# ASTR170

## Introductory Astronomy: Our Place in the Universe

S1 Day 2017

*Dept of Physics and Astronomy*

## Contents

# General Information

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Credit points
3

Prerequisites

Corequisites

Co-badged status

Unit description
This is a foundation unit in astronomy, suitable for aspiring physicists/astronomers and non-scientists alike. No prior knowledge of astronomy or physics is required. This unit gives a broad underpinning of basic astronomical subjects and concepts with minimal mathematical content. A diverse range of astronomical topics are covered, starting with the solar system, including comets and asteroids; and then increasing in scale to Galactic stars, nebulae, the interstellar medium, our own Milky Way galaxy, galaxy clusters, quasars, black holes and basic cosmology. Key fundamental physical principles, theories and observational technologies are covered. Experimental work is both hands-on and computer based, and covers such areas as galaxy classification, eclipses, spectroscopy and geometrical optics. A session at the Macquarie University Observatory forms a recommended part of the practical work.

## 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:

Knowledge of the layout and contents of the solar system.

Knowledge of the structure and lifecycle of stars, including our Sun.

Knowledge of how galaxies form, their basic structure and how they relate to the cosmology of the universe.

Demonstrate understanding of practical and conceptual topics in observational astronomy.

Be able to conduct, analyse, and draw conclusions from hands-on experimental work.

Be able to discuss the implications of funding scientific research.

# General Assessment Information

## ASTR170 Late Submission Policy:

Assessments received after the deadline will be subject to a 10% deduction for each day, or part-day, late. (So, e.g. 0–24 hours late = 10% deduction; 24–48 hours late = 20% deduction, etc). Work will not be accepted more than 5 days (120 hours) after the due date and time.

*Note*: extensions to due dates may be granted if a Disruption to Studies is submitted and approved.

See https://students.mq.edu.au/study/my-study-program/special-consideration/disruption-to-studies

# Assessment Tasks

| Name | Weighting | Hurdle | Due |
|---|---|---|---|
| Assignments | 20% | No | See below |
| Essay | 10% | No | Friday 5 May 5pm |
| Labs | 30% | No | See below |
| Exam | 40% | No | University Examination Period |

## Assignments

Due: **See below**
Weighting: **20%**

There will be five (5) assignments on the concepts covered in the lectures. Two (2) will be online quizzes and three (3) will consist of short-answer questions. Each assignment will be weighted at 4%. One of the assignments will require observing the sky at night. Assignments must be submitted on iLearn.  The due dates are:

- **Assignment 1** - Friday 17 March 5pm
- **Assignment 2** - Friday 7 April 5pm
- **Assignment 3** - Friday 12 May 5pm
- **Assignment 4** - Friday 2 June 5pm
- **Assignment 5** (observatory) - Friday 9 June 5pm

On successful completion you will be able to:

- Knowledge of the layout and contents of the solar system.
- Knowledge of the structure and lifecycle of stars, including our Sun.
- Knowledge of how galaxies form, their basic structure and how they relate to the cosmology of the universe.
- Demonstrate understanding of practical and conceptual topics in observational astronomy.

## Essay

Due: **Friday 5 May 5pm**
Weighting: **10%**

A 1000-1500 word essay addressing the question below is to be submitted electronically via iLearn. It must be typed.

In this assignment your task is to discuss the ethics, social responsibility and perceived value of

pure astronomical research in today's world. For example, should there always be a commercial expectation of government funded research?

Marking will based on the following, equally-weighted criteria:

1. Does the essay address the topic in an appropriate way?
2. Is adequate context provided?
3. Does the overall structure contribute to explaining the issues to the naive (but intelligent) reader?
4. Is the information presented at an appropriate level and in appropriate detail?
5. Is there evidence of the synthesis of information drawn from a variety of sources as well as intellectual input from the writer?

On successful completion you will be able to:

- Be able to discuss the implications of funding scientific research.

## Labs

Due: **See below**
Weighting: **30%**

Each student must attend five (5) practical sessions and complete five (5) laboratory exercises starting in Week **5**. The lab assessment is based on in-lab work only.

On successful completion you will be able to:

- Demonstrate understanding of practical and conceptual topics in observational astronomy.
- Be able to conduct, analyse, and draw conclusions from hands-on experimental work.

## Exam

Due: **University Examination Period**
Weighting: **40%**

A two-hour final exam consisting of multiple-choice and short-answer questions will take place in the university exam period. No material will be allowed in the exam room.

