UNIVERSITY
OF WOLLONGONG
AUSTRALIA

Physics Undergraduate Research Thesis

Information for students undertaking

Bachelor of Science (Honours) (Physics) 1815
Bachelor of Science Advanced (Honours) (Physics) 358
Bachelor of Science Advanced (Honours) (Atmospheric Science) 358
Bachelor of Science Advanced (Honours) (Biomedical Physics) 358
Bachelor of Medical and Radiation Physics (MRP) Advanced 357
Bachelor of Research (Physics/Medical Radiation Physics) 380

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Academic Director for Physics and MRP Advanced, Honours and BRes Degrees:
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Email: pan@uow.edu.au

Contents

1. OVERVIEW OF HONOURS (and BRes) YEAR

As your first major experience of independent research, your Honours Year is likely to be both exciting and daunting. Your previous years at university will have prepared you for the scientific aspects of your Honours year. ***However, during the Honours Year you will also be responsible for the organisational and managerial aspects of a research project***. This guide is aimed at

- outlining the coursework program;
- introducing you to the research thesis;
- providing resources and tools to assist you with your research;
- being the subject outline for **PHYS457** (the main purpose of this guide. The details on Research Project – Thesis are given starting from page 7).

ADMISSION REQUIREMENTS AND ADMISSION PROCESS

A) Bachelor of Science (Honours) course code 1815

(1 year "add-on" degree after completing a 3 year Bachelor of Science)

To be admitted to the Honours Program, you must complete a Bachelor of Science including the subjects below, and have achieved a Credit average (65%) or better.

- Physics

You must complete a 144 cp BSc (Physics) degree (or equivalent), which includes PHYS305, PHYS325, PHYS390 (or PHYS335), PHYS375, PHYS385 and PHYS396.

- Biomolecular Physics

You must complete a 144 cp BSc Advanced (Biomolecular Physics) degree (or equivalent), which includes PHYS305, PHYS325, CHEM314, CHEM320, BNAN201, MATH204, PHYS369, and PHYS385.

- Atmospheric Science

You must complete a 144 cp BSc Advanced (Atmospheric Science) degree (or equivalent), which includes PHYS305, PHYS325, CHEM327, STAT231, PHYS385, STAT232, PHYS402 (or PHYS403), and EESC207.

To apply for admission:

Fill out the online application form available at

https://applytouow.uow.edu.au/app/welcomeUow.jsp

B) Bachelor of Science Advanced (Honours) course code 358

(Fourth year of a 4 year BSc Advanced degree)

To be admitted to the Honours Program, you must complete the first three years of the degree, including the subjects below. All students in Advanced programs must maintain a yearly average of 80% to remain in the Advanced degree.

- **Physics major**

You must complete a 144 cp including PHYS305, PHYS325, PHYS390 (or PHYS335), PHYS375, PHYS385 and PHYS396.

- **Biomolecular Physics**

You must complete a 144 cp including PHYS305, PHYS325, CHEM314, CHEM320, BNAN201, MATH204, PHYS369, and PHYS385.

- **Atmospheric Science**

You must complete a 144 cp including PHYS305, PHYS325, CHEM327, STAT231, PHYS385, STAT232, PHYS402 (or PHYS403), and EESC207.

To apply for admission:

Separate application is not required. Contact the Physics Thesis Coordinator at the end of your third year to discuss your choice of project and supervisor.

C) Bachelor of Medical Radiation Physics Advanced (Honours) course code 357

(Fourth year of a 4 year B.MRP Advanced degree)

To be admitted to the Honours Program, you must complete 144 cp of the B.MRP Adv (Hons). All students in the Advanced program must maintain a yearly average of 80% to remain in the Advanced degree.

To apply for admission:

Separate application is not required. Contact the Physics Thesis Coordinator at the end of your third year to discuss your choice of project and supervisor.

D) Bachelor of Research (Physics/Medical Radiation Physics) course code 380

(*1 year degree, also comprising the 1st year of MRes, after completing a 3 year Bachelor of Science*)

To be admitted to the Bachelor of Research (BRes) program, you must complete a Bachelor of Science, and have achieved a Credit average (65%) or better.

To apply for admission:

Contact the Physics Thesis Coordinator to discuss your choice of subjects, choice of research direction and supervisor. To be enrolled in BRes, fill out the online application form for Master of Research degree available at
https://www.uow.edu.au/future/postgrad/index.html

OUTLINE OF THE HONOURS (AND BRES) PROGRAM AND ASSESSMENT

Bachelor of Science (Honours) (*major*) and

Bachelor of Science Advanced (Honours) (*major*)

The Honours Program include mandatory coursework subjects (24 credit points) AND a research thesis (24 credit points, making 48 credit points in total).

○ **Research Project (Thesis) component**

If you are a full-time student you should be enrolled in *PHYS457 Research Project* (24 cp).

Part-time students should consult Physics Thesis Coordinator (Prof. Alexey V Pan).

○ **Coursework**

If you are a full-time student you should also be enrolled in:

- **Physics major**

1. PHYS474 Quantum Mechanics – Annual (6 cp)
2. PHYS476 Solid State Physics – Annual (6 cp)
3. PHYS466 Research Methods – Annual (6 cp)
4. PHYS473 Electromagnetism – Autumn (3 cp)
5. PHYS471 Theoretical Mechanics – Autumn (3 cp) is offered in odd years only, OR
   PHYS472 Relativity and Cosmology – Autumn (3 cp) is offered in even years only

- **Biomolecular Physics major**

1. PHYS476 Solid State Physics – Annual (6 cp)
2. PHYS462 Medical Imaging – Autumn (6 cp)
3. PHYS466 Research Methods – Annual (6 cp)
4. One 6 cp subject at 300 or 400 level in Physics, Mathematics, Statistics, Biology or Chemistry.

- **Atmospheric Science major**

1. STAT301 Statistical Methods for Data Science – Spring (6 cp)
2. PHYS466 Research Methods – Annual (6 cp)
3. PHYS402 Atmospheric Remote Sensing and Inverse Methods –Spring (6 cp)
   PHYS403 Physics of Atmospheres and Oceans – Not available in 2020 (6 cp)
4. One 6 cp subject at 300 or 400 level in Physics, Earth and Environmental Science, Mathematics, Statistics, or Chemistry.

○ **Assessment**

Details of the contents and assessment of individual coursework modules may vary slightly from year to year. Your lecturers will provide detailed information sheets in the first week of session for each subject. Details of the assessment of PHYS457 *Research project* are covered starting from page 15.

○ **Grades of Honours**

The grade is based on the final year (400 level) only:

Class I:	85% to 100%
Class II, Division 1:	75% to less than 85%
Class II, Division 2:	65% to less than 75%
Class III:	50% to less than 65%
Honours not awarded:	0% to less than 50%

Minimum performance of at least 50% is required for each subject. Not achieving 50% for any of the subjects would result in student not qualifying for achieving the Honours degree.

Bachelor of Medical and Radiation Physics Advanced [BMedRadPhysAdv(Hons)]

The Honours Programs include mandatory coursework subjects (24 credit points) AND a research thesis (24 credit points, making 48 credit points in total).

PHYS463	Nuclear Medicine – Spring (6 cp)
PHYS462	Medical Imaging – Autumn (6 cp)
PHYS461	Radiobiology and Radiation Protection – Spring (6 cp)
PHYS466	Research Methods – Annual (6 cp)
PHYS457	Research Project – Annual (24 cp)

○ **Assessment**

Details of the contents and assessment of individual coursework modules may vary slightly from year to year. Your lecturers will provide detailed information sheets in the first week of session for each subject. Details of the assessment of PHYS457 *Research project* are covered starting from page 15.

○ **Grades of Honours**

The final grade of Honours is based on weighting of

4 for 400 level

1 for 300 level

0 for 200 level

0 for 100 level

Class I:	80% to 100%

Class II, Division 1:	72.5% to less than 80%
Class II, Division 2:	65% to less than 72.5%
Honours not awarded:	0 to less than 65%

Minimum performance of at least 50% is required for each subject. Not achieving 50% for any of the subjects would result in student not qualifying for achieving the Honours degree.

Bachelor of Research

- **Physics**

RES402	Responsible Research	6cp (Autumn)
PHYS458	Advanced Project	12cp (Annual)
PHYS466	Research Methods	6cp (Annual)
PHYS474	Quantum Mechanics	6cp (Annual)
PHYS476	Solid State Physics	6cp (Annual)
PHYS473	Electromagnetism	3cp (Autumn)
Plus one of the following		
PHYS471	Theoretical Mechanics	3cp (Autumn – offered in odd years)
PHYS472	Cosmology	3cp (Autumn – offered in even years)
Plus Elective PHYS/MATH/300/400 Subject		6cp (Spring)

- **Medical Radiation Physics**

MEDI100	Human Structure and Function	6cp(Autumn)
RES402	Responsible Research	6cp (Autumn)
PHYS458	Advanced Project	12cp (Annual)
PHSY365	Detection of Radiation	6cp (Autumn)
PHYS366	Physics of Radiotherapy	6cp (Autumn)
PHYS463	Nuclear Medicine	6cp (Spring)
PHYS462	Medical Imaging	6cp (Autumn)
PHYS461	Radiobiology and Radiation Protection	6cp (Spring)

○ **Assessment**

Details of the contents and assessment of individual coursework modules may vary slightly from year to year. Your lecturers will provide detailed information sheets in the first week of session for each subject.
Details of the assessment of PHYS458 *Advanced Project* are similar to those of PHYS457 and covered starting from page 15. The major difference is that Final Research Report is replacing Research Thesis with the commensurate assessment relevant to this 12cp subject as opposed to 24cp for PHYS457.

