UNSW Course Outline

AERO9500 Space Systems Architectures and Orbits - 2024

Published on the 29 Aug 2024

General Course Information

Course Code : AERO9500
Year : 2024
Term : Term 3
Teaching Period : T3
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Mechanical and Manufacturing Engineering
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Undergraduate, Postgraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

This course gives an overview of satellite systems, describing their main applications and providing a detailed introduction into the principles of orbital mechanics. The course focuses on orbital mechanics, covering orbit description and analysis, perturbations, orbital manoeuvres,

interplanetary transfers and launch systems.

Course Aims

The course aims to furnish students with an understanding of the space segment of satellite and spacecraft systems, and their applications. Specific aims include:

1. Describe the history and current state of space flight.
2. Describe spacecraft orbits, for Keplerian orbits and their perturbations.
3. Describe and calculate common spacecraft manoeuvers and their associated fuel costs.
4. Describe and calculate the basics of rocket propulsion and spacecraft launch systems.
5. Describe and calculate the mechanics of interplanetary travel.
6. Demonstrate System Tool Kit software in satellite orbit

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Explain the main applications of satellites and the way affect our everyday lives.
CLO2 : Analyse spacecraft orbits and their perturbations, and recognise commonly employed satellite orbits.
CLO3 : Compute delta-V and fuel requirements for various orbital manoeuvres, interplanetary transfers, and launches.

Course Learning Outcomes	Assessment Item
CLO1 : Explain the main applications of satellites and the way affect our everyday lives.	• Assignments • Final exam • Mid-term Exam
CLO2 : Analyse spacecraft orbits and their perturbations, and recognise commonly employed satellite orbits.	• Assignments • Final exam • Mid-term Exam
CLO3 : Compute delta-V and fuel requirements for various orbital manoeuvres, interplanetary transfers, and launches.	• Assignments • Final exam

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Assignments Assessment Format: Individual	30%	Start Date: From W1 and onwards. Due Date: Fridays of W3 and W10, respectively.
Final exam Assessment Format: Individual	40%	Start Date: Not Applicable Due Date: Not Applicable
Mid-term Exam Assessment Format: Individual	30%	Start Date: Friday afternoon, W7 Due Date: Friday afternoon, W7

Assessment Details

Assignments

Assessment Overview

Assessment length: Approx 3 pages for the draft report and 20 pages for the final report

2 individual assignments:

1. Draft report
2. Final report

Assessment criteria

The draft report (5%) assesses course content from weeks 1 to 3 inclusive.

The final report (25%) assesses all course content.

Additional details

Assessment instructions and marking rubrics for the draft and final reports will be provided on Moodle.

Feedback will be provided for each of the marking criterion on Moodle.

Course Learning Outcomes

- CLO1 : Explain the main applications of satellites and the way affect our everyday lives.
- CLO2 : Analyse spacecraft orbits and their perturbations, and recognise commonly employed satellite orbits.
- CLO3 : Compute delta-V and fuel requirements for various orbital manoeuvres, interplanetary transfers, and launches.

Assessment Length

10 weeks.

Submission notes

Please submit a single PDF of your report meeting the page limit via Turnitin on the course Moodle page.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Generative AI Permission Level

Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.
If your Convenor has concerns that your submission contains passages of AI-generated text or media, you may be asked to account for your work. 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.

Please acknowledge the generative AI tool if you use it for simple editing your reports.

Final exam

Assessment Overview

Assessment length: 2 hours

This is an individual open book exam.

The final exam assesses all course content.

Course Learning Outcomes

- CLO1 : Explain the main applications of satellites and the way affect our everyday lives.
- CLO2 : Analyse spacecraft orbits and their perturbations, and recognise commonly employed satellite orbits.
- CLO3 : Compute delta-V and fuel requirements for various orbital manoeuvres, interplanetary transfers, and launches.

Assessment Length

2 hours

Submission notes

A PDF of your working solutions needs to be submitted to the course Moodle.

Assignment submission Turnitin type

This is not a Turnitin assignment

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
For more information on Generative AI and permitted use please see here.

Mid-term Exam

Assessment Overview

Assessment length: 2 hours

This is an individual open book exam. The exam will run as a quiz that features a combination of multiple-choice and numerical questions. For numerical questions, you will need to input an answer into the quiz and also upload your working to a separate submission box within 30 minutes of completing the quiz. Uploaded answers will be marked and returned with feedback

Assessment criteria

This exam assesses course content from weeks 1 to 5 inclusive.

Course Learning Outcomes

- CLO1 : Explain the main applications of satellites and the way affect our everyday lives.
- CLO2 : Analyse spacecraft orbits and their perturbations, and recognise commonly employed

satellite orbits.

Assessment Length

2 hours

Submission notes

A PDF of your working solutions needs to be submitted to the course Moodle.

Assignment submission Turnitin type

This is not a Turnitin assignment

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
For more information on Generative AI and permitted use please see here.

General Assessment Information

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
Convenor	Yang Yang					No	Yes

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published.

Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/ Moodle/LMS applies.

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School-specific Information

Short Extensions

Short extensions are not currently applicable to Mechanical and Manufacturing Engineering Courses.

Review of Results

If you believe that there has been a marking error, you can request a review of results. Review of results cannot be used to get feedback.

If you would like feedback for assessments, you are welcome to contact the course convenor directly.

Use of AI

The use of AI is prohibited unless explicitly permitted by the course convenor. Please respect this and be aware that penalties will apply when unauthorised use is detected, such as through Turnitin. If the use of generative AI, such as ChatGPT, is allowed in a specific assessment, they must be properly credited, and your submissions must be substantially your own work.

Final Exam in Exam Period

For courses with a centrally timetabled final exam, students must be available for the entire exam period from Mon-Sat until your exact exam date is confirmed.

School Contact Information

Location

UNSW Mechanical and Manufacturing Engineering

Ainsworth building J17, Level 1

Above Coffee on Campus

Hours

9:00–5:00pm, Monday–Friday*

*Closed on public holidays, School scheduled events and University Shutdown

Web

School of Mechanical and Manufacturing Engineering

Engineering Student Support Services

Engineering Industrial Training

UNSW Study Abroad and Exchange (for inbound students)

UNSW Future Students

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

(+61 2) 9385 4097 – School Office**

**Please note that the School Office will not know when/if your course convenor is on campus or available

Email

Engineering Student Support Services – current student enquiries

- e.g. enrolment, progression, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries

- e.g. admissions, fees, programs, credit transfer

School Office – School general office administration enquiries

- NB: the relevant teams listed above must be contacted for all student enquiries. The School will only be able to refer students on to the relevant team if contacted

Important Links

- Student Wellbeing
- Urgent Mental Health & Support
- Equitable Learning Services
- Faculty Transitional Arrangements for COVID-19
- Moodle
- Lab Access
- Computing Facilities
- Student Resources
- Course Outlines
- Makerspace
- UNSW Timetable
- UNSW Handbook