PHYS798

Physics and Astronomy Special Topic 1

S2 Day 2019

Dept of Physics and Astronomy

Contents

General Information

Unit convenor and teaching staff
Project coordinator, Co-convenor
Matt Owers
matt.owers@mq.edu.au
Contact via email
By appointment

Project coordinator, Co-convenor
David Spence
david.spence@mq.edu.au

Credit points
4

Prerequisites
Admission to MRes

Corequisites

Co-badged status

Unit description
This unit will provide students with a bespoke learning path to fully prepare them for entry into specific advanced subject units at 700 level offered by the Department of Physics and Astronomy. The program will draw on a mixture of existing lecture content and established teaching laboratories further enriched by individually guided study to provide a program tailored to the students' individual development needs.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Apply advanced research skills in an authentic context.

Use sophisticated instrumentation and/or software tools effectively.

Identify and articulate how a research project fits within the context of, and contributes to, a wider field of research.

Understand and articulate concepts and theory that underpin advanced devices and/or

techniques.

Analyse, interpret and present new experimental results correctly and coherently, and as an aid to understanding the physics involved.

Clearly communicate scientific research.

General Assessment Information

Students will be assessed on a final written report consisting of four sections:

1. Literature review (25%)
2. Introduction and theory (25%)
3. Methods, results and analysis (40%)
4. Conclusions and outlook (10%)

The report is expected to be no longer than 20 pages in length.

Students will hand in a draft of each section of the report at different stages throughout the semester, and receive detailed feedback.

Assessment Tasks

Name	Weighting	Hurdle	Due
Literature review	25%	No	Week 13
Introduction and theory	25%	No	Week 13
Method, results and analysis	40%	No	Week 13
Conclusions and outlook	10%	No	Week 13

Literature review

Due: **Week 13**
Weighting: **25%**

Students will perform a limited literature review of the field of research, reviewing in detail approximately three key papers. In this section, students are expected to identify the overarching motivations for the field and the key current directions (e.g. what key challenges exist or are being addressed in recent years). This review should provide a clear context for the student's research project. Finally, this section should articulate the aim of the project and how it is expected to advance the field (i.e. address one or more of the challenges identified above).

Approximately 3-4 pages. Draft due week 4.

On successful completion you will be able to:

- Identify and articulate how a research project fits within the context of, and contributes to,

a wider field of research.

Introduction and theory

Due: **Week 13**
Weighting: **25%**

This section should briefly outline the approach of the project, including what techniques will be used, and then provide a detailed explanation of the principles of operation and theoretical underpinnings of one (or possibly two) key components of the research project.

Approximately 4-5 pages. Draft due week 6.

On successful completion you will be able to:

- Understand and articulate concepts and theory that underpin advanced devices and/or techniques.
- Clearly communicate scientific research.

Method, results and analysis

Due: **Week 13**
Weighting: **40%**

Clearly and accurately describe the apparatus/tools/software used to collect or generate data. Present, analyse and explain your data, and any accompanying modelling or calculations, with appropriate use of texts, graphs, images, tables, etc. Present a coherent discussion/ interpretation of the results that demonstrates a robust understanding of the physics involved, including a critical analysis of the quality of the data.

Approximately 5-8 pages. Draft due week 10.

On successful completion you will be able to:

- Apply advanced research skills in an authentic context.
- Use sophisticated instrumentation and/or software tools effectively.
- Analyse, interpret and present new experimental results correctly and coherently, and as an aid to understanding the physics involved.
- Clearly communicate scientific research.

Conclusions and outlook

Due: **Week 13**
Weighting: **10%**

Articulate the outcome of the project with respect to the aim(s) identified at the end of the literature review. Identify the next steps (short term) for further advancing the field building on the results of the project. Identify and articulate how this project contributes to the long-term direction

of the field.

Approximately 1-2 pages. Draft due week 11.

On successful completion you will be able to:

- Identify and articulate how a research project fits within the context of, and contributes to, a wider field of research.
- Clearly communicate scientific research.

