



ASTR310

Frontiers of Astronomy and Astrophysics

S2 Day 2014

Physics and Astronomy

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General Information

Unit convenor and teaching staff

Unit Convenor

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E6B

Credit points

3

Prerequisites

ASTR377

Corequisites

Co-badged status

Unit description

We are in the midst of a golden age of astronomy and astrophysics, with results streaming in from a host of telescopes, spacecraft and supercomputers. In this unit students have an opportunity to join this voyage of discovery by planning and conducting their own research project under the guidance of professional astronomer at CSIRO Astronomy and Space Science, the Australian Astronomical Observatory or Macquarie University. Students will develop familiarity with the required tools to tackle a real-world astrophysics problem and conduct their research project. Students report on their progress and findings through presentations and written reports. In addition, students will have the opportunity to take part in a field trip to major telescopes in Western New South Wales.

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:

Develop insight into the professional activities and work practises of astronomical, astrophysics and astrophotonics researchers.

Develop critical thinking and analysis both interpreting the outcomes of the project and identifying future research directions relevant to the project

Project planning and management, including a capacity to meet agreed deadlines set by the partner.

Students will write a comprehensive report that follows best practises for the discipline.

Students will learn to work effectively in a team based research project, learning to articulate project goals and results.

Assessment Tasks

Name	Weighting	Due
<u>Project Report</u>	50%	Weeks 8 and 13
<u>Oral Presentation</u>	20%	week 13
<u>Reflective Journal</u>	10%	Week 5 and 13
<u>Seminar attendance</u>	20%	Week 12

Project Report

Due: **Weeks 8 and 13**

Weighting: **50%**

The students are required to submit a 5000 word Project Report for the host organisation and formal presentation of Project outcomes to the Partner Supervisor. Typically, students will work in pairs with the partner. In those cases each student is expected to contribute equally to the project report, and the report must include a statement describing the contributions of each student to the joint project.

Note that in some cases Project progress and timely conclusion can be influenced by circumstances that are outside of the Student's control. This will be taken into account when assessing the report.

An introductory section will be due to the University Supervisor in Week 8.

On successful completion you will be able to:

- Develop insight into the professional activities and work practises of astronomical, astrophysics and astrophotonics researchers.
- Develop critical thinking and analysis both interpreting the outcomes of the project and identifying future research directions relevant to the project
- Project planning and management, including a capacity to meet agreed deadlines set by the partner.
- Students will write a comprehensive report that follows best practises for the discipline.
- Students will learn to work effectively in a team based research project, learning to

articulate project goals and results.

Oral Presentation

Due: **week 13**

Weighting: **20%**

Each student will give a 10 minute presentation (with 3 minutes for questions) on their work in the final week of semester. For students working in pairs, they may present a joint 20 minute talk, as long as each person presents approximately half of the work. The talk should cover both the research component of the project, and the experience of working at the partner organisation.

On successful completion you will be able to:

- Develop critical thinking and analysis both interpreting the outcomes of the project and identifying future research directions relevant to the project
- Project planning and management, including a capacity to meet agreed deadlines set by the partner.
- Students will write a comprehensive report that follows best practises for the discipline.
- Students will learn to work effectively in a team based research project, learning to articulate project goals and results.

Reflective Journal

Due: **Week 5 and 13**

Weighting: **10%**

Each student must maintain an individual reflective diary. The diary is a record of the additional reading and reflective research undertaken by each student on areas relevant to working in a professional or research environment. This may include a review of the broader project related implications for the host partner; a review of project planning and resources (eg. Gantt charts etc); a review of the science principles underpinning the Project; guidelines to working in a team environment; conflict resolution; management structure and best practise etc.

Students will be required to hand in their diaries to the University Supervisor as part of the assessment process, and their University Supervisor will verify that they are keeping a lab-book and/or journal effectively in Week 5.

On successful completion you will be able to:

- Develop critical thinking and analysis both interpreting the outcomes of the project and identifying future research directions relevant to the project
- Students will learn to work effectively in a team based research project, learning to articulate project goals and results.

