



# ASTR707

## Advanced Astrophysics

S2 Day 2015

*Dept of Physics and Astronomy*

### Contents

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|  |   |
|--|---|
| <a href="#"><u>General Information</u></a>     | 2 |
| <a href="#"><u>Learning Outcomes</u></a>       | 3 |
| <a href="#"><u>Assessment Tasks</u></a>        | 3 |
| <a href="#"><u>Delivery and Resources</u></a>  | 5 |
| <a href="#"><u>Policies and Procedures</u></a> | 5 |
| <a href="#"><u>Graduate Capabilities</u></a>   | 6 |

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#### **Disclaimer**

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

## General Information

Unit convenor and teaching staff

Unit Convenor

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Convenor

Richard McDermid

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Credit points

4

Prerequisites

Admission to MRes

Corequisites

Co-badged status

### Unit description

This unit covers the fundamental physics of celestial objects such as stars and galaxies. It starts with the physics of fluid dynamics and the interaction of matter with light; these concepts are then used to describe the interstellar medium, including star formation and the stellar feedback of energy and new elements. The unit concludes with a discussion of galactic formation and evolution from the standpoints of interstellar gas and stellar populations. Observations of real celestial objects are used throughout the unit as examples of the processes we need to explain. Throughout the unit strong emphasis is placed on the connection between observations and interpretation. The student will gain an understanding of how different types of observations (imaging, spectroscopy, multi-wavelength approaches, survey approaches) can allow us to gain insight into specific astrophysical situations and how these observations can be interpreted in the light of theory. The scientific method will be used and emphasised as the backbone of all research and its stages underlined during class and all the activities.

## 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:

Understand the role of gas in the lives of galaxies, with respect to observations and theory

Understand the dynamical properties of galaxies, including characteristic timescales of different stellar systems, the theoretical description of their stellar motions, and how these are used with observations

Understand qualitative and quantitative techniques for understanding the properties of galaxies

Understand the historic development of extragalactic astronomy and cosmology

Solve problems in real-time during class tutorials, and demonstrate solutions to peers

## Assessment Tasks

| Name   | Weighting | Due                         |
|--|-----------|-----------------------------|
| <a href="#">Assignment Tasks During Term</a> | 50%       | Approx. weeks 4,7,10 and 13 |
| <a href="#">Final Exam</a>                   | 50%       | University Exam Period      |

## Assignment Tasks During Term

Due: **Approx. weeks 4,7,10 and 13**

Weighting: **50%**

Four assessed problem sets will be given during the semester, each worth 12.5% of the final grade. Additional problem sets may be provided by the lecturer for the purpose of self-assessment. Tutorial sessions will be used to review problem sets, and students are expected to be able to demonstrate their solutions on the whiteboard in front of the class.

The assignments are an integral part of the unit and aid your understanding of the material. Extensions will only be considered if requested with valid reasons prior to the due date, and the penalty for late submission of the assignments is the subtraction of 5% of the final grade for every day of delay. The assignment can not be turned in more than 1 week past the official due date.

On successful completion you will be able to:

- Understand the role of gas in the lives of galaxies, with respect to observations and theory
- Understand the dynamical properties of galaxies, including characteristic timescales of different stellar systems, the theoretical description of their stellar motions, and how these are used with observations
- Understand qualitative and quantitative techniques for understanding the properties of galaxies
- Understand the historic development of extragalactic astronomy and cosmology
- Solve problems in real-time during class tutorials, and demonstrate solutions to peers

## Final Exam

Due: **University Exam Period**

Weighting: **50%**

The final examination will be of three hours duration plus ten minutes reading time. Battery or solar powered calculators which do not have a full alphabet on the keyboard will be allowed into the examination. Calculators with text retrieval are not permitted for the final examination.

You are expected to present yourself for the final examination at the time and place designated in the University examination timetable (<http://www.timetables.mq.edu.au/>). The timetable will be available in draft form approximately eight weeks before the commencement of examinations and in final form approximately four weeks before the commencement of examinations.

The only exception to not sitting the examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to apply for Special Consideration (see 'Special Consideration' in this Guide). If a supplementary examination is granted as a result of the special consideration process the examination will be

scheduled after the conclusion of the official examination period. You are advised that it is the policy of the University not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, i.e. the final day of the examination period.

On successful completion you will be able to:

- Understand the role of gas in the lives of galaxies, with respect to observations and theory
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## Delivery and Resources

The course will be delivered through weekly lectures and tutorial sessions. The unit will cover two parts:

- 1) Galaxies (6.5 weeks, lecturer Richard McDermid)
- 2) Astrophysics of the Interstellar Medium (6.5 weeks, lecturer Joanne Dawson)

Each part will be assessed via problem sets during the term, and will be proportionally represented in the final exam (i.e. 1/2 Galaxies, 1/2 Astrophysics of the ISM).

## 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](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](http://mq.edu.au/policy/docs/grievance_management/policy.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.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/](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](http://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](http://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](http://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

### PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

## **Learning outcomes**

- Understand the role of gas in the lives of galaxies, with respect to observations and theory
- Understand the dynamical properties of galaxies, including characteristic timescales of different stellar systems, the theoretical description of their stellar motions, and how these are used with observations
- Understand qualitative and quantitative techniques for understanding the properties of galaxies
- Understand the historic development of extragalactic astronomy and cosmology
- Solve problems in real-time during class tutorials, and demonstrate solutions to peers

## **Assessment tasks**

- Assignment Tasks During Term
- Final Exam

## **PG - Critical, Analytical and Integrative Thinking**

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

## **Learning outcomes**

- Understand the role of gas in the lives of galaxies, with respect to observations and theory
- Understand the dynamical properties of galaxies, including characteristic timescales of different stellar systems, the theoretical description of their stellar motions, and how these are used with observations
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## **Assessment tasks**

- Assignment Tasks During Term
- Final Exam

## PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

### Learning outcomes

- Understand the role of gas in the lives of galaxies, with respect to observations and theory
- Understand the dynamical properties of galaxies, including characteristic timescales of different stellar systems, the theoretical description of their stellar motions, and how these are used with observations
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- Solve problems in real-time during class tutorials, and demonstrate solutions to peers

### Assessment tasks

- Assignment Tasks During Term
- Final Exam

## PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

### Learning outcome

- Solve problems in real-time during class tutorials, and demonstrate solutions to peers

### Assessment task

- Assignment Tasks During Term