



## UNSW Course Outline

# BEES6741 Astrobiology: Life in the Universe - 2024

Published on the 28 Aug 2024

## General Course Information

Course Code : BEES6741

Year : 2024

Term : Term 3

Teaching Period : T3

Is a multi-term course? : No

Faculty : Faculty of Science

Academic Unit : School of Biological, Earth and Environmental Sciences

Delivery Mode : Online

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Postgraduate, Undergraduate

Units of Credit : 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

Astrobiology studies life in the universe and chemistry, physics, biology and adaptations that influence its origin, evolution and destiny. It encompasses all the sciences, but this fully online third-level and postgraduate elective course focuses mainly on geosciences and microbiology.

The three assessments are interlinked, helping the student build expertise in understanding the challenge of one of our most profound questions: Are we alone in the universe? The first two utilise purpose-built laptop delivered immersive Virtual Field Trips to hot springs and early Earth while the final assessment is enabled with a NASA question and answer session.

The content is organised into a single Moodle e-book each week, each containing interlinked chapters with text, images, videos and other media. Through these electronic books and the approach to assessments, you will learn how life is strongly coupled with its environment and the implications for the search for life on other worlds – particularly Mars - in our solar system and beyond. You will learn how evidence of life can be found in the geological record on Earth 3.48 billion years ago, how the oxygenation of the Earth gave rise to complex life, how evolution is demonstrated, and why the search for evidence of extraterrestrial life – whether microbial or intelligent – is important to our understanding of our place in space.

Electronic book topics cover the origin of life and its philosophical implications, extremophiles, the Tree of Life, fossil records, the co-evolution of life and the planet, planetary and galactic habitable zones, searching for life on Mars and beyond, and more. Students from all science disciplines are encouraged to consider this course providing they have completed the equivalent of at least one full year of university science courses. Students without the necessary background can take BEES2741 Introduction to Astrobiology in Term 2 and follow it with BEES6741 in Term 3.

## Course Aims

The aim of this course is to engage students with the broadly interdisciplinary subject of astrobiology. The course activities will help students develop skills in interdisciplinary thinking and research. The course is designed to inspire students through the study of the origin of life, the possibility of life elsewhere in the solar system and beyond.

## Relationship to Other Courses

This is an elective course open to science students.

## Course Learning Outcomes

Course Learning Outcomes
CL01 : Develop scientific arguments by critically analysing and evaluating theories.
CL02 : Investigate, observe and evaluate potential habitable environments.
CL03 : Critically review and evaluate primary and secondary literature.
CL04 : Develop and apply an interdisciplinary approach to investigate a scientific question.

Course Learning Outcomes	Assessment Item
CLO1 : Develop scientific arguments by critically analysing and evaluating theories.	<ul style="list-style-type: none"> <li>• Mars video and hot springs Virtual Field Trip</li> <li>• Searching for life on Mars and beyond</li> </ul>
CLO2 : Investigate, observe and evaluate potential habitable environments.	<ul style="list-style-type: none"> <li>• Early Life Virtual Field Trip</li> <li>• Mars video and hot springs Virtual Field Trip</li> <li>• Searching for life on Mars and beyond</li> </ul>
CLO3 : Critically review and evaluate primary and secondary literature.	<ul style="list-style-type: none"> <li>• Early Life Virtual Field Trip</li> <li>• Searching for life on Mars and beyond</li> </ul>
CLO4 : Develop and apply an interdisciplinary approach to investigate a scientific question.	<ul style="list-style-type: none"> <li>• Mars video and hot springs Virtual Field Trip</li> <li>• Searching for life on Mars and beyond</li> </ul>

## Learning and Teaching Technologies

Moodle - Learning Management System | Zoom

## Learning and Teaching in this course

Astrobiology, like all science disciplines, is not a collection of facts but research at the cutting edge between what we know and what we do not know. In this course, students will learn to think like an astrobiologist through three assessments.

Two assessments are 360-degree immersive laptop Virtual Field Trips (VFTs) developed for the course using UNSW's Teach and Learning Immersive Authoring (TALIA) tool. Assessment 1 teaches observation and basic field skills in several New Zealand and Chile hot spring sites. Students collaborate in the assessment with astrobiology students at Georgia State University.

In the second VFT, students use the skills taught in Assessment 1 at ten sites in the Pilbara of Western Australia with the earliest, most convincing evidence of life on Earth. Students individually select the most compelling samples of the four-stage story of how life arose there. They create a hand-written field notebook that tracks their critical and reflective thinking about each site and the relationships in the rocks. Students then pair with another student to share notebooks and create a 3-4 minute video interpretation.

In the third assessment, students use the collective field skills taught to apply them to the geology of Jezero Crater on Mars and to evaluate the NASA Perseverance rover exploration of the crater and beyond.

There is no final exam. To pass the course, you must submit all assessments. You cannot submit

an assessment without completing the relevant modules. Expectations of assessments are at third year/postgraduate level.

## Additional Course Information

No additional information.

