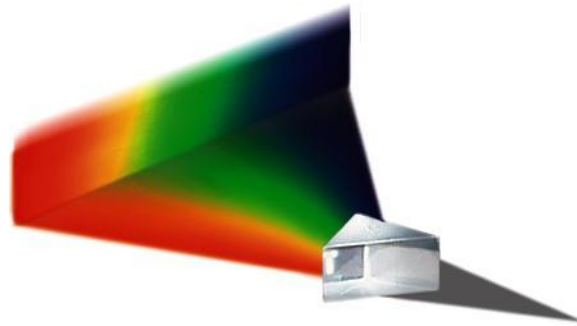


# Physics & Astronomy 400 Handbook 2010

Astronomy --- Physics --- Mathematical Physics --- Medical Physics

## Introduction to 400-level courses

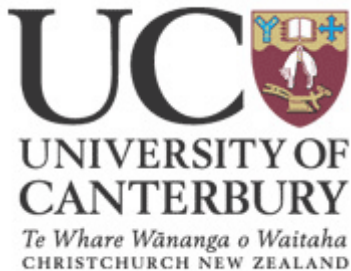
- Courses
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- Keys
- Rooms
- Tea
- Mailbox
- Seminars
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### 480 Research Projects

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- Common Mistakes and Things to Avoid



*Department of Physics and Astronomy*  
*University of Canterbury*  
*New Zealand*  
**Year 2010**



**Introduction to 400-Level Courses**  
*Department of Physics and Astronomy*  
*University of Canterbury*

Co-ordinator: Dr Jon-Paul Wells, Room 618  
 jon-paul.wells@canterbury.ac.nz  
 364-3308

Contact Hours: Let me know when you want to talk face-to-face and I will make time to meet with you.

**400 Level Courses for 2010**

Course	Title	Semester
ASTR 421	Techniques in observational astronomy	Not offered 2010
ASTR 422	Theoretical and Observational Cosmology	S1
ASTR 423	Stellar structure and evolution	Not offered 2010
ASTR 424	Radiative Transfer Processes in Astronomy	S1
ASTR 425	The Structure and Evolution of Galaxies	S2
ASTR 426	Special topic	S1
ASTR427	Special topic	S2
ASTR 430	Astronomy Literature Review	S1 or S2
ASTR 480	Research Project in Astronomy	S1+S2
MAPH 480	Research Project in Mathematical Physics	S1+S2
PHYS407	Research tools	S1
PHYS 411	Advanced Quantum Mechanics	S1
PHYS 412	Advanced Condensed Matter Physics	S1
PHYS 413	Laser Physics and Modern Optics	S2
PHYS 414	Relativistic electrodynamics & quantum mechanics	S1
PHYS 415	General Relativity	S2
PHYS 416	Quantum Field Theory	S2
PHYS 417	Atmospheric Remote Sensing	S1
PHYS 418	Physics of Atmospheres	S2
PHYS 420	Special topic	S1
PHYS 421	Special topic	S1
PHYS 422	Theoretical and Observational Cosmology	S1
PHYS423	Special topic	Not offered 2010
PHYS424	Radiative transfer in astronomy	S1
PHYS 426-7	Special topics	S2
PHYS 480	Research Project in Physics	S1+S2
PHYS 493	Special research project	Summer, S1 or S2
PHYS494	Independent course of study	Not offered 2010
PHYS495	Introduction to physics education research	S1
MDPH 401	Anatomy and physiology	S1
MDPH 402	Nuclear Medicine	S2
PHYS/MDPH 403	Radiation physics	S1
MDPH 404	Radiation biology	S1
MDPH 405	Radiation therapy	S2
PHYS/MDPH 406	Medical imaging	S2
MDPH 407	Special topic	S2
MDPH 408	Special topic	S1
MDPH 409	Special topic	S2
MDPH 410	Special topic	S2
MDPH 480	Medical physics research project	S1+S2

Check the Enrolment Handbook for specific questions regarding requirements, degrees or pre-requisite courses. I will also help to answer such questions.