If you apply for Disruption to Study for your final examination, you must make yourself available for the week of July 24 – 28, 2017. If you are not available at that time, there is no guarantee an additional examination time will be offered. Specific examination dates and times will be determined at a later date.

On successful completion you will be able to:

- Knowledge of the layout and contents of the solar system.

- Knowledge of the structure and lifecycle of stars, including our Sun.
- Knowledge of how galaxies form, their basic structure and how they relate to the cosmology of the universe.
- Demonstrate understanding of practical and conceptual topics in observational astronomy.

# Delivery and Resources

## Lectures:

- Monday 1-2pm - Macquarie Theatre (W2.4A)
- Thursday 10-11am - Macquarie Theatre (W2.4A)
- Friday 2-3pm - Lotus Theatre (W6D)

Lectures are automatically recorded and will be available on iLearn, along with the lecture slides.

## Labs:

The lab is located in E7B 209-213. Each student is required to sign up for one of the following lab streams:

- Monday 10am-12pm
- Tuesday 11am-1pm
- Tuesday 2-4pm
- Wednesday 12-2pm
- Wednesday 2-4pm
- Thursday 11am-1pm
- Friday 10am-12pm
- Friday 12-2pm

In Week 2 we will hold special planetarium sessions during the labs. Normal labs start in Week 5.

A mandatory lab notebook will be available from the bookstore after Week 3.

Please note that health and safety regulations specify that fully-enclosed footwear must be worn in the labs. (i.e. you will not be admitted if you are wearing sandals etc.)

## Textbook:

The lectures are based upon the following textbook, which is not absolutely required for the course, but is *strongly* recommended to enhance the learning process:

- *Foundations of Astronomy*, 13th Edition Michael A. Seeds and Dana Backman ISBN-10: 1305079159 | ISBN-13: 9781305079151

This can be purchased from the Macquarie bookstore. Earlier editions of the textbook are

acceptable.

# Unit Schedule

| Week | Lecturer | Topic | Textbook Chapters |
|---|---|---|---|
| 1 | J. Dawson | Introduction, the night sky and celestial motions, moon phases & eclipses | 1, 2, 3 |
| 2 | J. Dawson | Origins of modern astronomy, gravity, light & atoms (1) | 4, 5, 7 |
| 3 | J. Dawson | Light & atoms (2), telescopes, the Sun | 7, 6, 8 |
| 4 | J. Dawson | Introduction to the stars, the interstellar medium | 9, 10 |
| 5 | J. Dawson | Star formation, stellar structure and evolution | 11, 12 |
| 6 | J. Dawson | Stellar death, supernovae, neutron stars & black holes | 13, 14 |
| 7 | A. Lopez-Sanchez | The Earth, Moon and terrestrial planets | 20, 21, 22 |
| 8 | A. Lopez-Sanchez | The gas giants, dwarf planets, meteorites, asteroids & comets | 23, 24, 25 |
| 9 | A. Lopez-Sanchez | Origin of the solar system, extra-solar planets | 19 |
| 10 | D. Kamath | Life in the Universe, The Milky Way Galaxy | 26, 15 |
| 11 | D. Kamath | Galaxies, active galaxies & supermassive black holes | 16, 17 |
| 12 | D. Kamath | Modern cosmology | 18 |
| 13 | All | Revision Week | |

# 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_2016.html

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

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disr

uption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

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/

## Results

Results shown in *iLearn*, 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.

# 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://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.

# Graduate Capabilities

## 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

- Knowledge of the layout and contents of the solar system.
- Knowledge of the structure and lifecycle of stars, including our Sun.
- Knowledge of how galaxies form, their basic structure and how they relate to the cosmology of the universe.
- Demonstrate understanding of practical and conceptual topics in observational astronomy.

### Assessment tasks

- Assignments
- Labs
- Exam

## 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

- Knowledge of the structure and lifecycle of stars, including our Sun.
- Knowledge of how galaxies form, their basic structure and how they relate to the cosmology of the universe.
- Demonstrate understanding of practical and conceptual topics in observational astronomy.

- Be able to conduct, analyse, and draw conclusions from hands-on experimental work.

### Assessment tasks

- Assignments
- Labs
- Exam

## 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 outcome

- Be able to conduct, analyse, and draw conclusions from hands-on experimental work.

### Assessment task

- Labs

## 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 outcome

- Be able to discuss the implications of funding scientific research.

### Assessment task

- Essay

## 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:

### Learning outcome

- Be able to discuss the implications of funding scientific research.

### Assessment task

- Essay

## 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 outcome

- Be able to discuss the implications of funding scientific research.

### Assessment task

- Essay