

# PHYS 7003 SPACE SCIENCE, PLANETARY SCIENCE AND METEOROLOGY

Legacy Code 301249

**Coordinator** Luke Barnes ([https://directory.westernsydney.edu.au/search/name/Luke Barnes/](https://directory.westernsydney.edu.au/search/name/Luke%20Barnes/))

## Student Contribution Band

Check your fees via the Fees ([https://www.westernsydney.edu.au/currentstudents/current\\_students/fees/](https://www.westernsydney.edu.au/currentstudents/current_students/fees/)) page.

## Restrictions

Students must be enrolled in a postgraduate program.

## Assumed Knowledge

Knowledge of Mathematics equivalent to 2-unit HSC, and experience with the use of computer software such as Excel or Word would be beneficial. Previous experience of statistics or computer programming will be an advantage but is not essential.

## Learning Outcomes

On successful completion of this subject, students should be able to:

1. Scientifically evaluate the overall structure of our cosmic habitat (Earth & its environment).
2. Assess and recommend appropriate solutions to basic problems in modern space physics regarding gravity and radiations including a direct implication of the Sun's future evolution.
3. Appraise the forces that shape the interior, surface and atmospheres of rocky and gaseous (extra) solar planets.
4. Apply integrated knowledge of a range of scientific inventories of the Solar System and the Earth's weather systems in physical terms
5. Assess the basics of modern space rocket design including the next generation of micro satellites.
6. Critique the challenges of launching and maintaining satellites in space.
7. Evaluate large scale climate changes on Earth and other types of planets.

## Subject Content

This subject will be organised around providing the necessary scientific background for the six priorities of the Australian Space Agency: communication, space debris monitoring, navigation and positioning, Earth observation, space technology research and development, and remote asset management.

-Introduction to Space Science

oMeasuring the night sky: telescopes, magnitudes and the celestial sphere

oOur cosmic habitat: planets, stars, galaxies and expanding space

oThe physics of space 1: gravity and orbits

oThe physics of space 2: radiation and plasmas

-The Sun

oStructure, nuclear reactions and energy transport

oSolar atmosphere and the solar wind

-The Solar System

oThe planets and their moons

oAsteroids, the heliosphere and the outer solar system

-Planetary Science

oInteriors: pressure, magnetism and heat in rocky and gaseous planets

oSurfaces: plate tectonics, oceans and impacts

oAtmospheres 1: structure and composition

oAtmospheres 2: Sources and transport of energy

-Meteorology

oFluids: temperature, pressure, density

oMoisture and cloud formation

oWeather systems: wind, precipitation and storms

-Getting into space: the physics of rockets

oSpacecraft Design and Fabrication

oLife Support for Human Spaceflight

oTrajectories and the atmosphere

oBasic rocket design: thrust and propellants

-Staying in space: the physics of satellites

oTrajectories and Orbits

oBasic satellite design 1: altitude control, stabilisation, thermal control and shielding

oBasic satellite design 2: detectors, antennae and communicating with Earth

## Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task	Mandatory
Case Study	2,000 words	40	N	Individual	N
Critical Review	Up to 1,500 words	30	N	Individual	N
Quiz	1 hour	30	N	Individual	N