Delivery and Resources

This unit focuses on learning advanced concepts and acquiring important generic and technical research skills within the context of a research project. Delivery of the unit is therefore primarily through a supervised research project and independent reading, with weekly meetings for discussion, feedback and guidance with the unit staff, and additional consultation as required. Projects are within an active research group in the department, and students will work closely with senior PhD students, postdocs and/or academics from that research group.

Projects will consist of fifteen days of work spread over the semester, e.g. a day per week for ten weeks with a one-week block during semester break. Timetabling of project days will be arranged between the student and the supervising research group.

Students will be provided with relevant reading material including scientific papers and text book chapters, and will also conduct literature searches to supplement their reading.

Regular meetings with the unit staff for progress updates, discussion of reading materials, theory, etc., will be arranged between the student and the unit staff.

Classes

15 days of project work, spread over the semester and arranged for mutually-agreeable days between students and project supervisors.

Weekly meetings with unit staff for discussion of project progress, theory, research context, experimental aspects, etc., starting from week 2.

Required and Recommended Texts and/or Materials

Research papers, textbook chapters, or other reading material as advised by unit staff and project supervisors.

Part of the unit will involve online searching and accessing of current literature.

Unit Schedule

The unit will begin in week 2 with an introduction to the unit and the research projects available. By the end of week 2 students will be allocated to research projects, be introduced to supervisors, and be given initial reading material. Weekly research days (totalling 15) will be organised between the students and the supervising researchers, to be one day per week for most of the semester with a larger block timetabled in or around the mid-semester break. Weekly

individual meetings with the unit staff will be arranged to start in week 3. Additional classes may be arranged where necessary to cover common topics or questions.

Draft sections of the written report are due in Week 4 (Literature review), Week 6 (Introduction and theory), Week 10 (Methods, results, analysis) and Week 11 (Conclusions, outlook, future work). Detailed feedback and guidance on each section will be provided by the unit staff in the following week.

Final report due in Week 13.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

Undergraduate students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/study/getting-started/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Apply advanced research skills in an authentic context.
- Use sophisticated instrumentation and/or software tools effectively.
- Understand and articulate concepts and theory that underpin advanced devices and/or techniques.

- Analyse, interpret and present new experimental results correctly and coherently, and as an aid to understanding the physics involved.

Assessment tasks

- Introduction and theory
- Method, results and analysis
- Conclusions and outlook

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Identify and articulate how a research project fits within the context of, and contributes to, a wider field of research.
- Analyse, interpret and present new experimental results correctly and coherently, and as an aid to understanding the physics involved.

Assessment tasks

- Literature review
- Method, results and analysis
- Conclusions and outlook

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Apply advanced research skills in an authentic context.
- Use sophisticated instrumentation and/or software tools effectively.
- Identify and articulate how a research project fits within the context of, and contributes to, a wider field of research.

- Analyse, interpret and present new experimental results correctly and coherently, and as an aid to understanding the physics involved.

Assessment tasks

- Literature review
- Method, results and analysis
- Conclusions and outlook

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcomes

- Understand and articulate concepts and theory that underpin advanced devices and/or techniques.
- Analyse, interpret and present new experimental results correctly and coherently, and as an aid to understanding the physics involved.
- Clearly communicate scientific research.

Assessment tasks

- Introduction and theory
- Method, results and analysis
- Conclusions and outlook

PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

Learning outcomes

- Use sophisticated instrumentation and/or software tools effectively.
- Identify and articulate how a research project fits within the context of, and contributes to, a wider field of research.

- Analyse, interpret and present new experimental results correctly and coherently, and as an aid to understanding the physics involved.

Assessment tasks

- Literature review
- Method, results and analysis
- Conclusions and outlook

Changes from Previous Offering

This unit is a new trial offering. There will be few or no traditional lectures and no final exam. Instead the unit delivery is based primarily on individual supervised research projects with guided reading of theory and literature review related to the project. Assessment consists of a final written report (divided into four sections) covering theory, literature review and the research project.