○ **Grades**

Minimum performance of at least 50% is required for each subject. Not achieving 50% for any of the subjects would result in student not qualifying for graduating with BRes degree.

COURSE LEARNING OUTCOMES

Bachelor of Science (Honours) and Bachelor of Research (Physics)

1 Integrate knowledge of a variety of fundamental physical laws to analyse behaviour and properties of physical systems;

2 Demonstrate advanced knowledge of research principles and methods associated with physics;

3 Integrate advanced technical and cognitive skills in reviewing, analysing and synthesising information to address specific themes in physics;

4 Exercise critical thinking, initiative and judgment in understanding complex concepts and constructing new understandings in contemporary physics;

5 Communicate advanced knowledge and ideas clearly and coherently by written and oral means to an expert and non-expert audiences;

6 Plan and execute a research project pertinent to physics in collaboration with an academic supervisor.

Bachelor of Science Advanced (Honours)

Course Learning Outcomes 1-5 above plus

6 Demonstrate initiative and creativity in planning and executing a research project pertinent to physics.

Bachelor of Medical Radiation Physics Advanced (Honours) and Bachelor of Research (MRP)

1 Compare medical radiation related instrumentation and apply techniques associated with diagnostic imaging and radiation oncology.

2 Analyse theoretical, practical and professional information and communicate knowledge, ideas and procedures to other health care professionals/practitioners, researchers and other key stakeholders.

3 Employ independent learning strategies to self-evaluate and update professional knowledge of innovations in medical radiation physics

4 Apply knowledge of the basic structure and function of the human body relevant to clinical diagnostic imaging and radiation oncology.

5 Appraise radiation and radioactivity, its properties, units of measure, dosimetry measurement concepts and methods.

6 Compare radiation safety practices and procedures associated with diagnostic imaging and radiation oncology.

7 Consolidate and synthesise knowledge of the biological effects of radiation and its application for radiation safety and for radiation treatment.

8 Perform the clinical support procedures required of a medical physicist in a professional and ethical manner.

9 Integrate knowledge of a variety of fundamental physical laws to analyse behaviour and properties of physical systems.

10 Exercise critical thinking, initiative and judgment in understanding complex concepts and constructing new understandings in contemporary physics.

2. STUDENT SUPPORT

STUDENT ENQUIRIES

There are four main points of contact between you and the School of Physics:

- General enquiries relating to the ***Research Thesis*** and ***Final Research Report*** should be directed to Academic Director (*aka*. Physics Thesis Coordinator):

  Prof. Alexey V Pan

  Building 4, Room G73

  Email: pan@uow.edu.au

  Phone: (02) 4221 4729

- **Specific and technical enquiries** to your research project should be directed to your academic supervisor.

- The EIS Central in Building 4 room G14 can provide limited advice. All assignments are usually submitted via the EIS Central allowing you to obtain a receipt for each submission.

- The Head of School may also be contacted in exceptional cases:
  Prof. Michael Lerch

  Building 4, Room G62

  E-mail: mlerch@uow.edu.au

  Phone (02) 4221 4954

EIS STUDENT SUPPORT ADVISERS

Located in Rm 4.105

Mitz Perez (Mon-Fri)

(02) 4221 3833

mperez@uow.edu.au

LIBRARY ACCESS

Research students are allowed to borrow 15 items for 21 days. Students have Inter-Library Loan privileges in the Library and should make use of these privileges to gather information for their literature search (a maximum of five interlibrary loans may be requested). Honours students are also eligible for librarian assistance with research: https://www.library.uow.edu.au/ask/UOW099888.html.

Students are also strongly advised to attend a Library Research Skills Seminar. These seminars are held in weeks 1 to 3 first session of enrolment. For further information refer to the Faculty Librarian and the Library Resource material presented on the university web site. Students with English grammar and written communication skill problems or requiring help with their thesis writing skills should contact Dr. Alisa Percy (11.208, alisa@uow.edu.au, 4221 3289) as soon as possible for advice or assistance.

COMPUTER ACCESS

The Faculty is unable to provide computing equipment to honours or postgraduate students on an individual basis. Research students have access to:

The Student Central Computer Laboratories, located on level 1 within the ITS Building 17, house the University's bookable and general access computer teaching resources. This high quality teaching and research facility is provided to students and staff of the University of Wollongong (http://www.uow.edu.au/its/studentlabs/index.html).

The Faculty Computer Laboratories in Building 4

All students are entitled to have access to the Faculty PC Laboratory. You should contact Ms Leonie McIntyre in Room B6.221, Ext. 5875, to obtain computer password access and to discuss other computing facilities within the Faculty that you may wish to use.

PRIZES

For a list of prizes available to 400 level students in Physics, please see

https://www.uow.edu.au/student/studyinfo/UOW008195.html

3. CHOOSING YOUR RESEARCH TOPIC

The aim of the Research Thesis is to provide you with your first real opportunity to undertake research over an extended period, including the planning phase and ***its management***. After successfully completing this program, students will be able to embark on a career as a physicist. They will have advanced skills in problem solving in the fundamental and applied areas of the discipline and will be able to involve themselves in research programs either to assist in their execution or develop these themselves. Also, they will be qualified to enrol in Higher Degree programs without the need for further preliminary study.

Current research topics can be found under Information for Students tab at the Physics School Webpage: http://eis.uow.edu.au/physics/research/projects/index.html

If you are intending to undertake a research project you should approach the academics offering research in the area of interest to you and discuss opportunities for research. You will work closely with your chosen supervisor over the entire duration of the project. Your research may be carried out in Physics Research Laboratories on campus, at Institute for Superconducting and Electronic Materials (ISEM) located in AIIM buildings at Innovation Campus (iC), or/and off-campus at CSIRO, ANSTO or one of the Wollongong or Sydney hospitals. In the case of Off-Campus research, your main supervisor must be a member of academic staff of the School of Physics, and a co-supervisor is assigned by your main supervisor from the institute in which the research is undertaken. If you would like any help in finding a supervisor (from a specific field of interest), in the first instance contact Physics Thesis Coordinator (Prof. Alexey V Pan), who will help you to find one.

The School of Physics supports research programs in the following areas:

- **Fundamental and Applied Physics**

Staff: Prof. Alexey V Pan, A/Prof. Joseph Horvat, Prof. Chao Zhang, Prof. Roger Lewis, A/Prof. Rodney Vickers

- Superconductivity: physics, materials, and applications
- Ratcheting effects in superconductors for future cryogenic electronics
- Thin films, multilayers, and superlattices (Growth and Properties)
- Emerging phenomena at the interfaces in 2D systems, hybrid heterostructures, and superlattices
- Real-time magneto-optical imaging of superconductors and magnetic materials
- Micro and nano-fabrications: physics and development of thin film devices, detectors, SQUIDs
- Vortex matter, dynamics and pinning in superconducting and hybrid systems
- Magnetically induced "over-critical" currents in superconductors
- Thin films and nano-disks for magnetic storage and spintronics
- Terahertz physics and applications
- Terahertz sources
- Terahertz spectroscopy
- Practical applications of terahertz techniques
- Ultrafast processes
- Terahertz optics
- Electrical Characterisation of Low Dimension Structures
- Optical Spectroscopy of Semiconductors
- Theoretical Solid State Physics
- Photonics
- Frustrated spin systems

- Plasmonics
- Nonlinear effect in many-electron systems Quantum transport and charge dynamics in low dimensional systems
- Thermionics
- Physics of topological materials

o Medical and Radiation Physics

Staff: Prof Anatoly Rozenfeld , Prof. Peter Metcalfe, A/Prof. Susanna Guatelli, Prof. Michael Lerch, A/Prof Marco Petasecca, Prof. Alexey V Pan, Dr. Moeava Tehei, Dr. Dean Cutajar, Dr. Yujin Qi, Dr. Enbang Li, Dr. Linh Tran, Dr. George Takacs, Dr. Phil Simmonds (Hon. Fellow), Dr. Alessandra Malaroda.

