



ASTR7913

Contemporary Research Techniques in Astrophysics

Session 2, Weekday attendance, North Ryde 2021

Archive (Pre-2022) - Department of Physics and Astronomy

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Session 2 Learning and Teaching Update

The decision has been made to conduct study online for the remainder of Session 2 for all units WITHOUT mandatory on-campus learning activities. Exams for Session 2 will also be online where possible to do so.

This is due to the extension of the lockdown orders and to provide certainty around arrangements for the remainder of Session 2. We hope to return to campus beyond Session 2 as soon as it is safe and appropriate to do so.

Some classes/teaching activities cannot be moved online and must be taught on campus. You should already know if you are in one of these classes/teaching activities and your unit convenor will provide you with more information via iLearn. If you want to confirm, see the list of [units with mandatory on-campus classes/teaching activities](#).



Visit the [MQ COVID-19 information page](#) for more detail.

General Information

Unit convenor and teaching staff

Convenor and project advisor

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By email appointment.

Credit points

10

Prerequisites

Admission to MRes

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.

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

For each of the four projects, students will be required to submit a report that describes the research problem addressed, the techniques used, as well as the outcomes and conclusions. Each report should be submitted by the due date and time. Students will also give a presentation on their choice of one of the first three projects. 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*.

The penalty for late submission is deduction of 5% of the possible mark for that item for each 24 hour period (or part) overdue. Assessments will not be accepted for marking if submitted more than 1 week past the due date. Extensions to the due dates for assignments, practical assessments, and project will only be considered if requested with valid reason prior to the due date.

Students anticipating or experiencing difficulties in meeting a deadline should discuss this with

one of the lecturers in the first instance, ideally ahead of the deadline, if at all possible. Students should also be familiar with the University's provisions for [Special Considerations](#).

Assessment Tasks

Name	Weighting	Hurdle	Due
Oral presentation	20%	No	Week 12
Project 1	20%	No	Week 5
Project 2	20%	No	mid-semester
Project 3	20%	No	Week 11
Project 4	20%	No	Week 13

Oral presentation

Assessment Type ¹: Presentation

Indicative Time on Task ²: 10 hours

Due: **Week 12**

Weighting: **20%**

A oral report to the cohort on one of the projects.

On successful completion you will be able to:

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

Project 1

Assessment Type ¹: Project

Indicative Time on Task ²: 10 hours

Due: **Week 5**

Weighting: **20%**

A report of the first of four projects undertaken during the unit

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: Project

Indicative Time on Task ²: 10 hours

Due: **mid-semester**

Weighting: **20%**

A report of the second of four projects undertaken during the unit

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: Project

Indicative Time on Task ²: 10 hours

Due: **Week 11**

Weighting: **20%**

A report of the third of four projects undertaken during the unit

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 4

Assessment Type ¹: Project

Indicative Time on Task ²: 10 hours

Due: **Week 13**

Weighting: **20%**

A report of the fourth of four projects undertaken during the unit

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.

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

Students will undertake four guided projects over the course of the semester, each coupled with an academic advisor. Students will be expected to spend **one full day per week** on their projects, and will consult with the academic advisor either individually or in group sessions for help with problem solving. There are two workshops. The first is scheduled for Week 1, and this will involve an introduction to the unit, and to the four projects and academics. The second is scheduled for Week 12, and here students will give a presentation on their choice of one of the first three projects. The four projects will be computational in nature, so students will require access to either a laptop or desktop computer. There is no required text, and appropriate reading material will be made available by the academic advisors.

Unit Schedule

Students will complete 4 mini-projects throughout the semester:

1. **Week 1:** Unit overview and introduction to the projects (2hr workshop)
2. **Weeks 2-4, Project 1:** Exoplanet detection using high-resolution spectroscopy. (Mentor: Christian)
3. **Weeks 5-7, Project 2:** Understanding stellar collisions using 3D hydrodynamic simulations. (Mentor: Orsola)
4. **Weeks 8-10, Project 3:** Kinematics of HII regions using radio interferometry. (Mentor: Jo)
5. **Week 12:** Student presentations
6. **Week 11-13, Project 4:** Resolving the sources of gas ionisation in galaxies using optical spectroscopy. (Mentor: Matt)

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](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/su\)](https://students.mq.edu.au/su)

[port/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

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 help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [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

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.

Changes from Previous Offering

This is the first offering of this unit, so no changes to note.