and courses from the Department of Electrical and Electronic Engineering, including a major project in the fourth and final year. Many Optoelectronics graduates find that their electronics and computing training is a key to their employment in traditional industries, while the photonics side of the degree is more important in emerging industries. The degree includes two General Education courses, which must be chosen from faculties other than Science, Engineering, or Medicine – this is in response to requests from prospective employers who need staff with good communications skills and breadth in their degree studies in addition to specialist knowledge. There is a strong demand from employers for graduates from this degree, which identifies students who have performed well in a wide range of physical science courses.

The BTech degree is designed to allow easy transfer from the BTech into a BSc degree at any time up until the third year, as the courses prescribed for BTech Parts I and II are also suitable as the first two years of a BSc in Physics. Entry to Part II is limited: students will need to achieve at least a B average grade to progress into the second year. Transfer into the BTech degree from the BSc degree is also possible for suitably qualified students. Graduates are ideally prepared to enter the graduate programme in Optoelectronics at the University of Auckland.

For information on required courses and enrolment, see www.science.auckland.ac.nz/optoelectronics. Prospective students are encouraged to contact the coordinator:

Dr Stuart Murdoch
Phone: +64 9 373 7599 ext 85871
Email: s.murdoch@auckland.ac.nz

BTech in Medical Physics and Imaging Technology

All modern imaging technologies require a detailed understanding of the underlying physics and physiology to be used effectively. This BTech specialisation provides a background in physics and biomedical science that allows graduates to pursue a career in the increasingly complex fields of medical physics and imaging technology.

This degree is particularly well suited to students interested in the applications of the physical sciences in medicine, biomedical science, and biotechnology. With a strong background in physics and physiology, supplemented by specialist-led training, it provides an overview of all aspects of physics and physiology required for a career or postgraduate study in biophotonics, biomedical imaging or instrumentation. It also opens a pathway into the Training, Education and Accreditation Program (TEAP) offered by the Australasian College of Physical Scientists and engineers in Medicine (ACPSEM). Graduates could be part of a medical research team treating patients, perform research and development in private companies, or pursue academic research in collaboration with a medical team at the PhD level and beyond.

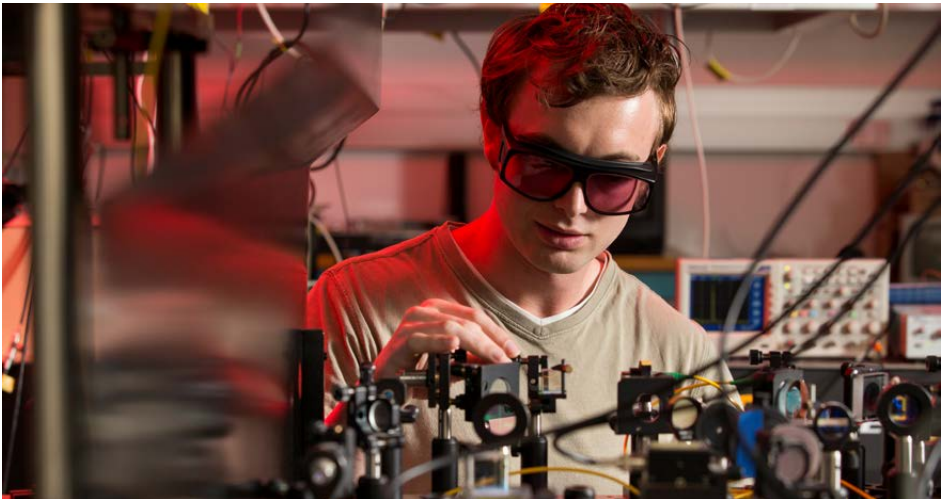
The first-year programme is the same as the Biomedical Common Year 1, so transfer from a BSc into this BTech is possible in years two and three.

For information on enrolment and course requirements, see www.science.auckland.ac.nz/medical-physics.