- Micro- and space dosimetry.
- Computational radiation transport for dosimetry and radiobiology.
- Proton and brachytherapy.
- Linac radiothrapy: intensity modulated radiation therapy, volumetric modulated arc therapy, stereotactic radiosurgery, MRI guided LINAC therapy.
- Emerging radiotherapy technologies: hadron therapy, synchrotron microbeam radiation therapy and magneto-radiotherapy.
- Spectroscopy of Biopolymers
- Medical Imaging: The Centre operates a GE Prospeed CT scanner and Gamma Cameras
- Film dosimetry and quality assurance utilising these systems
- Targeted magneto-mechanical cancer-cell destruction (via apoptosis) using nano-disks
- High Energy Physics
- Dosimetry in Molecular Radiotherapy
- Targeted Radionuclide Therapy

Research Off-Campus

● It is common for students completing their research program in Medical Radiation Physics to work off-Campus at ANSTO, CSIRO or local and metropolitan hospitals. You will need to check with your ***university supervisor*** and your ***hospital supervisor*** as to whether it is a requirement that you complete the following checks before beginning your research:

1) Prohibited Employment Declaration Form (Working with Children Check).

2) Application for a Criminal Record Check (CRC).

3) Student Acknowledgement Form.

4) Work Placement/Insurance form.

5) In addition, you may need an Adult Vaccination Record Card concerning your Immunisation status as per NSW Health Department circular "Occupational Screening and Vaccination against Infectious Diseases" available on the NSW Health department website.

These forms may be obtained from the relevant hospital.

● Physics, Biomolecular Physics, and Atmospheric Science Honours students normally carry out research projects in the School of Physics (which includes relevant ISEM and AIIM research facilities). Only under exceptional cases, approval may be given to do a project off-campus. For this:

(i) There should be a strong evidence that the external supervisor is of a higher quality compared to the academic staff in the school (eg., Curriculum Vitae, a strong record of successful student supervision, etc.) submitted together with the Project Proposal by week 5);

(ii) A clear project description of an external project, satisfying the school standard, should be submitted to the Physics Thesis Coordinator (as a part of the Project Proposal by week 5, see page 13);

(iii) It must be approved by Academic Director (Prof. Alexey V Pan) **and** the Head of School (Prof. Michael Lerch).

NB. The students undertaking Honours research projects within the School of Physics are more likely to have their research work published in top research journals as a result of excellent, tailored supervision and corresponding high quality research programs.

4. RESEARCH THESIS DETAILS:

PHYS457 *Research Project* (and PHYS458 *Advanced Project for BRes*)

Objectives

The Thesis Program provides you with the opportunity to undertake research. The mode of supervision varies with individual academics from a closely supervised "apprenticeship" to the more "hands-on" approach.

On successful completion of the final year thesis a student should be able to:

(i) Define clearly the aims and objectives of a given problem.

(ii) Retrieve and analyse previous work on related problems (critical literature review).

(iii) Formulate methods for problem solution.

(iv) Plan, design and construct an experimental or theoretical procedure to solve the problem.

(v) Collect data and evaluate findings.

(vi) Communicate conclusions and solutions verbally and in writing.

Progress (IMPORTANT INFORMATION)

In order to ensure completion of the thesis within the prescribed time, the following timetable (please see the table on the next page) is implemented. A number of benchmark submissions must be met, otherwise ***it may lead to failure of the Thesis Program*** unless corresponding Academic Consideration(s) are timely lodged through SOLS and discussed with the Physics Thesis Coordinator (Prof. Alexey Pan). Details of each submission are given in Appendix A.

Benchmark submission requirements:

1. All submissions (except for the Draft Thesis and PHYS458 Final Report) must be made to the EIS Central by 4.30 pm on the specified due dates (***not*** to your academic supervisor).
2. The Draft Thesis must be submitted ***by the due date*** to your ***Academic Supervisor***, not to EIS Central.
3. Student ***requests for deadline extensions*** should be submitted through SOLS to the Thesis Coordinator. Students should also discuss the matter with their academic supervisor. Decisions will be communicated to students through SOLS after consultation with the relevant thesis supervisors.
4. Late submissions (***without written extensions approved*** by the Thesis Coordinator) will incur a penalty of 3% of the relevant assessment per day. Submissions made ***later than one month after the due date are to receive 0 (zero) mark*** for the corresponding assessment task. ***A not-received benchmark submission may lead to failure of the Thesis/Research Program.***
5. Date, time and venue for oral presentations will be informed to you by the Thesis Coordinator through SOLS. Usually, presentations are held around the last day of the corresponding session.
6. The time limits for oral presentations will be strictly enforced.
7. Marks for each assessment task are to be entered in SMP by the Thesis Coordinator within 2-6 weeks after a corresponding deadline.
8. The final mark is to be entered in SMP by the Thesis Coordinator. The final mark will be composited (if applicable, for example for Honours Program) with the coursework marks to derive the total Grade.

Note, failure to meet these deadlines may result in a grade not being declared, or a student not being able to graduate at the end of Session 2, or failure of the Program.

The final marks will be presented to the Physics School Assessment Committee.

SUMMARY OF BENCHMARK REQUIREMENTS & DEADLINES FOR RESEARCH THESIS

Session 1						
Section/Item	**Student Deadlines**		**Supervisor Feedback**		Guide for page numbers/ Time limit	**Thesis Mark, %**
	Day	Wk	Day	Wk		
Thesis Project Proposal : Topic, listed all academic supervisors and their contacts, problem definition, aims and objectives, methodology, resources, work plan, and WHS issues.	Mon	5	Fri	6	5 pages	1
Progress Report: Submission of introductory chapters. Clear problem definition (preamble), refined aims, objectives and scope, preliminary chapters including literature review and possible results to date.	Mon	11	Fri	13	10 pages	4
Progress Oral Presentation (incl. questions)	TBA	14			5 Min	5
Session 2						
Draft Thesis (submitted to Academic Supervisor): Submission of neat draft copies suitable for comments/corrections from the supervisors	Fri	10	Mon	12	A guide only: >50 pages and <100 pages	None
Final Thesis/Final Research Report: Abstract, match objectives and conclusions, review and references, presentation and content. Submit the final thesis in PDF format on three tagged USB Flash Drives. **For BRes: Submit to your supervisor only.**	Fri	12			A guide only: >50 pages and <100 pages	80
Final Oral Presentation: Use of aids such as overheads, power point etc, technical and other content, delivery including eye contact and time management, answers to questions	TBA	14			15 min plus 5-10 min questions	10
Total Thesis Mark						100

TBA means “To Be Advised”.

All benchmark requirements are to be submitted to Prof. Alexey V Pan via EIS Central (except Draft Thesis is to be submitted to the thesis supervisor).

DEADLINES AND THESIS SUBMISSION DETAILS

Thesis/Research Project Proposal

(Due: Session 1, Monday Week 5)

(Feedback: Session 1, Friday Week 6)

Every student, together with their supervisors, must complete a Thesis Project Proposal by Week 5 of Session 1 of the Thesis/Research Year. One copy is to be handed in to the EIS Central marked Attention Prof. Alexey V. Pan ***by the due date***; the other copy is to be retained by the supervisor. On-time submissions will automatically receive mark of 1% after consultations with corresponding supervisor(s). Failure to submit by the due date (***without approved written extension***) will result in 0% mark. This package **must** include the first five items:

- Proposed Title
- Name of the student, student number and contact details
- Thesis supervisors and their contact details
- Aims and objectives
- Proposed work plan and methodology
- Risk Assessment sheet (WHS form, if required by the thesis supervisor)
- Project log and laboratory book preparation (if required by the thesis supervisor)

Progress Report

(Due: Session 1, Monday Week 11)

(Feedback: Session 1, Friday Week 13)

Each student must complete a progress report. One copy is to be submitted via EIS Central to Prof. Alexey V. Pan; the others are to be retained by the supervisors. The progress report comprises four percent of the final mark. Supervisors are to advise the suggested mark to the Thesis Coordinator (Prof. Alexey V. Pan) within two weeks after the deadline. The Progress Report should include the following items.

- Title page
- Name of the student and student number
- Thesis supervisors
- Abstract
- Refined aims, objectives and scope
- Preliminary chapters including literature review
- Results obtained to date

Progress Oral Presentation & Final Oral Presentation:

Progress Oral Presentation: Session 1, Week 14

Final Oral Presentation: Session 2 Week 14

Short Progress Presentation must be given by every thesis candidate in Week 14. The presentations should provide the motivation, aims, literature review, outline, novelty and possible research work conducted to date in precise and concise details. Presentations will be arranged in seminar-style, i.e. the candidates should outline their progress in a 5 minute talk, which will be followed by a few questions (up to 5 minutes). The presentation comprises five percent of the final thesis mark.

Final Oral Thesis Presentation represents ten percent of the final thesis/research mark. The break-up of this assessment component is as shown in Appendix C1. The Thesis/Research Presentation will normally be conducted at the beginning of Week 14 of Session 2 of the Thesis enrolment. Students will be advised, by Week 13, of the venue and time for their presentation by the Subject Coordinator. Presentations will be arranged in seminar-style, i.e. the candidate will outline the details of his/her work in a 15 minute talk, which will be followed by question time of 5 to 10 minutes. Students will be allotted a total of about 20 to 25 minutes for their presentation.

