

**INTRODUCTION TO 300 LEVEL COURSES IN THE  
DEPARTMENT OF PHYSICS AND ASTRONOMY  
For 2012, Revised October 2011**

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Your 3<sup>rd</sup> year is a crucial one: you must complete degree requirements and / or fulfil requirements for further study. I will do my best to help you negotiate your way through the course regulations and advise on course combinations but please remember that the final responsibility is *yours*. **Please keep this handout.** It should help you to get your pre-enrolment correct and **save you a lot of time during enrolment.**

**300-LEVEL COURSES FOR 2012**

Course	Title	Semester
PHYS311	Quantum Mechanics	1
PHYS312	Applied Electromagnetism	2
PHYS314	Condensed Matter Physics	2
PHYS316	Geophysical Fluid Dynamics	1
PHYS326	Classical Mechanics and Symmetry Principles	1
ASTR/PHYS322	Theoretical and Observational Cosmology	2
ASTR/PHYS323	Stellar Structure and Evolution	Not offered
ASTR/PHYS325	The Structure and Evolution of Galaxies	1
PHYS/ASTR381	Advanced Experiments in Physics and Astronomy	2
PHYS/ASTR391	Introductory Physics/Astronomy Research	1,2,SU
Various codes	Special Topics	1/2

**KEY QUESTIONS**

Q. What are the **main degree regulations** I must satisfy to complete my B.Sc. degree?

- You must have at least **360 points** (with no more than 105 points non-science subjects).
- You must have at least **225 points** above 100-level (in science subjects); of which at least **90 points** must be at 300-level.
- You must fulfil the *majoring requirement* (see next question).

Q. What do I have to do to **finish my B.Sc. with a Physics (or Astronomy) major**?

- You must complete the *majoring requirement*, i.e., at least **60 points** from 300 level courses in *Physics (or Astronomy)*. See **compulsory courses** below.
- In addition, *Physics and Astronomy majors* must complete PHYS204, PHYS285 and **30 more points** of PHYS201-203; MATH201 and **15 more points** of 200-level MATH. (For those who took PHYS310 in 2011 or earlier and/or 200-level PHYS/MATH courses in 2010 or earlier, the rules are slightly different. Please refer to the Calendar.)

Q. Are there any **compulsory 300-level courses**?

- **YES.** If you are a **Physics B.Sc. major** you must do PHYS381 **AND** 30 more points of papers PHYS301-322, PHYS326-379 or ASTR301-379. (For those who have already completed PHYS310 in 2011 or earlier, the rules are slightly different. Please refer to the Calendar.)

- If you are an **Astronomy B.Sc.** major you must do ASTR381, and 30 more points of papers ASTR301-379 or PHYS301-379.
- If you will be a **Mathematical Physics B.Sc. (Hons)** major you must do PHYS381, plus 45 more points from PHYS311-326 AND 60 points of MATH 302,303,321,343,363,365.
- Most Physics and Math. Physics majors should do the **core courses** PHYS 311, and 312.

Q. What **options** do I have at 300-level? (Many!)

- There are 8 physics courses (plus special topics), 2 astronomy courses each year. What options you chose will depend on your interests, what kind of career you aim for, and whether you intend to study further. Read the course descriptions online at <http://www.canterbury.ac.nz/courses/index.shtml> to find out what is in each course and pick things that appeal to you. Students interested in the following areas will probably choose at least the courses indicated, **including the compulsory courses, and core courses** PHYS311, 312 if you are a Physics or Math Physics major:

Astronomy	PHYS 311, 312, 316, ASTR 322, 325, 381
Atmospheric Physics	PHYS 311, 312, 316, 381
Gravitation and Cosmology	PHYS 311, 312, 326, ASTR/PHYS 322, 381
Nanotechnology/Solid State	PHYS 311, 312, 314, 381
Theoretical / Mathematical	PHYS 311, 312, 326, 381, MATH302,365

If you intend to enter the fourth year Honours programme be careful to choose courses which prepare you for courses that you intend to do in 4<sup>th</sup> year. The **core courses** PHYS311 and 312 are assumed knowledge in most 4<sup>th</sup> year courses. In addition,

- PHYS314 is preparation for PHYS412 Advanced Condensed Matter Physics.
- PHYS316 is preparation for both PHYS417 Atmospheric Remote Sensing and PHYS418 Physics of Atmospheres
- PHYS326 is preparation for PHYS414 Relativistic Electrodynamics and Quantum Mechanics, PHYS415 General Relativity, and PHYS416 Quantum Field Theory.
- ASTR/PHYS322 can be done in 4<sup>th</sup> year as ASTR/PHYS422, and no fourth year course relies on it.

Q. How do I do a **special topic**?

Special topics are only there so that we can create a new course at short notice. You should not consider the special topics as additional options.

Q. Are there any **other courses** that I should think about doing?

- If they have not already done the courses, some students will choose one or two additional courses from PHYS 201-203, 286, ASTR 212, MATH201-203, 270.
- Students intending to Honours require a minimum **30** points of **300-level maths** courses for Physics, **60** points for Mathematical Physics, or **30** points of **300-level maths or statistics** for Astronomy. When choosing maths courses note that: **MATH302, MATH365** are possibly the most useful 300-level maths courses for our majors.