For further information prospective students are encouraged to contact the coordinator:

Dr Frédérique Vanholsbeeck
Phone: +64 9 373 7599 ext 88881
Email: f.vanholsbeeck@auckland.ac.nz

Postgraduate study in Physics



We offer four postgraduate programmes: a Postgraduate Diploma in Science (PGDipSci) (one year of courses), Bachelor of Science Honours (BSc(Hons)) (one year of courses including a project), Master of Science (MSc) (one year thesis, or one year courses plus one year thesis), and Doctor of Philosophy (PhD) (three to four years of research). We welcome transfer students from other universities into any of these programmes.

Entry requirements

- PGDipSci in Physics or Geophysics requires a BSc in Physics or Geophysics
- BSc(Hons) requires a BSc in Physics or Geophysics, with at least 90 points at Stage III and a B average in 45 points in Physics or Geophysics
- MSc requires a BSc(Hons) or PGDipSci , with relevant B- average
- PhD requires a MSc, or for strong students, a BSc(Hons)

For further details consult the *University of Auckland Calendar*.

Courses at the postgraduate level include a choice of basic and specialised topics. The latter are closely related to the research interests (and therefore MSc thesis topics) in the department, which include aspects of theoretical physics, nuclear physics, laser physics, optoelectronics, nonlinear fibre optics, THz spectroscopy, adaptive optics, quantum optics, atom optics, optical metrology, biophotonics, theoretical biology, condensed matter physics, solid-earth physics, wind energy, atmospheric physics, astrophysics, elementary particle physics, remote sensing, signal processing and physics education.

Thesis/dissertation topics should be arranged well in advance of the relevant semester. Students are advised to talk to several staff members who offer relevant topics. Enrolment into a thesis/dissertation will only be approved once the topic and the supervisor have been arranged.

Enquiries:

Stage IV (Honours, PGDipSci)
Dr David Krofcheck
Phone: +64 9 373 7599 ext 88897
Science Centre Building 303 Room 711
Email: d.krofcheck@auckland.ac.nz

Research Degrees (MSc and PhD)
Associate Professor Neil Broderick
Phone: +64 9 373 7599 ext 84434
Science Centre Building 303 Room 617
Email: n.broderick@auckland.ac.nz

Email: pgadvice-physics@auckland.ac.nz

Postgraduate Diploma in Science

This programme consists of 120 points from 600 or 700-level courses and may include a dissertation. Enrolment in 600-level courses has to be discussed with the PG coordinator. Full-time students have one year for completion but part-time students can take up to four years. The diploma may be awarded with distinction or merit (calculated over all courses attempted).

PGDipSci Requirement

- 75 points from PHYSICS 625-681, 691, 701-787, 788

  and

- 45 additional points from PHYSICS 625-681, 691, 701-787, 788, MATHS 761-763, GEOPHYS 760-763, 780

  or

- At least 15 additional points from PHYSICS 625-681, 691, 701-787, 788, MATHS 761-763, GEOPHYS 760-763, 780 and up to a further 30 points, subject to the approval of Head of Department, from approved 600 and 700 level courses in related subjects.

BSc Honours degree

This programme consists of 120 points at 700 level. It must include a dissertation/project of 30 points. Full-time students have one year for completion but part-time students can take up to two years. Enrolment must be continuous and honours are calculated on the grades of all courses attempted with a maximum enrolment of 160 points.

BSc(Hons) requirement

- 30 points PHYSICS 789 Dissertation
- 45 points from PHYSICS 701–788, 791, 792

  and

- 45 additional points from PHYSICS 701–788, 791, 792, MATHS 761–763, GEOPHYSI 760–780

  or

- At least 15 additional points from PHYSICS 701–788, 791, 792, MATHS 761–763, GEOPHYS 760–780 and up to 30 points from approved 700 level courses in related subjects as approved by the Head of Department.

MSc degree

This programme consists of a 120-point thesis. The topic of the thesis has to be agreed upon by the supervisor and the student and has to be approved by the Head of Department. This degree may be awarded with honours.

MSc requirement

- PHYSICS 796 MSc Thesis in Physics

Doctor of Philosophy (PhD)

The PhD (Doctor of Philosophy) degree is entirely research based. Candidates for this degree need to have a MSc degree with or BSc (Hons) degree with First Class or Second Class, Division One honours (or equivalent), or equivalent international qualifications. The PhD typically takes three to four years to complete. For more information, or to complete an application for admission (AfA), visit www.auckland.ac.nz/afa.