Visual aids such as PC PowerPoint, PC and overhead projectors will be available in the allocated presentation room. However, it is the responsibility of students to ensure that PC/audio/visual equipment they require is available and functioning satisfactorily. If problems are encountered please discuss this with the Thesis Coordinator.

Two or more academic staff and visiting hospital personnel will assess your seminar. ***Thesis/Research students are required to attend all presentations*** (without interference with their normal lecture/tutorial attendance in other classes). ***The students are responsible to be on time for their presentation.***

Draft Thesis (PHYS458 final report formats are as agreed with research supervisors.)

(Due: Session 2, Friday Week 10)

(Feedback: Session 2, Monday Week 12)

Students must present a neat draft of the **completed** thesis to their academic supervisors by Week 10 of the Session 2 and ***arrange meeting*** with their supervisors to discuss the thesis in the following week. The supervisors will give their feedback ***only on neat completed draft theses***. Students should ask their supervisors for access to previous theses to gain familiarity with the expected format and standard of presentation. Student should expect to receive and discuss the feedback on the draft from their academic supervisors by Monday, Week 12.

Layout

A recommended layout of the thesis is as follows:

Title page

Statement of Originality

Acknowledgements

Abstract (not more than 300 words)

Table of contents

List of Figures/Plates

List of Tables

Notation (and units)

Main body of thesis

References

Appendices

For further details on the title page, acknowledgements, abstract, table of contents and notations, ***refer to Appendix D***. Students are also advised to refer to and inspect past theses particularly those that have been awarded higher grades. However, the specific details should be checked with the requirement specified in these guidelines prior to adoption.

Final Thesis Submission (PHYS458 final report formats are as agreed with research supervisors.)

(Due: Session 2, Friday Week 12)

Students should undertake all corrections specified by the supervisor in the draft thesis and submit **the final version of the thesis** in PDF format saved on **three** USB Flash Drives separately tagged with a name, student number, year and course in one sealed and signed envelope via EIS Central for examination by Friday Week 12 of Session 2. USB Flash Drives may be available from the Thesis Coordinator (Prof Alexey V Pan). Receipt of the thesis will be acknowledge by email or SOLSmail. Hard copies of the thesis are not normally returned, but students will receive written feedback.

Note: Some supervisors may require an additional hardbound copy, which is known to produce the best result. Discuss all the binding issues with your supervisor. After examination, the thesis will be kept in the School of Physics, and may be uploaded to UOW Electronic Thesis Collection database.

All thesis costs incurred, associated with the submission, must be borne by the student. This includes the cost of thesis binding and producing the electronic copy.

The Final Thesis/Research Report comprises 80% of the final thesis/research project mark. The thesis markers are expected to return their marks to the Thesis Coordinator (Prof. Alexey V Pan) within two weeks of the thesis submission deadline, so that the mark can be assessed at the Physics School Assessment Committee and declared to the candidates.

PHYS458: Submit Final Research Report directly to your Research Supervisor in the format required by the supervisor.

WHAT WILL EXAMINERS EXPECT FROM AND LOOK FOR IN YOUR THESIS/FINAL REPORT?

General appeal and presentation

Thesis should be a well-structured document with logical flow of the material and clear sentences, using scientific language. Catchy, clear and visually appealing figures, sketches and diagrams will significantly boost the positive impression and are likely to lead to higher marks. General visual appeal of the thesis, easiness to read and navigate contributes to positive expectations from the work by examiners. Frequent spelling or grammatical errors are likely to cause negative impression.

1. Abstract

Clearly and succinctly describe your work and its motivation, so that it can be understood by a person with a non-specialized physics background. Briefly emphasise its significance and novelty, its goals, some major techniques and methods used, main results obtained and their possible applications (if any).

Hint: Do not try to describe everything. Choose the main, most interesting points. It is the part where you can get the examiner interested in your work; it may positively be reflected in the marking.

2. Introduction (or, Literature Review)

Clearly describe the nature of your work, which provides a comprehensive review of the relevant literature, with some original insights. Rationale and importance of the work should also be placed in context. It should also include fundamentals of principles directly relevant to your work, which are necessary for understanding and processing of data obtained and their analysis in the later sections.

Hint: Do not just list technical characteristics; include basic principles and their need and relevance. Do not scatter "stand-alone", rephrased sections from some selected published papers, which do not have a common, guiding and clarifying purpose. Examiners may not get the feeling that there is a strong idea and/or understanding behind your work.

3. Method descriptions

Clearly describe techniques and methods employed in your work, using appropriate schematics and diagrams. Explain fundamental principles of their operation or/and applicability.

Hint: Do not include mere photos of commercial instruments or apparatus employed, unless it is necessary. In this case, include clear labels on the photos. Photos without explanations may be considered by examiners as space filling factor and may lead to lower marks.

4/5. Results

Present results clearly by using appropriate well-constructed tables and figures accompanied by corresponding descriptions and insightful interpretations. Descriptions should demonstrate full awareness of the work carried out, results obtained and their purpose, as well as should include explanations of uncertainties and ambiguities.

Hint: It is a poor style to state that "results are presented in Fig. A", and do not describe or discuss them in any other way, assuming that the figure is self-explanatory. Also, a lot of graphs and little explanations do not mean a good work. Choose results wisely, describe them with due respect.

4/5. Analysis and Discussions

Demonstrate full command of the subject. Use logical and rigorous arguments to analyse, explain and interpret the results obtained. Provide original insights and possible outlooks.

Hint: This is the most troublesome part of the work as usually little time is left for it and correspondingly insufficient input from supervisors. Do not fall in this pit. Examiners do pay a lot of attention to it and do like to see this section well-written. It carries a lot of weight in the mark.

6. Summary/Conclusion

Draw together material from the thesis in a compelling way.

Hint: This small section allows you to make your work look even better by briefly reminding examiners what your work was about, main results, achievements, novelties and future directions.

HOW DO EXAMINERS MARK YOUR THESIS/FINAL REPORT?

	Excellent (≥ 85)	**Very good (≥75)**	**Satisfactory (≥ 50)**	**Fail (< 50)**
Problem definition (25%): Motivation, Aim, Outline, Novelty, Literature Review, Fundamental Principles, Methodology (e.g. experimental	Clearly describes the nature of the work, its rationale, significance and novelty. Provides a comprehensive review of the relevant literature, with some original insights. Uses sophisticated descriptions	Clearly describes the nature of the work, its rationale and significance. Provides a comprehensive review of the relevant literature. Uses appropriate description of	Has attempted to describe the work, rationale, significance, and provide context, with partial success. Literature review incomplete and/or lacking critical analysis.	Has attempted to describe the work and rationale with limited success. Literature review is limited with lacking critical analysis. Methods

design, theoretical method, etc)	of methods with some originality and a high level of mathematics, where appropriate.	methods and techniques that are clearly described and referenced.	Methods described in incomplete and/or unclear fashion.	are poorly described.
Technical content (55%): Quantity and quality of data collected, Sophistication of data analysis, Interpretation of results, Logical arguments, Achievement of aims, Conclusions supported by data and analysis	Results are clearly presented with exceptionally well constructed tables and figures, insightful interpretation, demonstrates full awareness of uncertainties and ambiguities. Uses sophisticated techniques with some originality. Exhibits full command of the subject, uses logical and rigorous argument, provides original insights. Draws together material from the thesis in a compelling way.	Results are clearly presented, with well constructed tables and figures, appropriate interpretation, demonstrates awareness of uncertainties and ambiguities. Uses sophisticated techniques. Shows understanding of the subject, provides solid and comprehensive arguments. Brings work to a logical conclusion, well supported by the results.	Adequate use of text, tables and figures, limited interpretation and awareness of uncertainties and ambiguities. Does not explore all possibilities, misses connections, reasoning is incomplete and unconvincing. Conclusion is weak, incomplete, or not fully supported by results.	Partially adequate use of text, tables and figures for description of the work, limited interpretations. Reasoning is limited, misses connections. Conclusion is weak, unclear or not fully supported by results.
Presentation (20%): General visual appeal, Title page, Abstract, Compliance with thesis guidelines, Proper referencing, Grammar and Syntax	Beautifully structured document with excellent and clear figures. Writing is always clear and logical with rare spelling or grammatical errors.	Well-structured document with clear figures. Writing is mostly clear and logical, occasional spelling or grammatical errors.	Slightly disorganised document with understandable figures. Writing is pedestrian, numerous spelling and grammatical errors.	Disorganised document with non-understandable figures. Writing is pedestrian, numerous spelling and grammatical errors.

HONOURS THESIS SUBMISSION AND MARKING:

All submissions (except for the Draft Thesis and PHYS458 Final Report) must be made to the EIS Central by 4.30 pm on the specified due dates, ***not*** to your academic supervisor.

