UNSW Course Outline

PHYS2116 Stellar and Planetary Physics - 2024

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General Course Information

Course Code : PHYS2116
Year : 2024
Term : Term 1
Teaching Period : T1
Is a multi-term course? : No
Faculty : Faculty of Science
Academic Unit : School of Physics
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Since the discovery of the first exoplanet in 1995, astronomers have discovered more than 10,000 planets orbiting other stars. What processes govern the formation of these planets and their host stars, and how do they affect one another? What is the ultimate fate of our Solar

System and star systems like it, and how do we know?

In this course, students will explore stars and planetary systems in detail. Throughout the course, students develop an understanding of the building blocks of stars and planets, how they form, and how they evolve over time. They will learn about the telescopes and surveys, present and upcoming, used to understand the physics of these systems. Students will have the opportunity to analyse real telescope data related to topics covered in this course to appreciate how scientific theories are tested in practice. In developing the skills of professional astronomers, students will also critically evaluate current open questions related to stellar or planetary astronomy and produce a proposal highlighting how future observations could solve astronomical mysteries.

Topics to be covered include: stellar structure, star and planetary formation and evolution, stellar spectra in relation to fundamental properties, end states of stars, exoplanet detection and characterisation, planetary atmospheres and interior structures, and stellar activity and its effect on habitability.

Course Aims

Stars and planets form the basic building blocks of a galaxy, and make up one of the fundamental scales on which structure is found in the Universe. This course provides an introduction to the physics of stars and planets. The aim is to give students an introduction to our state of knowledge about these fundamental astronomical objects, what they contain, their physical parameters, how they function and how they evolve. The basic mathematical formalism governing the physics of is presented, though the detailed solution of the equations is not attempted.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Use mathematical and computational skills to quantitatively describe and interpret the structure, formation, and evolution of stars as a function of initial conditions.
CLO2 : Synthesise new hypotheses in planet and star formation and the viability of future missions to resolve them.
CLO3 : Design and undertake an experiment to test a current theory in stellar or planetary astrophysics.
CLO4 : Apply the tools that are used by professional astronomers in the analysis of stellar and planetary systems.
CLO5 : Relate the topics covered in this course to relevant articles in the primary scientific literature and active research questions in astronomy.

Course Learning Outcomes	Assessment Item
CLO1 : Use mathematical and computational skills to quantitatively describe and interpret the structure, formation, and evolution of stars as a function of initial conditions.	• Problem sets • Weekly quizzes • Computational assignment
CLO2 : Synthesise new hypotheses in planet and star formation and the viability of future missions to resolve them.	• Telescope proposal
CLO3 : Design and undertake an experiment to test a current theory in stellar or planetary astrophysics.	• Telescope proposal • Computational assignment
CLO4 : Apply the tools that are used by professional astronomers in the analysis of stellar and planetary systems.	• Problem sets • Weekly quizzes • Telescope proposal • Computational assignment
CLO5 : Relate the topics covered in this course to relevant articles in the primary scientific literature and active research questions in astronomy.	• Telescope proposal • Computational assignment

Learning and Teaching Technologies

Moodle - Learning Management System

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Problem sets Assessment Format: Individual	10%	
Weekly quizzes Assessment Format: Individual	20%	
Telescope proposal Assessment Format: Individual	40%	
Computational assignment Assessment Format: Individual	30%	

Assessment Details

Problem sets

Assessment Overview

You will submit a portfolio showing progress on the problem sets in the middle of term and at the end of term. Feedback will be provided on your submission.

Course Learning Outcomes

- CLO1 : Use mathematical and computational skills to quantitatively describe and interpret the structure, formation, and evolution of stars as a function of initial conditions.
- CLO4 : Apply the tools that are used by professional astronomers in the analysis of stellar and planetary systems.

Weekly quizzes

Assessment Overview

You will complete eight short invigilated weekly quizzes, given at the end of one of the lectures each week, the lowest two scores over the term will be dropped.

Course Learning Outcomes

- CLO1 : Use mathematical and computational skills to quantitatively describe and interpret the structure, formation, and evolution of stars as a function of initial conditions.
- CLO4 : Apply the tools that are used by professional astronomers in the analysis of stellar and planetary systems.

Telescope proposal

Assessment Overview

You will write a mock proposal for telescope observations or supercomputing time to study an open question in astrophysics related to a topic covered in this course. You will outline a problem in modern astronomy, the tools and data needed to solve it, and how this would be obtained. A draft of this proposal will be submitted for peer review before the final proposal is submitted. Half the marks for this assessment come from the written proposal itself and half the marks come from peer-reviewing the proposals of others and a defence of the proposal to a mock allocation committee consisting of other students in the course. The mock allocation committee will meet during a two-hour slot during the exam period.

Course Learning Outcomes

- CLO2 : Synthesise new hypotheses in planet and star formation and the viability of future missions to resolve them.
- CLO3 : Design and undertake an experiment to test a current theory in stellar or planetary

astrophysics.
- CLO4 : Apply the tools that are used by professional astronomers in the analysis of stellar and planetary systems.
- CLO5 : Relate the topics covered in this course to relevant articles in the primary scientific literature and active research questions in astronomy.

Computational assignment

Assessment Overview

You will write code to solve one of three problems related to stellar or planetary physics and create a 10 minute video describing how the code works along with specific details about the problem that has been solved. Feedback will be provided on your submission.

Course Learning Outcomes

- CLO1 : Use mathematical and computational skills to quantitatively describe and interpret the structure, formation, and evolution of stars as a function of initial conditions.
- CLO3 : Design and undertake an experiment to test a current theory in stellar or planetary astrophysics.
- CLO4 : Apply the tools that are used by professional astronomers in the analysis of stellar and planetary systems.
- CLO5 : Relate the topics covered in this course to relevant articles in the primary scientific literature and active research questions in astronomy.

General Assessment Information

Please note that the marks in Moodle are raw marks and may be subjected to moderation in order to calculate your final mark.

Grading Basis

Standard

Course Schedule

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Year coordinator	Elizabeth Angstmann					Yes	No
Administrator	Zofia Krawczyk					No	No
Convenor	Ben Montet					No	Yes

Other Useful Information

Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University's conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.
- Observe standards of equity and respect in dealing with every member of the UNSW community.
- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.
- Maintain the University's reputation and good standing.

For more information, visit the UNSW Student Code of Conduct Website.

Academic Honesty and Plagarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.
Further information about referencing styles can be located at https://student.unsw.edu.au/referencing

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be

detected in your work.

Further information about academic integrity, plagiarism and the use of AI in assessments can be located at:

- The Current Students site,
- The ELISE training site, and
- The Use of AI for assessments site.

The Student Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct

Submission of Assessment Tasks

Penalty for Late Submissions

UNSW has a standard late submission penalty of:

- 5% per day,
- for all assessments where a penalty applies,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

Special Consideration

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: https://student.unsw.edu.au/special-consideration

Important note: UNSW has a "fit to sit/submit" rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so and cannot later apply for

Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.

Faculty-specific Information

Additional support for students

- The Current Students Gateway
- Student Support
- Academic Skills and Support
- Student Wellbeing, Health and Safety
- Equitable Learning Services
- UNSW IT Service Centre
- Science EDI Student Initiatives, Offerings and Guidelines