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
Mars video and hot springs Virtual Field Trip Assessment Format: Individual	25%	
Searching for life on Mars and beyond Assessment Format: Individual	45%	
Early Life Virtual Field Trip Assessment Format: Group	30%	

## Assessment Details

### Mars video and hot springs Virtual Field Trip

#### Assessment Overview

In Assignment 1 Part A (5%) you will watch a short video on Mars research and then summarise in a short report. Due in Week 2 with marks and feedback in Turnitin in Week 3.

In Part B (20%), you will make observations in a laptop-delivered Virtual Field Trip of two land-based hot spring environments comparing the differences and similarities to the two types of ocean-based hot springs. You will use course content to critically analyse how protocells and the emergence of life could have occurred at the same time in hot springs or other potential hot environments. Due in Week 3 with marks and feedback in Turnitin in Week 5.

#### Course Learning Outcomes

- CL01 : Develop scientific arguments by critically analysing and evaluating theories.
- CL02 : Investigate, observe and evaluate potential habitable environments.
- CL04 : Develop and apply an interdisciplinary approach to investigate a scientific question.

#### Generative AI Permission Level

#### Assistance with Attribution

This assessment requires you to write/create a first iteration of your submission yourself. You are then permitted to use generative AI tools, software or services to improve your submission in

the ways set out below.

Any output of generative AI tools, software or services that is used within your assessment must be attributed with full referencing.

If outputs of generative AI tools, software or services form part of your submission and are not appropriately attributed, your Convenor will determine whether the omission is significant. If so, you may be asked to explain your submission. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.

For more information on Generative AI and permitted use please see [here](#).

Responsible use of AI as a tutor is encouraged during the course.

## **Searching for life on Mars and beyond**

### **Assessment Overview**

You will use learning from Assignments 1 and 2, the content of the course, virtual fieldwork (VFTs will remain open) and a question-and-answer session with a NASA scientist to consider where possible evidence of past microbial life, including stromatolites, may be found in Jezero Crater and why. You will then critically evaluate the implications of finding life on Mars (or not) in considering the origin of life on Earth and the presence of life (or not) elsewhere in the universe. A 2,000-word report excluding references, headings, and captions. Due at the end of Week 10. Marks and feedback in Turnitin available when all grades are announced. The course has no final exam.

### **Course Learning Outcomes**

- CLO1 : Develop scientific arguments by critically analysing and evaluating theories.
- CLO2 : Investigate, observe and evaluate potential habitable environments.
- CLO3 : Critically review and evaluate primary and secondary literature.
- CLO4 : Develop and apply an interdisciplinary approach to investigate a scientific question.

### **Generative AI Permission Level**

#### **Assistance with Attribution**

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Responsible use of AI as a tutor is encouraged.

## **Early Life Virtual Field Trip**

### **Assessment Overview**

You will combine course content, relevant papers and the virtual fieldwork experience from assignment 1 to undertake virtual fieldwork in the Pilbara of Western Australia where we find the most convincing evidence of life on Earth 3.48 billion years ago. The fieldwork utilises a laptop-delivered interactive and immersive Virtual Field Trip (VFT).

A volcano arose from the sea and over 13 million years collapsed, creating the environment for life to thrive before sinking back into the sea. In Part A (15% individual mark) you will use a handwritten field notebook to visit ten sites to critically analyse picture samples, assessing which samples best reflect the 13-million-year event. Due in Week 5 with marks and feedback via Turnitin in Week 6.

In Part B (15% group shared mark) you will partner with other students (number in a group is determined by the convenor each year, but indicative size of a group is 1 to 2 other students). You will share notebooks and select from them the samples to use in a video reconstruction of how life arose and then died in the Pilbara 3.48 billion years ago. Due in Week 7 with marks and feedback via Turnitin in Week 9.

### **Course Learning Outcomes**

- CLO2 : Investigate, observe and evaluate potential habitable environments.
- CLO3 : Critically review and evaluate primary and secondary literature.

### **Generative AI Permission Level**

#### **Assistance with Attribution**

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For more information on Generative AI and permitted use please see [here](#).

Responsible use of AI as a tutor during the course is encouraged.

## General Assessment Information

This course is third-level/ postgraduate and has expectations in assessments appropriate for that level. Students should have a good grounding in science (at least 48 UoC). While you are not expected to have a geology background, it will be taught intensively as related to astrobiology in the first half of the course. The course is heavily oriented to early life on Earth and Mars geology. Students are expected to attend weekly online virtual classes or watch the recording if they cannot attend.

### Grading Basis

Standard

### Requirements to pass course

Students must complete the relevant module before submitting an assessment. All assessments must be submitted to pass the course.

## Course Schedule

### Attendance Requirements

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

### General Schedule Information

A course schedule is published in Moodle.

## Course Resources

### Prescribed Resources

A Leganto list supports student learning. Although almost all the reading is optional, it is

recommended.

## Recommended Resources

Access to a laptop that is loaded with UNSW's Office 365. The PowerPoint app must be downloaded to make a video in PowerPoint - the only way you can create a video for Assessment 2. No other program or AI tool is acceptable in this course.

## Additional Costs

No additional costs.

## Course Evaluation and Development

Student feedback is always considered. How that caused changes to be made in the course is reported in the section on student feedback in Moodle.

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Carol Oliver		401c, Floor 4, Building D26	0417477612	one-on-one consultations available throughout the course on request	Yes	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 Plagiarism

**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](#)