



PHYS7900

Research Frontiers in Physics and Astronomy 1

Session 1, In person-scheduled-weekday, North Ryde 2022

School of Mathematical and Physical Sciences

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General Information

Unit convenor and teaching staff

Gavin Brennen

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Credit points

10

Prerequisites

Admission to MRes

Corequisites

Co-badged status

Unit description

This unit will engage students with research frontiers in physics and astronomy. Students will attend research seminars and journal clubs within the department's major research centres as well as follow a directed reading program of current literature. Students will be expected to actively critique and review selected literature through reports and group discussions.

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:

ULO1: use your broad physics knowledge to gain insight into difficult and unfamiliar research material presented in written or spoken form.

ULO2: discuss the context for a range of frontier activities in several research fields of physics and astronomy.

ULO3: give written and oral presentations of contemporary research results and offer critical analysis of those results.

ULO4: evaluate and describe how new results sit in the context of existing knowledge and ideas, and assess the likely impact of new research.

ULO5: demonstrate the technical skills needed to access and navigate the scientific literature.

Assessment Tasks

Name	Weighting	Hurdle	Due
Journal club presentation	30%	No	[TBA]
Opportunity essay	25%	No	[TBA]
Journal club participation	20%	No	[TBA]
Seminar Forum	25%	No	[TBA]

Journal club presentation

Assessment Type ¹: Presentation

Indicative Time on Task ²: 18 hours

Due: **[TBA]**

Weighting: **30%**

Presenting selected research papers to peers.

On successful completion you will be able to:

- use your broad physics knowledge to gain insight into difficult and unfamiliar research material presented in written or spoken form.
- discuss the context for a range of frontier activities in several research fields of physics and astronomy.
- give written and oral presentations of contemporary research results and offer critical analysis of those results.
- evaluate and describe how new results sit in the context of existing knowledge and ideas, and assess the likely impact of new research.
- demonstrate the technical skills needed to access and navigate the scientific literature.

Opportunity essay

Assessment Type ¹: Essay

Indicative Time on Task ²: 28 hours

Due: **[TBA]**

Weighting: **25%**

An essay on a research opportunity relating to a recent research breakthrough.

On successful completion you will be able to:

- use your broad physics knowledge to gain insight into difficult and unfamiliar research

material presented in written or spoken form.

- discuss the context for a range of frontier activities in several research fields of physics and astronomy.
- give written and oral presentations of contemporary research results and offer critical analysis of those results.
- evaluate and describe how new results sit in the context of existing knowledge and ideas, and assess the likely impact of new research.
- demonstrate the technical skills needed to access and navigate the scientific literature.

Journal club participation

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 0 hours

Due: **[TBA]**

Weighting: **20%**

Assessment of informed participation in group discussions.

On successful completion you will be able to:

- use your broad physics knowledge to gain insight into difficult and unfamiliar research material presented in written or spoken form.
- discuss the context for a range of frontier activities in several research fields of physics and astronomy.
- give written and oral presentations of contemporary research results and offer critical analysis of those results.
- evaluate and describe how new results sit in the context of existing knowledge and ideas, and assess the likely impact of new research.
- demonstrate the technical skills needed to access and navigate the scientific literature.

Seminar Forum

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 13 hours

Due: **[TBA]**

Weighting: **25%**

Engaging with peers to discuss seminars, using an online forum.

On successful completion you will be able to:

- use your broad physics knowledge to gain insight into difficult and unfamiliar research material presented in written or spoken form.

- discuss the context for a range of frontier activities in several research fields of physics and astronomy.
- give written and oral presentations of contemporary research results and offer critical analysis of those results.
- evaluate and describe how new results sit in the context of existing knowledge and ideas, and assess the likely impact of new research.
- demonstrate the technical skills needed to access and navigate the scientific literature.

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

Background

This unit focuses on accessing and understanding research results through seminars, colloquia and papers.

It addresses questions like

- How do we make a start on understanding unfamiliar material?
- How do we present material describing other people's results?
- How do we lead and contribute to a discussion of a third party's research work?

The key idea is that as scientists approaching new topics, the quantity and technical difficulty of material can be overwhelming. Nevertheless there are techniques that can allow us to grab footholds and start to develop a basic understanding of the material. In this unit, we will do this many times by encountering new research in several forms (papers, talks etc); following it up online by looking for further literature and other information; and reporting our conclusions in different ways: journal club discussions, short blogs and discussion fora.

Amongst other things we will try to evaluate:

- novelty and potential impact
- wider context of the work

- probable correctness
- quality of presentation

We will also think about the ways scientific research is a human activity. This has implications for how scientists and teams of scientists plan their projects over a series of papers, and what are appropriate ways for us as consumers of scientific reporting to discuss and critique the work of others. We will also discuss factors around the process of publication, including the peer review process, research funding and careers which are all linked to the overall enterprise of research as captured through the Academic Literature.

The intention of this unit is that it should be unfamiliar and demanding, but rewarding. The skills developed and assessed are entirely different from any other unit this year. If you put in the time, it should be very achievable to perform well.

This is also a unit where discussion and (respectful) exchange of opinions is central. The more each of us puts in, the more fun we will have.

Class timetable

Main tutorial/workshop

The first workshop will be an introduction session in Week 1.

In week 2, I will explain to you how a good Journal club presentation should look like and I will also present a sample Journal club talk.

You will attend a library

Week 3: Library workshop

From week 4 onwards, the floor is yours. A times decided in class,

one or two students will present a journal club of

around 20-25 minutes at each session and lead a discussion of the paper.

Other topics related to seminars we've seen may come up from time to time.

Technologies used and resources

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

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://policie) (<https://policie>

[s.mq.edu.au](https://www.mq.edu.au)). 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](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

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

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/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

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

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

The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

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.

Changes since First Published

Date	Description
20/02/2022	Convenor change.