ASTR7913

Contemporary Research Techniques in Astrophysics

Session 2, In person-scheduled-weekday, North Ryde 2026

School of Mathematical and Physical Sciences

Contents

General Information

Unit convenor and teaching staff
Convenor and project advisor
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Convenor and project advisor
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Project advisor
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Credit points
10

Prerequisites
Admission to GradDipResFSE or GradCertResFSE

Corequisites

Co-badged status

Unit description
This unit will introduce students to fundamental analysis techniques used in contemporary astrophysics. Students will undertake a series of projects in which they will reproduce key recent results from research papers. The projects will span a range of potential topics from radio astronomy, instrumentation, high resolution optical spectroscopy of stars, spatially resolved spectroscopy of galaxies, quantitative structure of galaxies, analysis of large survey data, and computational theory. After completion of this unit, students will possess the skills required to undertake a range of advanced research projects.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals (UNSDGs) Quality Education; 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: demonstrate the skills required to undertake research across a broad range of topics in astrophysics.

ULO2: apply advanced knowledge of fundamental analysis techniques used in astronomy research.

ULO3: critically evaluate scientific outcomes in light of applied analysis techniques.

ULO4: effectively communicate the results of astronomical research in written and oral form.

ULO5: independently solve complex computational and technical problems related to astronomy research projects.

General Assessment Information

Unit Workload

During this unit, the students will carry out three projects. For each project, they are required to submit a written report and an oral presentation. The written report will be in the format of a research paper that describes the research problem addressed, the techniques used, as well as the outcomes and conclusions. The oral presentation per project is to be no more than 10 minutes in duration, plus question time. The oral presentation slides are to be submitted with the written report submission. Each report should be submitted by the due date and time. Please note that the time listed against each assessment task is the estimated time required to complete the task, *in addition to the time spent on the project itself.*

Requirements to Pass this Unit

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

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 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.

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 ask.mq.edu.au.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
Project 1	30%	No	25/08/2026	Individual	Yes	Open
Project 2	35%	No	06/10/2026	Individual	Yes	Open
Project 3	35%	No	03/11/2026	Individual	Yes	Open

Project 1

Assessment Type [1]: Portfolio
Indicative Time on Task [2]: 20 hours
Due: **25/08/2026**
Weighting: **30%**
Groupwork/Individual: Individual
Short extension [3]: Yes
AI Approach: Open

You will complete a written report and presentation slides for the oral component of the first project.

On successful completion you will be able to:

- demonstrate the skills required to undertake research across a broad range of topics in astrophysics.
- apply advanced knowledge of fundamental analysis techniques used in astronomy research.
- critically evaluate scientific outcomes in light of applied analysis techniques.
- effectively communicate the results of astronomical research in written and oral form.
- independently solve complex computational and technical problems related to astronomy research projects.

Project 2

Assessment Type [1]: Portfolio

Indicative Time on Task [2]: 20 hours
Due: **06/10/2026**
Weighting: **35%**
Groupwork/Individual: Individual
Short extension [3]: Yes
AI Approach: Open

You will complete a written report and presentation slides for the oral component of the second project.

On successful completion you will be able to:

- demonstrate the skills required to undertake research across a broad range of topics in astrophysics.
- apply advanced knowledge of fundamental analysis techniques used in astronomy research.
- critically evaluate scientific outcomes in light of applied analysis techniques.
- effectively communicate the results of astronomical research in written and oral form.
- independently solve complex computational and technical problems related to astronomy research projects.

Project 3

Assessment Type [1]: Portfolio
Indicative Time on Task [2]: 10 hours
Due: **03/11/2026**
Weighting: **35%**
Groupwork/Individual: Individual
Short extension [3]: Yes
AI Approach: Open

You will complete a written report and presentation slides for the oral component of the third project.

On successful completion you will be able to:

- demonstrate the skills required to undertake research across a broad range of topics in astrophysics.
- apply advanced knowledge of fundamental analysis techniques used in astronomy research.
- critically evaluate scientific outcomes in light of applied analysis techniques.
- effectively communicate the results of astronomical research in written and oral form.
- independently solve complex computational and technical problems related to astronomy

research projects.

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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
- Academic Success 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.

[3] An automatic short extension is available for some assessments. Apply through the Service Connect Portal.

Delivery and Resources

Students will undertake three guided projects over the course of the semester, each coupled with an academic advisor. Students will be expected to spend at least one full day per week on their projects and will consult with the academic advisor in the weekly 2-hour workshops for help with problem-solving. The first workshop in Week 1 will involve an introduction to the unit. The projects will be computational in nature, so students will require access to either a laptop or a desktop computer. There is no required text, and appropriate reading material will be made available by the academic advisors.

Methods of Communication

Communication will be via your **university email** or through **announcements on iLearn**. General queries regarding assessments and/or lecture/lab content should be placed on the iLearn discussion board. Queries of a more personal nature can be sent to the convenor (gayandhi.desilva@mq.edu.au) from your university email address.

Unit Schedule

The delivery of this unit will be once a week, face-to-face, laboratory-type classes of 2 hours per week.

Week 1 - 4: Project 1 by Gabriella Quattropani

Week 5 - 8: Project 2 by Gayandhi De Silva

Week 9 - 12: Project 3 by Maksym Mohorian and Kateryna Andrych

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (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). 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) 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.

- Ask a Study Coach
- 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 https://students.mq.edu.au/support/technology/service-desk.

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

This unit previously involved completing 4 projects with three weeks per project. This has now been modified to be 3 projects with four weeks per project. The assessment is 3 project submissions, which include a written report and oral presentation per project, to meet the new assessment principles.

Unit information based on version 2026.04 of the Handbook