Special topics are occasionally used (i) to allow a student to take a relevant course from another department under a PHYS or ASTR code, (ii) to construct a course for a student's special needs by combining parts of two or more other courses or (iii) to be able to offer a course delivered by a guest lecturer on any relevant topic.

In addition, the following 300-level papers may also be taken as 400-level papers with possibly a more advanced assessment and assignments, provided the 300-level papers have not already been credited. MSc students are limited to one of the courses below, while students doing BSc(Hons) or PGDipSc may take up to two.

PHYS441	Quantum mechanics (PHYS331)	S1
PHYS442	Applied electromagnetism (PHYS312)	S2
PHYS444	Condensed matter physics (PHYS314)	S2
PHYS446	Geophysical fluid dynamics (PHYS316)	S1
PHYS448	Computational physics (PHYS318)	Not offered 2010
PHYS456	Classical mechanics (PHYS326)	S2

### Course selection:

BSc (Hons) students in physics do a research project, PHYS480 and seven courses from PHYS401-460, at least five of them from PHYS401-440. BSc (Hons) students in mathematical physics do a research project (MAPH480) and seven lecture courses, including at least four courses from the physics list and at least two from MATH401-490. BSc (Hons) students in astronomy do the research project, ASTR480 and seven lecture courses, including ASTR424 and the remaining six courses from ASTR and PHYS 400-level courses. The enrolment handbook gives details of prerequisites and other restrictions. BSc (Hons) students in medical physics do MDPH480, six courses from MDPH401-410, PHYS407 and one course from PHYS410-460.

MSc (Part 1) students in physics do PHYS480 and five lecture courses from PHYS401-460. In astronomy the choice is ASTR480, ASTR424 and four other courses from ASTR and PHYS 400-level courses.

PGDipSc students may replace the PHYS/ASTR480 project with three other lecture courses in PHYS or ASTR at 400-level; otherwise the PGDipSc requirements are the same as those for MSc (Part 1).

In all cases the precise requirements on course selection and prerequisites can be found in the Enrolment Handbook, or please consult me as 400-level supervisor of studies.

Other items that you need to attend to:

**E-mail Addresses:** You will receive from me important notices and reminders. Please make certain that I have the e-mail address that you most often check.



**Keys:** See Rhondda Sullivan in room 708 to obtain a corridor key.

**Rooms:** You should be given a desk within your research group.

**Coffee/Tea:** You are welcome to coffee/tea in room 701 from 10:30 – 11:00 am and 3:30 – 4:00 pm. These facilities are available at all times except when a meeting is being held in room 701.

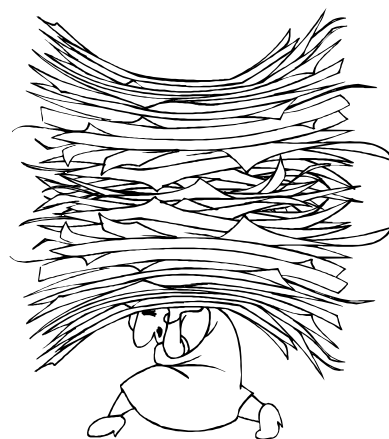
**Mailbox:** You should have your own mailbox (pigeon hole) in room 711. Please check this frequently.

**Seminars:** You are **URGED** to attend the departmental seminars at 11:00 am on Fridays. The seminars are worth the price of your University education—and there are no exams!

**Beer Seminars:** Mainly students, lively discussion and beer!

**Computer Facilities:** You will be assigned a username and password. There will be tutorial support for those new to the system. I encourage you to learn as much as you can. Your computer account will have \$20 in funds for printing. Your research supervisor can request additional funds, if that is necessary for your work.

**Stress, conflicts, problems:** Your studies will be challenging. You might find them overwhelming. Overwork also promotes personal conflicts. Personal and family relationships can affect your university work. Please feel free to discuss any problem at any time, with me, your instructors, or the Head of the Department. Usually it is better to get help early.