Two examiners chosen from the academic, honorary staff and (where possible) external appropriately qualified associates will mark the final thesis. In the case, where thesis is 24cp or greater the supervisors cannot be an examiner, but can suggest the examiners to the Thesis Coordinator no later than by the due date of the thesis submission. Both markers will carry equal weight. If the marks differ by more than 10%, a third marker may be consulted by the Thesis Coordinator. In this case, an Assessment Clarification meeting with the Supervisor, Head of the School and Thesis Coordinator will be organised prior to the School Assessment Committee meeting. Normally, the outlier will be omitted and an average taken. Generally, Supervisors can contact the Thesis Coordinator (Alexey) with respect to the assessment reports and raise issues or points of clarification prior to the School Assessment Committee meeting. If required, Assessment Clarification meetings can also be organised in such cases. In all the cases, the final decision is to be taken by the Physics School Assessment Committee.

Student requests for extension should be submitted through SOLS to the Thesis Coordinator. Students should also discuss the matter with their academic supervisor. Decisions will be communicated to students through SOLS after consultation with the relevant thesis supervisors.

Late submissions (without written extensions ***approved*** by the Thesis Coordinator) will incur a penalty of 3% of the relevant assessment per day. Submissions made ***later than one month after the due date***

are to receive 0 (zero) mark for the corresponding assessment task. ***A not received benchmark submission may lead to failure of the Thesis Program.***

Date, time and venue for oral presentations will be informed to you by the Thesis Coordinator through SOLS at least one week before presentations. Usually, presentations are held on Monday or Tuesday in week 14.

The time limit for oral presentations will be strictly enforced.

The final mark is to be entered in SMP by the Thesis Coordinator. The final mark will be composited with the coursework marks to derive the total Grade of Honours.

The mark for each component of the Research Thesis will be published in SMP within 2-6 weeks after the deadline (except for the final mark).

Failure to meet the deadlines may result in a grade not being declared, or a student not being able to graduate at the end of Session 2, or failure of the Thesis Program. The final decision is to be taken by the Physics School Assessment Committee.

PHYS458 FINAL REPORT SUBMISSION AND MARKING

Submit Final Research Report directly to your Research Supervisor in the format required by the supervisor.

In the case of PHYS458, Research Supervisor is the only marker.

5. RESPONSIBILITIES

A successful thesis requires that you, as a student, work closely with your academic supervisor. You both have a stake in the research outcome. It is your first step in research and you want to succeed, maybe publish and graduate. Your supervisor because they have often handed over a nascent idea to your care and want to it developed. Although these guidelines clearly identifying both the student's and the supervisor's responsibilities, full details may be found on the University's website at

http://www.uow.edu.au/handbook/index.html

STUDENTS

Students are encouraged to develop good organisational practices from the outset and should produce a schedule of anticipated activities at the earliest opportunity. The students should be spending about 3 days a week on the project during session and at least 5 days a week outside session and exam time.

The responsibility for successful Project Management lies with each student, and therefore a detailed project log should be maintained. A work program diagram (e.g. a Time/Task Chart initial and final) or other appropriate material (e.g. project log or laboratory book) should be maintained. This material must accompany any formal request for an extension of a deadline.

It is the student's responsibility to arrange regular times for discussion with his/her Academic Supervisor(s). If students have problems of a general nature they should firstly contact the Thesis Coordinator. Students are expected to attend all classes and meetings although there is no formal minimal attendance requirement.

Students have the primary responsibility for the timely completion of their thesis. They should be familiar with the information in Section 4 of the Code of Practice.

Their specific responsibilities include:

- to develop a thesis proposal and plan for completing the project within a timeframe agreed to by the supervisor(s);
- to maintain regular contact with the supervisor(s);
- to establish with the supervisor(s) the level of support required for successful completion of the degree;
- to present required written material to the supervisor(s) in sufficient time to allow for comments and discussions before scheduled meetings;
- to undertake additional work towards their project identified as necessary by the supervisor(s);
- to accept responsibility for the quality and originality of all submitted work.

SUPERVISORS

The overriding responsibility of supervisors is to provide continuing support to students in researching and producing an Honours project report to the best of the student's ability. In accordance with Section 3 of the Code of Practice, specific other responsibilities of the supervisor include:

- to support students in developing a proposal for their research project within a negotiated time frame;
- to assist students to develop a plan for completing the research project within an appropriate time frame;
- to advise and assist students to comply with occupational health and safety and ethics requirements where relevant;
- to maintain regular contact with students in order to monitor their progress;

- to inform students about any planned absences during the candidature and arrangements for supervision during those absences;
- to provide timely and helpful written feedback to students on any submissions and to assist them to develop solutions as problems are identified (please refer to the table for supervisor feedback due dates);
- to advise students about their procedural and substantive rights and responsibilities contained in the Code;
- to advise students of inadequate progress or work below the standard generally required and to suggest appropriate action;
- to attend meetings of the academic unit assessment committee where students' grades are determined.

It is essential that the student's thesis is within the supervisor's field of expertise and that the subject pursued be of interest to the supervisor. Adequate resources for the satisfactory completion of both the research and the thesis must be available.

Supervisors should make themselves familiar with the general rules pertaining to corresponding degrees and the Code of Practice, and bring these to the attention of the student wherever necessary.

Supervisors should meet with students on a regular basis - *preferably weekly, but not less than fortnightly* - to discuss work in progress and to advise on the direction of the work. They should comment critically on any drafts of the thesis (including aspects of referencing, bibliographic work and proofreading). They should provide regular advice and timely feedback necessary to the production of a thesis of merit.

Roles and responsibilities of the University and Academic Unit may be found in the Code of Practice – Honours

https://www.uow.edu.au/about/policy/UOW058661.html#P100_4225

GRIEVANCE AND OTHER PROCEDURES

It is expected that students will maintain appropriate progress. Should any problems arise concerning supervision, students should follow the procedures below:

Any unresolved problems or disagreements between a student and academic supervisor during the candidature may be referred in writing by the student to the Thesis Coordinator. If the matter cannot be resolved at this level then students wishing to take further action must follow the procedure set out in the UOW Student Complaints/Grievances:
http://www.uow.edu.au/student/haveyoursay/studentcomplaints/index.html

Students and staff are advised to refer to the following University of Wollongong web sites for access to relevant codes, policies and information:

Code of Practice - Honours:
http://www.uow.edu.au/about/policy/UOW058661.html

Code of Practice - Teaching: http://www.uow.edu.au/about/policy/UOW058666.html

Teaching and Assessment: Assessment and Feedback Policy
https://www.uow.edu.au/about/policy/alphalisting/UOW222910.html

Teaching and Assessment: Subject Delivery Policy
https://www.uow.edu.au/about/policy/alphalisting/UOW222910.html

Coursework Student Academic Complaints Policy https://www.uow.edu.au/about/policy/UOW058653.html

Research Misconduct Policy https://www.uow.edu.au/about/policy/rules/UOW060095.html

The Student Charter:
http://www.uow.edu.au/student/haveyoursay/studentcharter/index.html

Authorship Policy:
http://www.uow.edu.au/about/policy/UOW058654.html

Code of Practice - Research:
http://www.uow.edu.au/about/policy/UOW058663.html

Academic Integrity Policy:
http://www.uow.edu.au/about/policy/UOW058648.html

Student Academic Consideration Policy:
http://www.uow.edu.au/about/policy/UOW058721.html

Workplace Health and Safety Policy:
http://staff.uow.edu.au/ohs/commitment/ohspolicy/index.html

Inclusive Language Guidelines:
http://www.uow.edu.au/about/policy/students/UOW140611.html

Intellectual Property Policy:
http://www.uow.edu.au/about/policy/UOW058689.html

IP Student Assignment of Intellectual Property Policy https://www.uow.edu.au/about/policy/UOW058690.html

IP Student Assignment of Intellectual Property Guidelines https://www.uow.edu.au/about/policy/UOW058616.html

Research Ethics:
http://www.uow.edu.au/about/policy/research/index.html

Human Research Ethics Forms and Policies https://www.uow.edu.au/research/ethics/human/index.html

For information about ethics application requirements for experiments involving live subjects, please consult the Ethics and Integrity Unit.

STUDENT SUPPORT SERVICES & STRESS

As you no doubt realise, the final year project and writing up of the thesis is a major task to undertake - by far the biggest single piece of assessable work you will tackle in the course of your degree. It is also quite different in kind from the work involved in the other subjects.

In the other subjects, with the setting of tutorials, continuous assessment tasks and so on, students are led step by step through the required material. In contrast, when it comes to the final year thesis, ***the student is primarily responsible for the progress of the project*** - setting of goals, timetables and monitoring rate of achievement of these tasks. A very significant part of the thesis is the effective "project management" aspects associated with meeting the various deadlines set out in the previous section. A particular challenge in this subject is to maintain progress whilst still meeting the assessment requirements of the remaining subjects.