Q. What is the **Introduction to Physics/Astronomy Research** course all about?

- This course takes the form of a small research project, which involves 150 hours lab/field work. It may be taken either in Semester 1, in Semester 2 or in the Summer Term. Assessment will be 80% on a written report, and 20% on an oral presentation.
- The PHYS/ASTR 391 course may be used as credit for your points total, but does **not** count to the 60 points required for a subject major.
- The crucial thing is to find a supervisor who will agree to supervise a project. Available projects are listed on the web at <http://www.phys.canterbury.ac.nz/courses/300/phys390> - if a project you would like is not available look at the list of past projects, and approach a relevant supervisor to ask whether something similar might be offered.
- Note: not every project is suitable for every student – some may require students with a background in electronics (say), while others may require a high level of computation or of mathematical knowledge. Acceptance to a project is on a case by case basis, depending on which courses a particular student has completed.

Q. What's the story with the **labelling of astronomy** courses?

- They can be taken under either a *PHYS* or *ASTR* course code.
- *ASTR/PHYS 323* and *325* are offered in alternating years. In 2012 it will be *325*.
- *ASTR/PHYS 323* and *325* can also be done in fourth year with a *423* or *425* code.

Q. What's **changing** in 2012 as compared to 2011 (in addition to alternation of some courses)?

- *PHYS310* is now *PHYS204*. If you have done *PHYS310*, the old rules will apply to you.
- The Electronics major is no longer offered, although individual courses such as *PHYS312* (equivalent of *ELEC312*) are still on offer. If you started an Electronics major but did not complete it then you should seek urgent advice of the 300-level coordinator.
- Seek advice if you have any queries.

Q. What do I have to do to enter the **4th year Honours** programme?

- Your suitability for the 4th year Honours programme is evaluated by the department at the end of your third year.
- For Honours Physics you must complete the BSc Major requirements **PLUS** at least 30 more points in 300 level *PHYS* **AND** 30 points in 300 level *MATH*: usually **MATH302** and **MATH365**. (Some students will be able to do significantly more points in both physics and maths).
- For Honours Astronomy you must complete the BSc Major requirements **PLUS** at least 30 more points of the 300-level *PHYS/ASTR* courses **AND** 30 points in 300 level *MATH* or *STAT*. You will also need to have done *ASTR112*.
- For entry to 4<sup>th</sup> year you must have at least a B+ average in your **physics** (or **astronomy**) courses.

Q. What about the **Mathematical Physics Honours** programme?

- This programme suits students who wish to go on in theoretical physics, or alternatively in the applied mathematics of atmosphere/ocean modelling.
- At 300-level you need at least 60 points in *MATH* **and** 60 points in *PHYS* papers (excluding the lab *PHYS381* or *PHYS391* research papers) to do **Mathematical Physics Honours** in fourth year, i.e., a mixture of 400-level *MATH* and *PHYS* papers.
- For entry to 4<sup>th</sup> year you must have at least a B+ average in your **physics** and **maths** courses.

Q. What do I have to do to enter the **Masters** programme?

- Complete your B.Sc. with at least a B average and at least 90 points in 300-level subjects approved by the Head of Dept. You can convert to an M.Sc. via a B average in a postgraduate Dip. Sci. if you cannot meet the M.Sc. entry requirements.

Q. What do I need to be eligible to enrol for a **Ph.D.**?

- A good honours or masters degree.

Q. How can I **find out more**?

- The first place to look is the courses website <http://www.canterbury.ac.nz/courses/index.shtml>
- Further information about the Department is online at <http://www.phys.canterbury.ac.nz>
- The Department **handbook** summarises information from the above websites, and will be available in December from the Departmental secretaries on the 7<sup>th</sup> floor.
- Contact the 300-level coordinator.

## OTHER INFORMATION

### Seminars

The Department runs a 50-minute seminar in room 701 at 11 a.m. every Friday in term time. Many of the seminar speakers are from overseas or other physics institutions in New Zealand. They include various employers of physicists. The speakers are asked to pitch their material at a general physicist's level, recognising that there are 300-level physicists in the audience. I urge all of you to get into the habit of attending these seminars as they are a means to gain insight into research and employment here and elsewhere. The style of seminars is quite different from lectures, the speaker aims to give an overview of the subject and to present it in a way that it does not matter that a particular member of the audience doesn't understand it all. Some find the transition from listening to lecture material for exam purposes, to listening to a topic in order to get a flavour of another field, quite a big transition. There will be some seminars during the year that you wish you had not attended but most should be more useful than a night watching TV!

### Class Representatives

The Students' Association wants us to organise at least one representative per class who would have a liaison role between the students, the lecturers and the Student Education Officer. We require enough volunteers to ensure that there is a representative in each of the courses at 300-level. The first meeting with the Department Teaching Committee will be in about the second or third week of term.

### Computing Access

In addition to the various computer workstations around the University, room 817 of the Department contains a number of PCs. Room 711 contains a document scanner and some PCs. These are for the use of 200- and 300-level students and the other students and staff of the Department. Some written information about computing is available on the departmental web page, see:

<http://www.phys.canterbury.ac.nz/computers/>

### Careers Advice

The careers advisory service is on the 7<sup>th</sup> floor of the central library building. If you are completing your degree this year (or even if not) it is strongly recommended that you visit this helpful service.

### Accommodation

Room 815 is a common room for 300 and 400-level students. The 400-level students have their own study space elsewhere.

### Social activities

There will be a barbecue at the University Staff Club, which is in Ilam Road opposite the Students' Association building, early in the first term. Look out for notices about the time and day. Many of the lecturers and a number of graduate students of the Department will also attend.

### New Zealand Institute of Physics

The NZIP is the professional association for NZ physicists. You can join as a student member for a \$25 annual subscription. Further details are available at <http://nzip.rsnz.org/>. There is a national conference every 2 years. The next will be in Palmerston North in 2013.