### Computers Available

We provide research equipment for all our research students. All students doing a 480 research project can expect a desk and access to a desktop computer for their project work.

### Important Dates

**Monday 22 February:** Project descriptions available on the physics dept website.

**Wednesday 3 March:** E-mail me your first, second and third choices for 480 projects

**Friday 5 March:** 480 assignments will be e-mailed to you

**Friday 5 March:** Last day to add or drop a class. (To be sure, check the enrolment handbook or UoC website).

**Monday 8 March:** Nominal start date for 480 projects

**Wednesday 10 March:** Barbecue at the Staff Club starting at 5:10. Free food!!

**Week 12-16 July:** Oral talk on your research project (12 min talk plus 3 min questions). The talk should discuss the motivation for your research and ‘set the scene’, not present final results.

**Friday 16 July:** A three-page (max. length) progress report on your project is due at 4.00 pm with Rhondda.

**Friday 10 September:** Your full project reports (25 pages max. length) are due to be handed in to Rhondda by 4.00 pm (3 copies). Late projects and those which are over the page limit will have their grade reduced.



**Week 11-15 October:** Poster symposium. All students will produce an A0 format poster on your research project. You will discuss your poster with assessors, including an external moderator.

It will be possible for some students to start their 400-level studies in semester 2 and conclude in semester 1 of the following year. In that case the dates for the commencement of the research project and for the deadlines along the way will be set by mid-2010.

## **2010 Research Projects PHYS 480, ASTR 480, MAPH 480, MDPH 480**

### **Introduction**

Each student doing 400 level Honours or MSc part I in physics, astronomy, mathematical or medical physics is required to do a research project. Those doing a PGDipSc may choose to replace three lectures courses with a research project. The project must include:

- An oral presentation in July (first week of S2). This presentation will take 12 minutes plus 3 minutes for questions. It will set the scene, review the motivation and literature for your project, but is not intended to present final results.
- A 3-page (max) written progress report due on July 16.
- A final written report due on September 10. The maximum length is 25 pages, including diagrams and tables.
- An A0 size poster describing the final results of your research. The poster will be assessed and the assessors and an external moderator will discuss the poster with you for about 20 minutes.

Project descriptions will be available from about 22 February. Please talk to the supervisors about any project that interests you. The current list of projects being offered will be on the web from 22<sup>nd</sup> February.

The written report must comply with the format given in this document. This scholarly work will be archived in the Departmental Library. Your oral presentations should be at the level of a Departmental Seminar and the poster will be similar to a typical conference poster.

The **McLellan Prize in Physics** is awarded annually to the highest ranked project undertaken by a BSc Hons student.

## Assessment

The following are the credit weightings for the assessment of your project work:

- The project talk is assessed by three people independently;  $3 \times 5\% = 15\%$
- The progress report is not assessed but it is essential to complete this by the deadline to complete the course.
- The final written reports are assessed by three people: your supervisor (25%) and two independent readers ( $2 \times 15\%$ ), total 55%.
- The poster contribution will be 15%
- The quality of the discussion on your poster with two assessors and the external moderator will attract a further 15% of credit.

### Your final written report will be graded on the following concepts:

1. Clear statement of the problem being investigated
2. Use of appropriate methods
3. Reviewed the work of others
4. Clear presentation of results
5. Critical appraisal of the research outcomes
6. Logical ordering to the presentation
7. Quality of the language (grammar, spelling, clarity of expression)
8. Completeness of the bibliography
9. Amount of detail presented
10. Quality of the science presented
11. Quality of the work presented
12. Original thoughts
13. Completeness of the report
14. Quality of the presentation, including tables, and figures
15. Followed the rules (turned in on-time, length, format)

### Your project talk will be assessed on the following criteria:

1. Clear discussion of the project and statement of the problem tackled
2. Clear speech and presentation manner
3. Good summary of the motivation for your research and overview of the literature
4. Good use of audio-visual aids (such as PowerPoint or other a/v aids)
5. Ability to keep to time (typically 12 minutes for talk, 3 min questions)
6. Ability to answer questions concisely and well

## Organization

You should meet regularly with your supervisor. You are NOT expected to take the research topic home and return with the work completed. Research is an evolving process that requires give-and-take between you and your supervisor. Make yourself a timetable and stick to it. Have a near-to-final draft of your manuscript to your supervisor several weeks before it is due.