Postgraduate Study in Geophysics

While some students study and research geophysical topics at postgraduate level in a Physics or Geology programme, Geophysics is available as a subject in its own right for PGDipSci, BSc(Hons) and MSc. A PhD thesis on a geophysical topic would be completed using Physics or Geology as the subject, as appropriate.

The generic structure and entry requirements are as described for the Physics programmes above.

Prospective students are encouraged to contact the adviser:

Dr Kasper van Wijk
Phone: +64 9 373 7599 ext 85754
Email: k.vanwijk@auckland.ac.nz

Postgraduate Diploma in Science

Prerequisite: A BSc with at least 45 points from GEOLOGY 361, GEOPHYS 330-339

Requirements:

- 15 points from Physics 731, 732
- 105 points from approved 600 or 700 level courses in Applied Mathematics, Geology, Geophysics, Physics or other Science subjects as approved by the Programme Coordinator

BSc honours degree

Prerequisite: At least 90 points at Stage III including at least 45 points from GEOLOGY 361, GEOPHYS 330-339.

Requirements:

- 15 points from Physics 731, 732
- 30 points: GEOPHYS 789 dissertation

- 75 points from approved 700 level courses in Applied Mathematics, Geology, Geophysics or Physics

MSc degree

Prerequisite: A BSc(Hons) or PGDipSci in Geophysics

Requirement: GEOPHYS 796 MSc Thesis in Geophysics

Diploma courses in Physics

PHYSICS 625
Selected Topics 1

PHYSICS 626
Selected Topics 2

PHYSICS 681
Experimental Physics

PHYSICS 690 or PHYSICS 690A and 690B
Graduate Diploma Dissertation (Physics)

PHYSICS 691 or PHYSICS 691A + 691B
PG Diploma Dissertation (Physics)

Honours and Masters courses for Physics

Courses labelled with an asterisk (*) will not be offered in 2014. All are 15 points and taught on the City Campus unless stated. For detailed course information, see the Department of Physics website.

PHYSICS 701	Linear Systems
PHYSICS 703	Advanced Quantum Mechanics
PHYSICS 705	Advanced Electromagnetism and Special Relativity
PHYSICS 706	Quantum Field Theory
PHYSICS 707	Inverse Problems
PHYSICS 708	Statistical Mechanics and Stochastic Processes
PHYSICS 715	Selected Topics 1
PHYSICS 726	Optoelectronics
PHYSICS 727	Optoelectronics and Communications
PHYSICS 731	Wave Propagation
PHYSICS 732	Fluid Mechanics and Applications
PHYSICS 751	Selected Topics 2
PHYSICS 754	Condensed Matter Physics
*PHYSICS 755	Particle Physics
PHYSICS 756	Nuclear Physics
PHYSICS 760	Quantum Optics
PHYSICS 780	Advanced Imaging Technologies
PHYSICS 788	Project in Physics
PHYSICS 789 or 789A + 789B (30 points)	BSc(Hons) Dissertation in Physics
PHYSICS 791	Selected Topics 3
PHYSICS 792	Selected Topics 4
PHYSICS 796A + PHYSICS 796B (120 points)	MSc Thesis in Physics
GEOPHYS 761	Advanced Applied Geophysics 1
GEOPHYS 762	Advanced Applied Geophysics 2
GEOPHYS 763	Advanced Applied Geophysics 3
GEOPHYS 780	Special Topic in Geophysics
GEOPHYS 789	BSc(Hons) Dissertation
GEOPHYS 796A + 796B (120 points)	MSc Thesis in Geophysics
MATHS 761	Dynamical Systems
MATHS 763	Advanced Partial Differential Equations
MATHS 789	Advanced Topic(s) in Applied Mathematics

The following courses are suggested prerequisites. Please check *the University of Auckland Calendar* (www.calendar.auckland.ac.nz) for all academic course prerequisites.