There are several points that may assist with regard to the handling, and hopefully relieving of this stress:

- Stress, to some degree, is a common part of the effort involved in tackling a major and significant task of this sort. You will not be the odd one out if you are experiencing this.
- If you are a "bright" student with a good academic record you are not immune - you are likely to have set your personal standard for the thesis at a challenging level - and you need to be careful that it is not too challenging (regular interaction with your supervisor should help).
- Stress free thesis completion is invariably associated with good project management and disciplined time management - including the ability to prevent thesis work being swamped by the requirements of your other subjects.
- ***The student is basically the "project manager" for the thesis - not the supervisor*** - and is responsible for seeing that the thesis gets done. However you should draw on your supervisor's experience and guidance regularly throughout the thesis. Regular meetings with your supervisor (weekly or fortnightly) are perhaps the best way to ensure this. The best way of relieving stress in the thesis is to catch the causes early and solve them. *A problem shared is a problem halved - therefore make it part of your project management plan to organise regular meetings with your supervisor.*
- If there are problems that you do not appear to be able to resolve in conjunction with your supervisor, you should discuss them with the thesis coordinator.

The University has a counselling service, located in the UniCentre building, to assist students. A significant part of their work involves assisting students in coping with the stress associated with tackling this type of major project. Be aware of and make use of this resource sooner rather than later if you feel stress levels building. There are techniques and strategies you can use to help you not only in this task but also in your future career.

6. APPEALS

Students who consider they have received adverse assessment may initiate an appeal. At the initial level this should be discussed with your supervisor(s). Subsequent action, supported by written documentation, may be taken up with the Thesis Coordinator and the Head of School. Any appeal initiated after marks have been declared must be formal and lodged in accord with the University Rules and Regulations.

7. PENALTIES

ASSESSMENT PENALTIES FOR OVERDUE SUBMISSIONS

The penalty for overdue submissions is as follows: - 3% per day or 15% per week of the overdue assessment component.

SUBMISSION DEADLINE EXTENSIONS

Any request for a thesis assessment component extension must be presented formally through SOLS to the Thesis Coordinator (Prof. Alexey Pan) with appropriate supporting documentation. The student should also discuss the matter with their academic supervisor. The extension must be submitted at least one week prior to the deadline. This request must clearly indicate that regular contact has been maintained with your thesis supervisor, include any supporting information.

Generally, deadline extensions will only be granted at the discretion of the Thesis Coordinator (based on recommendations from the supervisor) and on the basis of serious medical or compassionate grounds. Students who cannot demonstrate that they have applied the best project management and planning strategies will not be granted extensions to deadlines.

Students not completing the thesis requirements or who do not submit a further formal letter requesting an extension by week 14 of the second session of enrolment will receive a fail grade at the time of the University subject result release.

FORFEIT OF EARLY GRADUATION

Students failing to properly submit their thesis by Week 14 will automatically forfeit the opportunity of early graduation.

8. SAFETY IN LABORATORIES AND FIELD WORK

It is imperative that students' work safely in the laboratories/field at all times. In particular, enclosed footwear must be worn. Thongs and sandals are not acceptable.

A "Risk Assessment Form" relating to your thesis project is to be completed and submitted in week 5 as part of the thesis project proposal. This is to identify safety issues relating to your proposed work programme and come to an agreed means of addressing these issues (in discussion with the technical staff responsible for the relevant laboratory area and your supervisor). Your supervisor is to sign off this sheet to ensure that he/she is aware of the major safety considerations and the agreed actions to be taken. If there are significant departures from the original programme of work this sheet may need to be updated and a new form submitted.

At the commencement of their thesis, students should introduce themselves to the technical or professional officer responsible for any laboratory in which they will be working (refer Appendix F).

If students wish to work in the laboratories outside the hours when technical staff are available, then the following Faculty WORKPLACE SAFETY REGULATIONS must be followed at all times.

(a) Staff and students must not work alone in:

  (i) Laboratories where chemical substances are handled or housed or where there is a risk of injury from the work being carried out.

  (ii) In areas where power tools or hand tools that could cause injury are used.

  (iii) Areas where moving machinery is used.

(b) In all areas other than those detailed above where staff or students work alone, arrangements should be made for other staff to regularly check the welfare of persons working alone. Alternatively, a means of communication to gain assistance must be available.

The above regulations were introduced by the University of Wollongong Workplace Health and Safety Committee. All relevant policies and forms can be found at:

http://eis.uow.edu.au/current-students/student-support/whs/index.html

Letters giving permission to work in laboratories after hours or at weekends may be arranged through your Supervisor (you must be accompanied by another adult at all times). Keys are not issued and students must arrange with the EEC and with Patrols and Security Section for access to rooms out of normal working hours (**Note:** give Security notice of at least one day of your requirements).

9. RATE OF PROGRESS

If for some reason a student makes insufficient progress in the course of the thesis it is important for him or her to be aware of the effect on their overall degree. A failure in your thesis can have a very significant impact on your final Weighted Average Mark (WAM). Since the thesis subject is an annual subject it is possible for a student to withdraw up until the date set in second session for withdrawal without penalty (currently Week 8). In such an event the student concerned must start a completely new thesis topic the following year.

The vast majority of students complete their thesis without major difficulty. However, if you are having difficulties at any point in your thesis for whatever reason, do not hesitate to contact the Thesis Coordinator. If you need to know how to manage work related stress, see Subsection **Student Support Services & Stress**.

10. PLAGIARISM

Plagiarism is the use of another person's work, or idea, as if it is your own. The other person may be an author, critic, lecturer or another student. When it is desirable, or necessary, to use other peoples' material, take care to include appropriate references and attribution - do not pretend the ideas are your own. Be sure not to plagiarise unintentionally. Plagiarism has led to expulsion from the University.

Refer to the following University website for further detail on ***plagiarism*** and acknowledgement practice:

http://www.uow.edu.au/about/policy/UOW058648.html

APPENDIX A.1

THESIS PROJECT PROPOSAL

Due: Session 1, Monday Week 5

Feedback: Session 1, Friday Week 6

Submission Details

Every student must complete a Thesis Project Proposal by week 5 of Session 1. One copy is to be handed in to the EIS Central marked Attention Alexey Pan ***by the due date***; the others are to be retained by your supervisors. On-time submissions will automatically receive mark of 1% after consultations with corresponding supervisor(s). Failure to submit by the due date (***without approved written extension***) will result in 0% mark. The proposal must include the first five items:

- Proposed Title
- Name of the student and student number
- Thesis supervisors and their contact details
- Aims and objectives
- Proposed work plan and methodology
- Risk Assessment (WHS form, see Appendix A.6, if required by the thesis supervisor)
- Project log and laboratory book preparation (if required by the thesis supervisor)

APPENDIX A.2

EXAMPLE TITLE PAGE

DRAFT TITLE

By

Student Name

Submitted in partial fulfilment of the requirements for the award of the degree of

BSc Advanced
(Physics)

from

University of Wollongong
Faculty of Engineering and Information Sciences

Month Year

APPENDIX A.3

Aims and Objectives

This section is one of the most important one. A statement can be provided on the aim of the research. Subsequently the student is expected to identify clearly in itemised format the clear objectives of the research. A guide is to come out with 4 to 6 clear objectives. Each objective should be a single sentence. This section can be completed about half a page.

APPENDIX A.4

PROPOSED WORK PLAN & METHODOLOGY

This section should provide details of your proposed work plan by identifying the major sections of the thesis, the time duration allocated from the start of work in week 1, Session 1 to submission of bound copy in week 12 in Session 2. A Gantt chart or similar work plan chart may be appropriate. The student should describe the proposed methodology that will enable the project aims and objectives to be achieved.

APPENDIX A.5

PROJECT LOG OR LABORATORY BOOK PREPARATION

If required, details for a Project Log or Laboratory Book will be advised by your supervisor/s.

APPENDIX A.6

RISK ASSESSMENT (WHS FORM)

http://staff.uow.edu.au/ohs/newsalerts/onlineriskassessmentform/index.html

APPENDIX B

PROGRESS REPORT

Progress Report

Due: Session 1, Monday Week 11

Feedback: Session 1, Friday Week 13

Each student must complete a progress report. One copy is to be submitted via EIS Central for Physics Thesis Coordinator (Prof. Alexey V. Pan); the others are to be retained by your supervisors. The progress report comprises four percent of the final mark. Supervisors are to advise the suggested mark to the Thesis Coordinator within two weeks after the deadline. The Progress Report should include the following items.

- Title page
- Name of the student and student number
- Thesis supervisors
- Abstract
- Refined aims, objectives and scope
- Preliminary chapters including literature review
- Results obtained to date

APPENDIX C.1

MARKING OF ORAL PRESENTATIONS

Due: Session 2, Week 14

Marking Sheet for Physics Thesis Oral Presentations (10% worth) **EIS, School of Physics**

Marker_____ **Date:** _____

Student name, Subject	Introduction and review of background	Identification of goals & novelty	Quality & quantity of data & results	Overall clarity, grasp of problem	Presentation: slides, timing, etc.	Understanding of questions & quality of answers	Comments (if need more space, use the reverse side, indicating the name to whom it refers to)	TOTAL MARK Out of 100
	Outstanding, Excellent, Very good, Good, Average, Satisfactory, Poor, Fail							

Marking Sheet for Physics Thesis *Short* Oral Presentations (5% worth) **EIS, School of Physics**

Marker_____ **Date:** _____

Student name, Subject	Presentation Mark (out of 100)	Content Mark (out of 100)	**Comments** (if need more space, use the reverse side, indicating the name to whom it refers to)	**TOTAL MARK** **Out of 100**

APPENDIX C.2

MARKING OF FINAL THESIS

School of Physics
Thesis Examination

This form is intended to assist the examiner in arriving at your assessment of the student's performance in the Final Thesis. You may add extra pages detailing your assessment of the thesis if you wish.

