ASTR3020

Extragalactic Astronomy

Session 2, Special circumstance 2020

Department of Physics and Astronomy

Contents

Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and ot her small group learning activities on campus for the second half-year, while keeping an online ver sion available for those students unable to return or those who choose to continue their studies onli ne.

To check the availability of face-to-face and onlin e activities for your unit, please go to timetable vi ewer. To check detailed information on unit asses sments visit your unit's iLearn space or consult yo ur unit convenor.

General Information

Unit convenor and teaching staff
Richard McDermid
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Mark Wardle
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Credit points
10

Prerequisites
ASTR3010 or ASTR377

Corequisites

Co-badged status
Co-taught with ASTR7908

Unit description
Galaxies are vast collections of stars, gas and dust, gravitationally bound into an evolving and dynamic ecosystem of physical processes. The Milky Way Galaxy in which we live is just one of billions of galaxies in the observable Universe. This unit will look beyond our Milky Way, and examine how galaxies form and evolve over cosmic time, how we quantify and categorise their properties, and what they tell us about the Universe on the largest possible scales. Topics covered will include galaxy evolution, super-massive black holes, dark matter, dark energy, Big Bang cosmology, and gravitational waves. These topics will also be explored through practical sessions making use of public research data archives and contemporary analysis techniques.

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 knowledge of quantitative and qualitative galaxy morphology from a variety of observational evidence, and relate this to theories of galaxy formation and evolution.

ULO2: Explain the principle properties of stellar populations, including their evolution with time and metallicity, and how their properties are modelled.
ULO3: Calculate the dynamical properties of stellar systems based on analytic gravitational potentials, and use these to make inferences about galaxies.
ULO4: Explain the basic qualitative principles of, and observational evidence for, current cosmological models.
ULO5: Apply metric tensors in the context of cosmological models, and understand how observations constrain different components of these models.
ULO6: Demonstrate knowledge of current galaxy formation and evolutionary theories, and the techniques used to simulate these.

General Assessment Information

Assignments will be submitted electronically. Lab sessions will be based on python via jupyter-style notebooks using Google CoLab (though notebooks can also be run locally if preferred). The final exam is a hurdle assessment. ASTR7908 students will follow the same lectures and labs, but with differentiated assessments.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignments	20%	No	Weeks 3, 6, 9, and 11
Lab report	20%	No	Weeks 2, 4, 7, 10 and 12
Final Exam	60%	Yes	Exam period

Assignments

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 40 hours
Due: **Weeks 3, 6, 9, and 11**
Weighting: **20%**

There will be four problem-set assignments given through the semester: two for the first half of the course, focussed on galaxies; and two for the second half, focused on cosmology. The assignments will be based on the lecture content, and are designed to deepen students' understanding of the course content, and develop problem-solving skills. Each assignment will be equally weighted. Feedback on submitted work will be provided to each student, along with worked solutions posted on iLearn.

On successful completion you will be able to:

- Demonstrate knowledge of quantitative and qualitative galaxy morphology from a variety of observational evidence, and relate this to theories of galaxy formation and evolution.
- Explain the principle properties of stellar populations, including their evolution with time and metallicity, and how their properties are modelled.
- Calculate the dynamical properties of stellar systems based on analytic gravitational potentials, and use these to make inferences about galaxies.
- Explain the basic qualitative principles of, and observational evidence for, current cosmological models.
- Apply metric tensors in the context of cosmological models, and understand how observations constrain different components of these models.
- Demonstrate knowledge of current galaxy formation and evolutionary theories, and the techniques used to simulate these.

Lab report

Assessment Type [1]: Lab report
Indicative Time on Task [2]: 5 hours
Due: **Weeks 2, 4, 7, 10 and 12**
Weighting: **20%**

Each lab project will be assessed using the electronically submitted python notebooks directly. These are mostly completed during the lab sessions, so only a small amount of additional time is needed to prepare these for submission.

On successful completion you will be able to:

- Explain the principle properties of stellar populations, including their evolution with time and metallicity, and how their properties are modelled.
- Calculate the dynamical properties of stellar systems based on analytic gravitational potentials, and use these to make inferences about galaxies.
- Explain the basic qualitative principles of, and observational evidence for, current cosmological models.

Final Exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 30 hours
Due: **Exam period**

Weighting: **60%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

A final exam held during the University exam period will be used to assess skills and knowledge developed over the entire unit.

On successful completion you will be able to:

- Demonstrate knowledge of quantitative and qualitative galaxy morphology from a variety of observational evidence, and relate this to theories of galaxy formation and evolution.
- Explain the principle properties of stellar populations, including their evolution with time and metallicity, and how their properties are modelled.
- Calculate the dynamical properties of stellar systems based on analytic gravitational potentials, and use these to make inferences about galaxies.
- Explain the basic qualitative principles of, and observational evidence for, current cosmological models.
- Apply metric tensors in the context of cosmological models, and understand how observations constrain different components of these models.
- Demonstrate knowledge of current galaxy formation and evolutionary theories, and the techniques used to simulate these.

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[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

Lectures will be available in a fully-online format. Lectorials and labs will be designed to run on campus, with an online option.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-centr

al). 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 *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

Students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/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.