700 level suggested prerequisite:				
Course #	**Sem**	**Course name**	**300 level**	**700 level**
PHYSICS 701	S1	Linear Systems	PHYSICS 340	
PHYSICS 703	S1	Advanced Quantum Mechanics	PHYSICS 325, 350	
PHYSICS 705	S1	Advanced Electromagnetism and Special Relativity	PHYSICS 325	
PHYSICS 706	S2	Quantum Field Theory	PHYSICS 315, 350	PHYSICS 703
PHYSICS 708	S1	Statistical Mechanics and Stochastic Processes	PHYSICS 315	
PHYSICS 726	S1	Optoelectronics	PHYSICS 326	
PHYSICS 727	S2	Optoelectronics and Communications	PHYSICS 326	
PHYSICS 731	S2	Wave Propagation		
PHYSICS 732	S1	Fluid Mechanics and Applications		
PHYSICS 754	S2	Condensed Matter Physics	PHYSICS 355	
PHYSICS 755	n/a	Particle Physics	PHYSICS 350, 355	PHYSICS 703, 706
PHYSICS 756	S2	Nuclear Physics	PHYSICS 350, 355	PHYSICS 703
PHYSICS 760	S2	Quantum Optics	PHYSICS 350	PHYSICS 703
PHYSICS 780	S1	Advanced Imaging Technologies	PHYSICS 340	
GEOPHYS 761	S2	Advanced Applied Geophysics 1	GEOPHYS 330, GEOLOGY 330, 361	
GEOPHYS 762	S2	Advanced Applied Geophysics 2	GEOPHYS 330, GEOLOGY 330, 361	
GEOPHYS 763	S2	Advanced Applied Geophysics 3		
MATHS 761	S2	Dynamical Systems	MATHS 340, 361	
MATHS 763	S1	Advanced Partial Differential Equations	MATHS 340, 361	

Department of Physics staff

Name	Room #	Phone	Research area
Academic Staff			
Prof Geoff Austin	303.723	88770	Atmospheric Physics
Prof Stuart Bradley	303.701	88886	Acoustics, Wind Energy, Remote Sensing
Dr Barry Brennan	303.612	88831	Solid Earth Geophysics
Assoc Prof Neil Broderick	303.617	84434	Nonlinear Fibre Optics, Fibre Tapers, Underwater Lidar
Prof Howard Carmichael	303.633	88899	Optical Physics (Theory)
Dr Stéphane Coen	303.615	88841	Laser Physics, Fibre Optics, Nonlinear Optics
Assoc Prof Matthew Collett	303.629	88837	Theoretical Physics
Mark Conway	303 G03	88864	Professional Teaching Fellow
Prof Peter Derrick	303.702	87888	Biophysics
Prof Roger Davies	303.733	88868	Climate Physics
Prof Richard Easther	303.601	81585	Cosmology, Astrophysics, Particle Physics
Dr John Eldridge	303.717	85911	Astrophysics
Assoc Prof Malcolm Grimson	303.612	86286	Condensed Matter Physics
Prof John Harvey	303.612		Laser Physics, Optoelectronics
Prof Shaun Hendy	303.624	89936	Computational Materials Science
Dr Maarten Hoogerland	303.627	86291	Trapping and Cooling of Neutral Atoms; Atom Optics
Dr David Krofcheck	303.711	88897	Nuclear Physics
Assoc Prof Rainer Leonhardt	303.619	88835	Laser Physics, Optoelectronics, THz Spectroscopy
Dr Stuart Murdoch	303.621	85871	Nonlinear Optics, Optoelectronics
Dr Nicholas Rattenbury	303.719	81224	Astronomy, Microlensing and Exoplanets
Assoc Prof Scott Parkins	303.631	86282	Quantum Optics; Quantum Chaos
Dr Cather Simpson	301.B028	83525	Chemical Physics, Laser Micromachining
Dr Frédérique Vanholsbeeck	303.613	88881	Biophotonics, Nonlinear Optics
Dr Kasper Van Wijk	303.705	85754	Laser Ultrasonics, Elastic Wave Scattering, Seismology
Dr Lionel Watkins	303.725	88878	Optoelectronics
Assoc Prof Peter Wills	303.709	88889	Theoretical Biology
Dr Geoff Willmott	303.609	89998	Bionano/Nanobio and Soft Matter
Anna Yang	303-618	88833	Professional Teaching Fellow
Assoc Prof Phil Yock	303.612	88831	Astrophysics and Theoretical Particle Physics