Assessment Criteria for Final Thesis

Name of student:	Marker Name:	Thesis title:	
A) Problem Definition • Motivation for research • Aims • What's new? • Research outline • Literature review: relevance, diversity, depth • Project plan (e.g. experimental design)	**Comments**		Mark **Out of 25**
B) Technical Content • Quantity and quality of data collected • Sophistication of data analysis • Interpretation of results • Logical arguments • Achievement of aims • Conclusions supported by data and analysis	**Comments**		Mark **Out of 55**
C) Presentation • Title page, abstract, contents page, grammar, syntax and "visual appeal" • Compliance with thesis guidelines (e.g. word limit) • Proper referencing • Adequate use of appendices	**Comments**		Mark **Out of 20**
Comments:			
Total Mark (out of 100)			

APPENDIX D

DRAFT THESIS

Due: Session 2, Friday Week 10 to your Supervisor only

Feedback: Session 2, Monday Week 12 by your Supervisor

Layout

A recommended layout of the thesis is as follows:

Title page
Statement of Originality
Acknowledgements
Abstract (not more than 300 words)
Table of contents
List of Figures/Plates
List of Tables
Notation (and units)
Main body of thesis
References
Appendices

For further details on the title page, acknowledgements, abstract, table of contents and notations, and ***refer to Appendix F***. Students are also advised to refer to and inspect past theses particularly those that have been awarded higher grades. However, the specific details should be checked with the requirement specified in these guidelines prior to adoption.

Presentation

Main Body of Thesis

The main body of the thesis shall be divided into a number of chapters. Each chapter should contain a number of sections and each section may contain a number of sub-sections. The use of sub-sub-sections should be avoided. The numbering system used herein may be adopted for ease of cross-references.

The following is a common sequence of thesis presentation:

(a) The first chapter is an "Introduction". It should include a preamble or introduction to the topic including justification of work and clearly identifiable and itemised objectives, scope of research, and outline the thesis chapter organization.

(b) If the thesis contains significant literature review it can be inserted in a separate chapter.

(c) The next chapter is devoted to the theoretical aspects of the work. This will normally include equations derived, methods of analysis developed, etc.

(d) Verifications of theoretical work should be given in the next chapter or two. For experimental type of work, details should be given of the test programme, instrumentation, method and procedure of data collection etc. This should then be followed by the presentation and discussion of results, which normally warrant a separate chapter.

(e) The final chapter should be reserved for conclusions and recommendations for future work. The conclusions should clearly match the objectives.

(f) The first and final chapters need to be cohesive and the abstract should complement these two chapters.

High quality drawings, tables, photographs etc. shall be inserted wherever necessary to enhance the readability of the thesis and should be included in the text as close to possible to the first citation. Each drawing, table and photograph must be provided with a caption or title. Should a table or figure be arranged in landscape mode the page should read away from the thesis spine.

References

One of two methods of referring to other people's work should be used. The two acceptable methods are:

(a) by naming the author followed by year of publication;

(b) by giving the author's name and the corresponding number in the reference list.

For theses that use many references, method (a) is usually most convenient. Otherwise, method (b) is quite acceptable. For method (a), the listing of references should be in alphabetical order of the names of the authors; for each author the listing should be in order of publication dates. For method (b), the references should be numbered in the order in which they are first referred to in the text.

Examples of the methods of referencing and the corresponding styles of listing may be seen in Appendix G.

Appendices

Material, which, if included in the main text, would disrupt the flow of presentation, should be included in the appendices. These include mathematical and numerical details, maps, charts, computer programme listings, work plan and risk assessment. However, significant numerical material (e.g. data files, computer output, etc.) should only be presented as separate files on the USBs.

Grammar and English Usage

Particular attention should be paid to spelling, usage of English, and proof reading of the typed manuscript. The body of the manuscript must be written in third person past tense and formal style. Test procedure description/s may be written in alternate person and tense.

Students experiencing difficulty should consult with the Learning Development Centre for assistance. Alternatively, students can contact Dr. Alisa Percy (11. 208, alisa@uow.edu.au, 4221 3289) as soon as possible for advice and assistance.

Should extensive spelling and English corrections be necessary by the supervisor/s students will be required to add the Disclaimer Statement.

"The majority of work in this thesis is original. However, some assistance with spelling and English has been provided by my supervisor/s."

If deemed necessary, by the thesis supervisor and Discipline Thesis Coordinator this Disclaimer must appear towards the bottom on the thesis Abstract page.

Formatting

The draft thesis shall be presented in a permanent and legible form. Accordingly, only the original or good quality photocopy is acceptable. Only bond paper shall be used in all copies.

The specifications given below shall be followed:

(a) The text of the thesis shall be in Times Roman 12 font 1.5-line spacing.

(b) The page layout shall approximate ISO paper size A4 (297mm x 210mm), except for illustrative materials such as drawings, maps and printouts, on which no restriction is placed. This material must be securely affixed and be arranged to fold outwards and upwards (as need be).

(c) The margins on each sheet shall be not less than 25mm on the bound side and 20mm on the opposite side, 20mm at the top and 20mm at the bottom.

(d) There shall be a title page showing thesis title, author's name, degree and date of submission (see Appendix C). No other decoration should be included on this page.

(e) All pages (including diagrams, tables and appendices etc.) shall be numbered consecutively.

(f) Header and Footers should contain the page number only and be void of borders. References should not be placed as footnotes.

(g) Diagrams, tables and figures with proper captions shall appear on pages close to where reference is first made to them. Photographs should be included as high quality graphical objects in the word document. Figure and photograph titles should be placed following the Figure whereas Table titles should be placed at the top of the table.

(h) The draft thesis may be printed double sided.

APPENDIX E

FINAL THESIS SUBMISSION

Due: Session 2, Friday Week 12

Students should undertake all corrections specified by the supervisor in the draft thesis and submit **the final version of the thesis** in PDF format saved on **three** USB Flash Drives separately tagged with a name, student number, year and course in one sealed and signed envelope via EIS Central for examination by Friday Week 12 of Session 2.

(Note: Some supervisors may require an additional Hardbound copy, which is known to produce the best result. Discuss all the binding issues with your supervisor). After examination, the thesis will be kept in the School of Physics Electronic Thesis collection.

All thesis costs incurred, associated with the submission, must be borne by the student. This includes the cost of thesis binding and producing the electronic copy.

Notes for students and academic supervisors:

All submissions (except for the Draft Thesis and PHYS458 Final Report) must be made to the EIS Central by 4.30 pm on the specified due dates, ***not*** to your academic supervisor.

The Draft Thesis and PHYS458 Final Report must be submitted by the due date to your ***Academic Supervisor***, not to EIS Central.

APPENDIX F

EXAMPLES OF TYPICAL TITLE PAGE, TABLE OF CONTENTS NOTATION AND CHAPTER PRESENTATION

Examples of the following sections are shown on the following pages:

Title Page

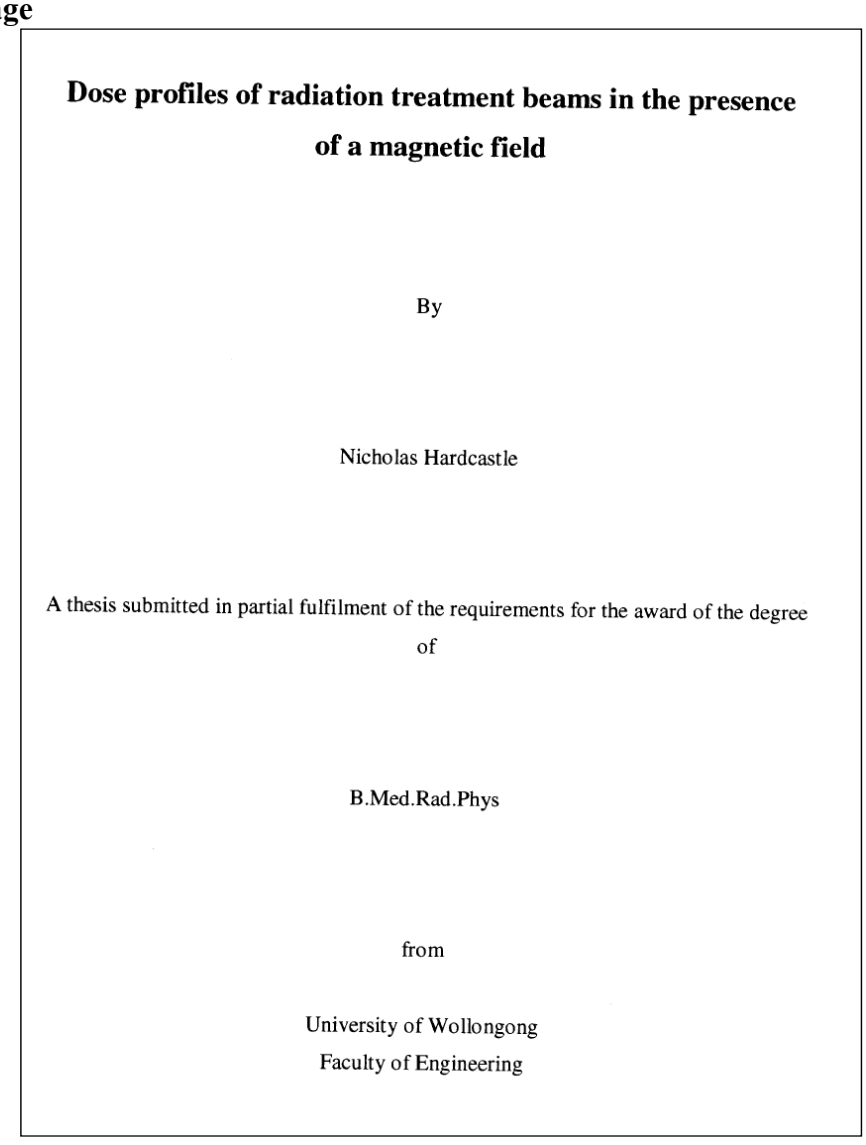
Abstract Page

Table of Contents

Notation

Presentation of Chapters

F.1 Title Page



Dose profiles of radiation treatment beams in the presence of a magnetic field

By

Nicholas Hardcastle

A thesis submitted in partial fulfilment of the requirements for the award of the degree of

B.Med.Rad.Phys

from

University of Wollongong
Faculty of Engineering

Taken from Nick Hardcastle, Honours Thesis “Dose Profiles of Radiation Treatment Beams In The Presence of a Magnetic Field”, University of Wollongong 2005

F.2 Abstract Page

ABSTRACT

(250 words maximum)

(One page only)

Abstract

In 2002 when this research started the brief of the project was to produce streamlined checks of planar dose maps delivered by IMRT fields to film.

At this time no other centre in Australia had a protocol for checking accuracy of RTP planned RT dose distributions. While many US centers have been checking IMRT distributions, there is still no standard protocol for these checks.

By the end of this project in 2005, 13 IMRT patient treatments had been successfully checked and this centre remains the only centre to have treated IMRT patients in Australia using the pinnacle RTP planning computer platform.

Early film dose maps revealed dose spikes due to MLC matchline effects. These matchlines were due to Varian MLC leaf ends sometimes matching other segment neighbors and were not predicted using pinnacle RTP until version 7.4 available about 2 months prior to the end of this project cycle.

Verifying a radiation treatment planning (RTP) computer's IMRT calculation was the first task for this thesis. Planar dose maps (dose in water perpendicular to the beam [cGy/MU]) were compared with beam dose distributions measured using films (XV and EDR) at various depths. The RTP computer and film measurements agreed within ±3% within the inside field region. In addition, the XV film had a lower linear dose response range than the EDR film, the efficacy of each film type depends on dose

Taken from Puangpen Tangboonduangjit, PhD Thesis "Intensity Modulated Radiation Therapy Dose Maps: The Matchline Effect", University of Wollongong 2006

F.3 Table of Contents

Contents

Taken from Andrew Walker, PhD Thesis “Filamentary Structure in The Southern Milky Way”, University of Wollongong 2006

F.4 Notation

All notations should use SI units. Sometimes it is permissible to use 'cgs' or other archaic units if they are appropriate (consult with your supervisor).

F.5 Chapter Presentation

Chapter 3 Experimental

This chapter will describe the experimental methods used and the apparatus constructed to carry out the investigations.

3.1 Measurement Modalities

The main measurement modality used in the experiments was radiochromic film. This was used for all of the electron beam measurements and the photon beam measurements. Radiochromic film was used as it provides an accurate 2D representation of the dose delivered, and does not require chemical processing. MOSFET measurements were also performed on one electron beam energy. The following section describes each of the two modalities used.

3.1.1 Radiochromic Film

Radiochromic films are radiosensitive films that require no chemical development to acquire an image. When exposed to ionizing radiation they will change colour and darken according to the absorbed dose (Butson et al, 2003). The particular radiochromic film used was Gafchromic EBT, manufactured by International Specialty Products. The configuration of the film is given in Figure 3-1.

Taken from Nick Hardcastle, Honours Thesis "Dose Profiles of Radiation Treatment Beams In The Presence of a Magnetic Field", University of Wollongong 2005

APPENDIX G

METHOD OF REFERENCING AND REFERENCE LISTING

G.1 Reference by Naming Authors

The following is an extract from a published work, which may serve as an example when the author's name is placed in the sentence:

"The flexibility approach adopted by Mortarjemi and Van Horn (1969) is useful only in determining the load-distribution characteristics for some specific form of box-bridge construction. Other methods of analysis due to Wright et al. (1968, 1968a), Richmond (1969, 1969a, 1971) and Kristek (1970) are approximate in assumptions and in applications and are generally suitable for single-cell boxes only.

If the sentence does not use the author's name but the content requires referencing the following method should be used:

At Idaho Falls, a 1.6m thick soil layer was capable of storing and removing 370 mm of precipitation which corresponds to the maximum annual precipitation over a 40 yr. period (Anderson et al. 1993).

The corresponding reference listing should follow the styles below:

(a) Articles

Author's name (surname first followed by initials (title case)); year of publication; full stop; title of article; full stop; title of journal (abbreviated in conventional manner as desired); comma; volume; comma; part of number; comma; month of publication (if applicable); comma; numbers of first and last pages; full stop.

(b) Books and Reports

Authors' names in title case (surname first followed by initials); year of publication; full stop; title of book; full stop; series number (if applicable); comma; publisher/s; comma; place of publication (if necessary); full stop.

G.2 Portion of Typical Reference List

Jeraj R., and Keall P., 1999 Monte Carlo-based inverse treatment planning, ***Phys. Med. Biol., 44:*** 1885-1896.

Johns H.E., And Cunningham J.R., ***"The physics of radiology",*** Charles C Thomas Publisher, Springfield Illinois U.S.A. 4th edition, p371,1983.

Jones L.,C., and Hoban P.,W., 2000 Treatment plan comparison using equivalent uniform biologically effective dose (EUBED), ***Phys. Med. Biol., 45***: 159-170.

Jordan T.F., and Williams P.C., 1994 The design and performance characteristics of a multileaf collimator, ***Phys. Med. Biol., 39***: 231-251.

Taken from Puangpen Tangboonduangjit, PhD Thesis " Intensity Modulated Radiation Therapy Dose Maps: The Matchline Effect", University of Wollongong 2006

G.3 Reference by Numbers

This method of referencing is widely used in writing journal articles. The following is an example:

"Cable structures are becoming increasingly popular because of their economical constructional advantage and high strength capacity. However, the cable material typically used in modern construction exhibits linear stress-strain characteristics over only a portion of its useable strength. For ultimate load analysis, the resulting formulations should consider material nonlinearity. Some attention has been given to nonlinear material effects in static cases (1-3, 5-7, 13), but little attention has been devoted to dynamic cases (8, 9, 11, 12)."

It should be noted that the authors may also be names in this system as can be seen in the following paragraph.

"With the advances being made in digital computer capabilities, simulations of discrete digital time sequences have become an important engineering tool for both design and analysis. Digital time sequence simulations of random waves for ocean engineering applications have been developed by Smith (1) and applied by the Jones (5) for random wave force predictions. Alternative techniques for simulating a discrete random time sequence have been developed by Shvetsov and Shorin (10) and by Shinozuka (8) with an application to coastal sediment transport problems under random waves by Wang and Liang (13). In addition, dynamic testing systems, which are utilized to compute complex-valued transfer functions by the Frequency-sweep method, may be driven by a digital simulation of a discrete random time sequence that has been sythesized from a Fast Fourier transform (FFT) algorithm and is capable of providing excitations of the more desirable periodic random type (see for comparison, Ref. 6)."

For this method the styles of listing are very similar to those given in D.1 except that:

(i) the authors' names only need to be in upper and lower case;

(ii) for articles, year of publication should be inserted just after the month of publication;

(iii) for books and reports, the year of publication should appear last;

(iv) title of article (in upper and lower case) should be in double quotations and starts and ends with a comma;

(v) title of journal or book should be underlined.

The following are two examples:

1. Wehausen, J.V. and Laaitone, E.V., "Surface Waves," Encyclopaedia of Physics, Vol. 9, 1960, pp. 475-479.
2. Gere, J.M. and Waver, W.J.R., Analysis of Framed Structures, Van Nostrand, New York, 1965.

G.4 Electronic Material

Students are advised to refer to the requirements of referencing electronic sourced material. Useful information on **Citing Electronic Resources** is available at the University of Wollongong Library Web Site. http://www.library.uow.edu.au/helptraining/index.html Additional material is available from the Learning Development Centre (Building 11 Level 2).