ASTR170
Introductory Astronomy: Our Place in the Universe
S1 Day 2016
Dept of Physics and Astronomy

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# General Information

<table>
<thead>
<tr>
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<th>Contact via Email</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

- **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://students.mq.edu.au/important-dates

Learning Outcomes

1. Knowledge of the layout and contents of the solar system.
2. Knowledge of the structure and lifecycle of stars, including our Sun.
3. Knowledge of how galaxies form, their basic structure and how they relate to the cosmology of the universe.
4. Demonstrate understanding of practical and conceptual topics in observational astronomy.
5. Be able to conduct, analyse, and draw conclusions from hands-on experimental work.
6. Be able to discuss the implications of funding scientific research.

General Assessment Information
Satisfactory completion of the assessment in each of the categories of Assignments, Labs, and Final Exam is required to pass the unit.

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 http://students.mq.edu.au/student_admin/exams/disruption_to_studies/
Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>20%</td>
<td>See below</td>
</tr>
<tr>
<td>Essay</td>
<td>10%</td>
<td>Friday 6 May 5pm</td>
</tr>
<tr>
<td>Labs</td>
<td>30%</td>
<td>See below</td>
</tr>
<tr>
<td>Final exam</td>
<td>40%</td>
<td>University Examination Period</td>
</tr>
</tbody>
</table>

Assignments

Due: See below
Weighting: 20%

There will be five (5) assignments on the concepts covered in the lectures. One of the assignments will require observing the sky at night. Assignments must be submitted on iLearn. The due dates are:

- Assignment 1 - Friday 18 March 5pm
- Assignment 2 - Friday 8 April 5pm
- Assignment 3 - Friday 13 May 5pm
- Assignment 4 - Friday 3 June 5pm
- Assignment 5 (observatory) - Friday 10 June 5pm

This Assessment Task relates to the following 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.
- Be able to conduct, analyse, and draw conclusions from hands-on experimental work.

Essay

Due: Friday 6 May 5pm
A 1000-1500 word essay addressing the question below is to be submitted electronically via iLearn. It must be typed.

Australia is aiming to co-host the $1-2 billion Square Kilometre Array (SKA), the largest ground-based astronomical infrastructure ever funded. 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?

This Assessment Task relates to the following Learning Outcomes:
  • Be able to discuss the implications of funding scientific research.

Labs
Due: See below
Weighting: 30%

Lab attendance is required. Each student must attend five (5) practical sessions and complete five (5) laboratory exercises starting in Week 4. The lab assessment is based on in-lab work only.

This Assessment Task relates to the following Learning Outcomes:
  • Demonstrate understanding of practical and conceptual topics in observational astronomy.
  • Be able to conduct, analyse, and draw conclusions from hands-on experimental work.

Final exam
Due: University Examination Period
Weighting: 40%

A three-hour final exam consisting of multichoice and short-answer questions will take place in the exam period of semester 2. No material will be allowed in the exam room.

This Assessment Task relates to the following 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.
Delivery and Resources

External vs Day Offerings
This unit is offered in S1, in Day and External modes. The only difference between these modes is that students enrolled in the external mode are not formally entitled to attend lectures. The lectures will be recorded and available on line along with the slides. Students enrolled in the "External" offering are also very welcome -- nay, encouraged -- to attend lectures. If room space is tight we will send out an iLearn announcement warning external enrollees that we cannot guarantee a lecture seat for the first few weeks of the semester.

Note that students enrolled in the external offering are still required to enrol in and attend a weekly lab session (see below).

Lectures
Lectures are held in X5B T1 on Tuesdays from 12-1pm and Fridays from 11am-1pm.
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 lab streams:

- Monday 10am-12pm
- Monday 2-4pm
- Tuesday 10am-12pm
- Thursday 10-12pm
- Friday 1-3pm
- Friday 3-5pm

In Week 2 we will hold special planetarium sessions during the labs. Normal labs start in Week 4 for the Monday, Tuesday, Thursday streams, and in Week 5 for the Friday stream (because of the Easter break).

A mandatory lab notebook will be available from the bookstore in 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 but strongly recommended to enhance the learning process:


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

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecturer</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MW</td>
<td>Intro, Earth</td>
</tr>
<tr>
<td>2</td>
<td>MW</td>
<td>Terrestrial planets, dwarf planets, asteroids, comets</td>
</tr>
<tr>
<td>3</td>
<td>MW</td>
<td>Jovian planets, formation of the solar system</td>
</tr>
<tr>
<td>4</td>
<td>MW</td>
<td>The night sky (no Friday lecture)</td>
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<tr>
<td>5</td>
<td>MW</td>
<td>Cycles of the Moon, history of astronomy, gravity</td>
</tr>
<tr>
<td>6</td>
<td>JD</td>
<td>The Sun, light and atoms, telescopes</td>
</tr>
<tr>
<td>7</td>
<td>JD</td>
<td>Stars</td>
</tr>
<tr>
<td>8</td>
<td>JD</td>
<td>Stellar evolution, when stars die, neutron stars and black holes</td>
</tr>
<tr>
<td>9</td>
<td>JD</td>
<td>The Milky Way, interstellar medium</td>
</tr>
<tr>
<td>10</td>
<td>JD</td>
<td>Formation of the Milky Way, life in the Universe</td>
</tr>
<tr>
<td>11</td>
<td>RM</td>
<td>Other galaxies, large scale structure of the Universe cosmology</td>
</tr>
<tr>
<td>12</td>
<td>RM</td>
<td>Distant galaxy observations, Cosmology</td>
</tr>
<tr>
<td>13</td>
<td>MW/JD/RM</td>
<td>Revision</td>
</tr>
</tbody>
</table>

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:


In addition, a number of other policies can be found in the Learning and Teaching Category of [https://unitguides.mq.edu.au/unit_offerings/58063/unit_guide/print](https://unitguides.mq.edu.au/unit_offerings/58063/unit_guide/print)
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 Enquiry Service

For all student enquiries, visit Student Connect at ask.mq.edu.au

Equity 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.

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

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:

**Learning outcome**

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

**Assessment task**

- Essay

**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**

- 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.

**Assessment tasks**

- Assignments
- Labs
- Final exam

**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 outcome
  • Be able to discuss the implications of funding scientific research.

Assessment task
  • Essay

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
  • Be able to conduct, analyse, and draw conclusions from hands-on experimental work.
  • Be able to discuss the implications of funding scientific research.

Assessment tasks
  • Assignments
  • Essay
  • Labs

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

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

**Assessment task**
- Essay

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

**Assessment tasks**

• Assignments
• Labs
• Final 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 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.

**Assessment tasks**

• Assignments
• Labs
• Final exam