Seminar attendance

Due: **Week 12**

Weighting: **20%**

A key part of professional development for researchers is regular attendance to seminars delivered by leaders in their respective fields. In this context, students are required to attend at least 5 seminars delivered by professional researchers in the disciplines of astronomy, astrophysics and astrophotonics. Seminar attendance will be recorded by University Supervisors attending those presentations. Students will then be required to write a short reports (500 words) summarising the context and key results highlighted at at least 2 of those seminars. Those reports are required to be uploaded online following the seminar.

On successful completion you will be able to:

- Develop insight into the professional activities and work practises of astronomical, astrophysics and astrophotonics researchers.

Delivery and Resources

Initial Course Briefing

The first lecture slot of the semester (10am to 12pm on 6th August, in W5C 310) will be taken up with a description of the course, safety information about partner organisations and the Macquarie University observatory, and assigning students to projects. All students are expected to attend. This same time slot on 12th November will be taken up with the final project talks.

Supervisors

The project has a supervisor at the host organisation, who is able to devote some time to supervising the students on the days that they attend the host organisation. The Physics and Astronomy Department at Macquarie University also appoints a University staff supervisor to maintain liaison, monitor progress and assist in advising students.

Required Unit Materials

You will be working within the premises of the partner organisation. Compliance with standard WHS practise is expected. This includes wearing appropriate clothing and footwear (covered shoes).

Required Text

Not applicable

Teaching Strategy

Students spend a total of 13 days within the host organisation, plus the field trip. This time should be used effectively in the pursuit of the objectives identified by the partner supervisor. A clear understanding of the project objectives and appropriate research planning will facilitate progress towards the project objectives. Students are expected to regularly graph and analyse their results, and keep comprehensive and up-to-date records in their lab-books. The Partner

and University supervisor will review the research plan and lab-books to ensure good practise in this respect. Students are also expected to maintain a work diary that captures other project related reading and reflective analysis undertaken by the student.

Record-keeping

Each student must maintain an individual lab book and work diary. The lab book needs to be completed for each day of work on the project. Entries in the lab book must be viewed and approved as correct records by the Partner supervisor on a regular basis (at least fortnightly). Students will be required to hand in their lab books to the Partner supervisor as part of the assessment process. The work diary is a record of the additional reading and reflective research undertaken by each student on areas relevant to working in an industry environment. Students will be required to hand in their diaries to the University supervisor as part of the assessment process.

Laboratory Requirements

Appropriate clothing and footwear

Lab-book

Calculator and / or lap-top

Workload

Students will meet with the Unit convenor / University Supervisor at least twice during the semester to review lab-books, work diaries and progress against project objectives. One of these meetings will take place at the host organisation.

Unit Schedule

PACE

PACE stands for Participation and Community Engagement. By connecting students with partner organisations, PACE gives Macquarie students the chance to contribute their academic learning, enthusiasm and fresh perspective to the professional workplace. ASTR310 is a PACE unit from 2013. PACE activities in this unit includes astronomy outreach at our Macquarie University observatory and a activities at either the Australian Astronomical Observatory or CSIRO Astronomy and Space Science.

Attendance

Students are required to be on-site at the host organisation when undertaking the project. The total project duration is 13 days. Typically, students will devote one day a week (nominally Friday) during 2nd semester (Weeks 1 to 13) working on the project at the partner institution. On some of these days some time may be spent at the University or elsewhere pursuing the objectives of the project with the agreement of the partner supervisor.

Observatory Service

The Macquarie University observatory runs community observing nights throughout semester. Each student in ASTR310 will act as a demonstrator (i.e. an astronomy guide) for three 2-hour

sessions (weather permitting) under the supervision of Association for Astronomy staff members.

Field Trip

A field trip to the Anglo-Australia Telescope and the Australa Telescope National Facility Compact Array will take place during the September mid-term break. There will be some cost to each student for food, transport and accomodation, with details finalised in the 2nd week of semester. If students can not partake in the field trip, additional project activity will be arranged.

Progress Meetings

Students are required to attend progress meetings at the external site as arranged by the University supervisor. At least one such meeting will take place during the project.

