



PHYS7900

Research Frontiers in Physics and Astronomy

Session 1, In person-scheduled-weekday, North Ryde 2025

School of Mathematical and Physical Sciences

Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	2
<u>General Assessment Information</u>	3
<u>Assessment Tasks</u>	6
<u>Delivery and Resources</u>	9
<u>Unit Schedule</u>	10
<u>Policies and Procedures</u>	10
<u>Changes from Previous Offering</u>	12
<u>Changes since First Published</u>	12

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General Information

Unit convenor and teaching staff

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Credit points

10

Prerequisites

Admission to GradDipResFSE or GradCertResFSE

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 School'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.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals ([UNSDGs](#)) Industry, Innovation and Infrastructure

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.

ULO6: critically reflect on your current skills and knowledge, and identify what further skills and knowledge are required to achieve your career aspirations.

General Assessment Information

Requirements to Pass this Unit

To pass this unit you must achieve a total mark equal to or greater than 50%.

Hurdle Assessments

There are no hurdle tasks in this unit.

Engagement – please read, as this is very important

As a GradDip / MRes Yr 1 student you are becoming part of our community of researchers. You need to be an active participant in the unit activities. You will be expected to lead and participate in discussions, ask questions and engage with speakers, and proactively work to find your place in our diverse research community.

Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, a **5% penalty** (of the total possible mark) will be applied each day a written report or presentation assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at **11:55 pm**. A 1-hour grace period is provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for [Special Consideration](#).

Assessments where Late Submissions will be accepted

In this unit, late submissions will be accepted as follows:

- Opportunity Essay – YES, Standard Late Penalty applies
- Journal Club Presentation - NO, unless Special Consideration is Granted you must present in your scheduled timeslot

- Journal Club Participation - NO, unless Special Consideration is Granted you must attend and participate in all journal clubs
- Seminar Forum - NO, unless Special Consideration is Granted

Special Consideration

The [Special Consideration Policy](#) aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through connect.mq.edu.au.

Assessment Tasks

Name	Weighting	Hurdle	Due
Opportunity essay	25%	No	Outline Week 8, Full essay week 13
Journal club presentation	30%	No	Throughout session.
Seminar Forum	25%	No	Throughout session.
Journal club participation	20%	No	Throughout session.

Opportunity essay

Assessment Type ¹: Essay Indicative Time on Task ²: 28 hours Due: **Outline Week 8, Full essay week 13** Weighting: **25%**

An essay on a research opportunity relating to a recent research breakthrough, which will include an examination of the skills and knowledge required to follow a career path in this research area.

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.
- critically reflect on your current skills and knowledge, and identify what further skills and

knowledge are required to achieve your career aspirations.

Journal club presentation

Assessment Type ¹: Presentation Indicative Time on Task ²: 18 hours Due: **Throughout session**. 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.

Seminar Forum

Assessment Type ¹: Practice-based task Indicative Time on Task ²: 13 hours Due: **Throughout session**. 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.

Journal club participation

Assessment Type ¹: Practice-based task Indicative Time on Task ²: 0 hours Due: **Throughout session**. 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.

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

Assessment Tasks

Name	Weighting	Hurdle	Due
Journal club presentation	30%	No	Throughout session.
Seminar Forum	25%	No	Throughout session.
Opportunity essay	25%	No	Outline Week 8, Full essay week 13
Journal club participation	20%	No	Throughout session.

Journal club presentation

Assessment Type ¹: Presentation

Indicative Time on Task ²: 18 hours

Due: **Throughout session.**

Weighting: **30%**

You will present 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.

Seminar Forum

Assessment Type ¹: Practice-based task

Indicative Time on Task ²: 13 hours

Due: **Throughout session.**

Weighting: **25%**

You will engage 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.

Opportunity essay

Assessment Type ¹: Essay

Indicative Time on Task ²: 28 hours

Due: **Outline Week 8, Full essay week 13**

Weighting: **25%**

You will write an essay on a research opportunity relating to a recent research breakthrough, which will include an examination of the skills and knowledge required to follow a career path in this research area.

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.
- critically reflect on your current skills and knowledge, and identify what further skills and knowledge are required to achieve your career aspirations.

Journal club participation

Assessment Type ¹: Practice-based task

Indicative Time on Task ²: 0 hours

Due: **Throughout session.**

Weighting: **20%**

You will be expected actively participate 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.
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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
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Delivery and Resources

Overview

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

It addresses questions such as:

- 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.

Methods of Communication

Communication will be via your **university email** or through **announcements on iLearn**. Queries to the convenor can either be placed on the iLearn discussion board or sent to tayyaba.zafar@mq.edu.au from your university email address.

COVID Information

For the latest information on the University's response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: <https://www.mq.edu.au/about/coronavirus-faqs>. Remember to check this page regularly in case the information and requirements change during semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

Unit Schedule

Class timetable

The workshops in Weeks 1-4 will include introductory material to help set you up for Week 5 onwards where the floor is yours! At 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.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.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 connect.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/>

Academic Success

[Academic Success](#) 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 Advocacy](#) provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via the [Service Connect Portal](#), 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 from Previous Offering

Prof Daniel Terno is returning back to the unit and is welcomed.

Changes since First Published

Date	Description
20/02/2025	No changes were made.

Unit information based on version 2025.05 of the [Handbook](#)