## Guidelines for the report format

The style rules of the Journal of Physics (UK) should be used. Any article in any volume of the journal may be consulted for layout. Certain issues contain instructions on the inside cover. A project report from a previous year may be a useful guide.

In general, the report should contain:

Title Page

Abstract page (summary of project, including results less than 250 words)

Contents page (listing section and headings)

List of Figures and Table page (if applicable)

Main Sections (either divided according to topics or as given below):

Introduction

Materials and Methods

Results

Discussion

Conclusion

Figures and tables should be located in the text where cited or on the next blank page.

Acknowledgements

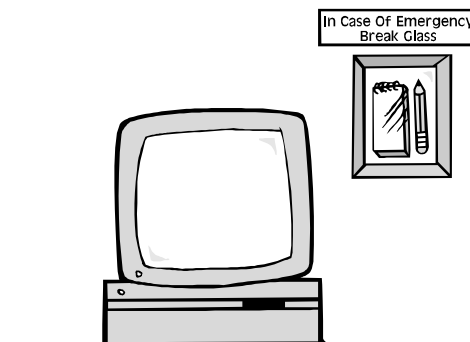
Appendices (if applicable)

References: follow the layout of the Journal of Physics

All pages from the start of the Introduction should be in Arabic numbers (1, 2, 3...) and the preceding pages (except Title and Abstract pages with lower case roman numerals (i, ii, iii, ...)). The Arabic numbered pages of the report from the beginning of the Introduction through to the Conclusion **must not be longer than 25 typed A4 pages in a 12-point font**. 1.5 cm margins should be used on sides of the page, except a 3.0 cm margin should be used on the left side for binding. The 25-page limit includes figures and appendices.

You are encouraged to use either MS Word or L<sup>A</sup>T<sub>E</sub>X to prepare the report. If you choose to use latex, a 480 shell file is available at `/usr/local/phys/common/tex/lxshells/480proj/`.

Although the format is similar to a journal article, this report should be less cryptic and more expository than a published article. Your report should resemble a short thesis.



## Your contribution to the research project

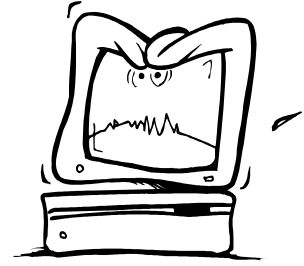
The Introduction should state the purpose of the research in the context of adequate background material. The Introduction should conclude with a very EXPLICIT statement about YOUR contribution to the project. Since most research is very collaborative, your role in the collaborations needs to be carefully listed. If a grader is unable to determine your exact role in a project, your grade might suffer.

## Plagiarism

In submitting your written paper, you should be aware of what is considered plagiarism. While you are encouraged to consult a wide range of references in preparing your report, the actually written submission must be your own words on the topic. It is not acceptable to copy the work of someone else and change a few words in the text. If you are uncertain about the rules, talk to me in advance. The University penalties for plagiarism are severe.

### **Common mistakes and things to avoid**

- Be sure to consult your supervisor early as to their preferences regarding writing style to minimize editorial changes
- Be sure to allow plenty of time for the original write up, revision and final formatting. As a guide, the majority of your experimental work should be completed two months before the hand in deadline.
- Do not write in the first person singular (*e.g.*, I measured the resistance. . .)
- Be consistent with verb tense.
- Be consistent with the way things are referenced.
- Define all symbols and constants the first time they are used.
- Define all abbreviations the first time they are used.



### **Further Studies**

Those of you not already undertaking a degree course involving thesis work may well be undecided on what you are doing in 2011! Feel free to discuss the possibilities for post-graduate research within the Physics and Astronomy department with any staff member. I will be free to discuss your options at anytime. Just call by or email me to set up a meeting.