Name	Room #	Phone	Research area
Research Fellows			
Dr Claude Aguergaray	303.626	88810	Research Fellow
Emad Al-Imarah	303.716	86327	Research Assistant
Dr Grigor Aslanyan	303.707	86283	Research Fellow
Dr Miro Ekintalo	303.707	85988	Research Fellow
Dr Igor Filippov	303.716	86327	Research Fellow
Dr Dion O'Neale	303.626	88832	Research Fellow
Professional Staff			
John Antunovich			Ardmore Field Site
Martin Brett	303.G30	88192	Advanced Teaching Lab
Florence Cabansag	303.605	88827	Finance Administrator
Murray Hollis	303.803	87184	Electronic Workshop
Aisha Khan	303.605	88805	Department Administrator
Lucy Mo	303.605	88200	Department Administrator
Harry Oudenhoven	303.G30	88883	Technical Support
Edwin Rogers	303.607	88846	Technical Support
Helen Ross	303.603	88854	Department Manager
Denis Taylor	303.618	88885	Teaching Lab

Advice and support for students

The University of Auckland provides support, services and facilities for all students. Please refer to the Welcome to the Faculty of Science e-book for more information or advice on:

- Academic honesty, cheating and plagiarism
- English Language Enrichment (ELE)
- English Language Self Access Centre (ELSAC)
- AUSA Advocacy
- Libraries and Learning Services
- Information Commons
- Career Development and Employment Services

The *Welcome to the Faculty of Science* e-book will be available at the beginning of Semester One, 2014 from www.science.auckland.ac.nz/publications. A directory of support services and useful information is available on the following page.

Student support services

Service	Location	Contact details
Accommodation and Conference Services	O'Rorke Hall, 16 Mount Street	0800 61 62 63 accom@auckland.ac.nz www.auckland.ac.nz/accommodation
Career Development and Employment Services	Room 126, Ground Floor, The ClockTower	+64 9 373 7599 ext 88727 careers@auckland.ac.nz www.auckland.ac.nz/careers
Parenting Support (including childcare information)		www.auckland.ac.nz/parenting-support
Spiritual and religious support		www.auckland.ac.nz/spiritual-support
Disability Services	Room 036, The ClockTower (South Wing)	+64 9 373 7599 ext 82936 disabilities@auckland.ac.nz
Dispute Resolution		www.auckland.ac.nz/mediation
Equity Office	Level 1, The ClockTower (East Wing)	+64 9 373 7599 ext 88211 (Student Equity) www.eo.auckland.ac.nz
Student Finance	Room 108, The ClockTower	+64 9 373 7599 ext 84422
Health Services (including counselling)		www.auckland.ac.nz/health-services
International Office	Room G23, Old Choral Hall, 7 Symonds Street	+64 9 373 7513 int-questions@auckland.ac.nz www.auckland.ac.nz/international
Recreation Centre	Building 314, 17 Symonds Street	+64 9 373 7599 ext 84788 www.auckland.ac.nz/recreation
Scholarships Office	Room 012, The ClockTower	+64 9 373 7599 ext 87494 scholarships@auckland.ac.nz www.auckland.ac.nz/scholarships
AUSA Advocacy	Old Choral Hall, 7 Alfred Street	+64 9 923 7294 advocacymanager@ausa.org.nz www.ausa.org.nz
Student Information Centre	Room 112, The ClockTower	Phone: 0800 61 62 63 Fax: 0800 61 62 64 studentinfo@auckland.ac.nz
Student Learning Services (Tā te Ākonga)	Room 320, Level 3, Information Commons, 11 Symonds Street	+64 9 373 7599 ext 88850 sls@auckland.ac.nz www.library.auckland.ac.nz/student-learning
Student loans and allowances	StudyLink	0800 88 99 00 www.studylink.govt.nz
SciSpace and Science Student Resource Centre	G0402, Building 301 (access via the Science Student Plaza)	www.science.auckland.ac.nz/scispace
Auckland University Students' Association (AUSA)		www.ausa.auckland.ac.nz
University Book Shop (UBS)	Kate Edger Building	+64 9 306 2700 www.ubsbooks.co.nz
Campus maps		www.auckland.ac.nz/maps

Contact

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