Learning and Teaching Activities

Field Trip

A visit to the Anglo Australia Telescope, the Australia Telescope Compact Array and other smaller telescopes, where the research process from proposal to data acquisition will be experienced directly.

Research Project

A project in partnership with an active researcher at the partner organisation (AAO or CASS).

Observatory Service

Acting as a demonstrator at public observing nights at the Macquarie University observatory.

Seminar Participation

Listening to and reflecting on seminars by expert visiting astronomers both at Macquarie and the partner organisation.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/p

[olicy.html](#) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of 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/support/student_conduct/

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

IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use Policy](#). The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing

environments.

This graduate capability is supported by:

Learning outcomes

- Develop insight into the professional activities and work practises of astronomical, astrophysics and astrophotonics researchers.
- Students will learn to work effectively in a team based research project, learning to articulate project goals and results.

Assessment task

- Reflective Journal

Learning and teaching activity

- A visit to the Anglo Australia Telescope, the Australia Telescope Compact Array and other smaller telescopes, where the research process from proposal to data acquisition will be experienced directly.

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Assessment tasks

- Reflective Journal
- Seminar attendance

Learning and teaching activities

- Acting as a demonstrator at public observing nights at the Macquarie University observatory.
- Listening to and reflecting on seminars by expert visiting astronomers both at Macquarie and the partner organisation.

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able

to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Develop critical thinking and analysis both interpreting the outcomes of the project and identifying future research directions relevant to the project
- Project planning and management, including a capacity to meet agreed deadlines set by the partner.
- Students will write a comprehensive report that follows best practises for the discipline.

Assessment tasks

- Project Report
- Oral Presentation
- Seminar attendance

Learning and teaching activities

- A visit to the Anglo Australia Telescope, the Australia Telescope Compact Array and other smaller telescopes, where the research process from proposal to data acquisition will be experienced directly.
- A project in partnership with an active researcher at the partner organisation (AAO or CASS).
- Listening to and reflecting on seminars by expert visiting astronomers both at Macquarie and the partner organisation.

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Develop critical thinking and analysis both interpreting the outcomes of the project and identifying future research directions relevant to the project
- Students will write a comprehensive report that follows best practises for the discipline.

Assessment task

- Project Report

Learning and teaching activity

- A project in partnership with an active researcher at the partner organisation (AAO or CASS).

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Develop insight into the professional activities and work practises of astronomical, astrophysics and astrophotonics researchers.
- Develop critical thinking and analysis both interpreting the outcomes of the project and identifying future research directions relevant to the project
- Students will write a comprehensive report that follows best practises for the discipline.

Learning and teaching activities

- A project in partnership with an active researcher at the partner organisation (AAO or CASS).

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- Develop insight into the professional activities and work practises of astronomical, astrophysics and astrophotonics researchers.
- Project planning and management, including a capacity to meet agreed deadlines set by the partner.
- Students will learn to work effectively in a team based research project, learning to articulate project goals and results.

Assessment task

- Oral Presentation

Learning and teaching activity

- A visit to the Anglo Australia Telescope, the Australia Telescope Compact Array and other smaller telescopes, where the research process from proposal to data acquisition will be experienced directly.
- A project in partnership with an active researcher at the partner organisation (AAO or CASS).

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Project planning and management, including a capacity to meet agreed deadlines set by the partner.
- Students will learn to work effectively in a team based research project, learning to articulate project goals and results.

Assessment tasks

- Project Report
- Oral Presentation
- Reflective Journal
- Seminar attendance

Learning and teaching activities

- A project in partnership with an active researcher at the partner organisation (AAO or CASS).
- Acting as a demonstrator at public observing nights at the Macquarie University observatory.
- Listening to and reflecting on seminars by expert visiting astronomers both at Macquarie and the partner organisation.

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Assessment task

- Seminar attendance

Learning and teaching activity

- A visit to the Anglo Australia Telescope, the Australia Telescope Compact Array and other smaller telescopes, where the research process from proposal to data acquisition will be experienced directly.
- Acting as a demonstrator at public observing nights at the Macquarie University observatory.

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning and teaching activities

- Acting as a demonstrator at public observing nights at the Macquarie University observatory.