



UNSW Course Outline

ELEC9762 Space Mission Development - 2024

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General Course Information

Course Code : ELEC9762

Year : 2024

Term : Term 1

Teaching Period : T1

Is a multi-term course? : No

Faculty : Faculty of Engineering

Academic Unit : School of Electrical Engineering & Telecommunications

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Postgraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

This course examines the steps and issues involved in the development of satellite missions.

Topics covered include: mission definition and specification, moving from the mission to the functions, from the functions to the elementary units, system development plan, integration and

testing (from the units to the system), launch and in-orbit testing (IOT).

Course Aims

The course aims to give students an in-depth look at the process involved in defining and undertaking a space mission. Specific aims include:

1. Describe to students the process involved in defining a space mission.
2. Give students an understanding in deriving the mission specification
3. Explain to students how to go from the mission specifications to the system functions
4. Explain to students how to go from the functions to the elementary units: (specification, production)
5. Explain to students how to formulate a system development plan
6. Explain to students how to move from the elementary units to the system: assembly, integration and test on ground
7. Give students an understanding of the issues involved in the launch campaign and in-orbit testing (IOT)

Relationship to Other Courses

The Space Mission Development course is a core specialisation course within the Master of Engineering Science (Satellite Systems Engineering) program (ELECOS8338). This course can be taken in either the first or second year of the program, although it is intended (though not required) that this be taken early in the Satellite Systems Engineering Masters program. This course is also available as a Technical Elective in Electrical Engineering Undergraduate and Masters programs.

Pre-requisites and Assumed Knowledge

There are no prerequisite courses leading into this course, however it is expected that enrolling students will have completed a 4 year Bachelor's in Engineering and have prior undergraduate learning in Mechanics, Mathematics and Physics.

Following Courses

Although this course is not a pre-requisite for any other course, it is a core course of the ELECOS8338 program, and as such should ideally be undertaken in the first year of the program.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : List the steps involved in undertaking a space mission
CLO2 : Explain the process involved in obtaining the mission specifications
CLO3 : Discuss the issues involved in fleshing out the system design
CLO4 : Describe the issues involved in the launch campaign
CLO5 : Describe the in-orbit testing (IOT) of the satellite.

Course Learning Outcomes	Assessment Item
CLO1 : List the steps involved in undertaking a space mission	• Weekly Assessments
CLO2 : Explain the process involved in obtaining the mission specifications	• Assignment
CLO3 : Discuss the issues involved in fleshing out the system design	• Weekly Assessments
CLO4 : Describe the issues involved in the launch campaign	• Weekly Assessments
CLO5 : Describe the in-orbit testing (IOT) of the satellite.	• Final Exam

Learning and Teaching Technologies

Moodle - Learning Management System

Learning and Teaching in this course

Teaching Strategies

Delivery Mode

The is an online course. The course material for each week has three components:

1. The learning guide: A brief learning guide that introduces the topic for that week and provides a breakdown of the concepts to be learned.
2. The study material: this comprises lecture recordings, course notes, slides, and other recommended reference material.
3. The weekly assessment: The lesson for that week is concluded by an assessment task that is take on Moodle.

The course is intended to be taken as self-directed study. The course authority will administer

the course and provide support for the students when required.

Learning in this Course

As this is a self-directed course, you are expected to be diligent in your self-study and to complete all weekly tasks in order to maximise learning. In addition to the lecture notes/video, you should read relevant sections of the recommended text. Reading additional texts will further enhance your learning experience. Group learning is also encouraged. As this is an online course, group interaction will be facilitated using the Moodle discussion forum. You are highly encouraged to post questions and comments and to respond to questions and comments that others post. This interaction will be very beneficial to your learning experience.

Other Professional Outcomes

Engineers Australia, Professional Engineer Stage 1 Competencies

The course learning outcomes (CLOs) contribute to your development of EA competencies:

PE1: Knowledge and Skill Base

- PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals: CLOs 1, 2, 3, 4, 5
- PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing:
- PE1.3 In-depth understanding of specialist bodies of knowledge: CLOs 1, 2, 3, 4, 5
- PE1.4 Discernment of knowledge development and research directions: CLO 5
- PE1.5 Knowledge of engineering design practice: CLOs 1, 2, 3, 4

PE2: Engineering Application Ability

- PE2.1 Application of established engineering methods to complex problem solving: CLOs 1, 2, 3
- PE2.2 Fluent application of engineering techniques, tools and resources: CLOs 1, 2, 3, 4, 5
- PE2.3 Application of systematic engineering synthesis and design processes: CLOs 1, 2, 3, 4, 5
- PE2.3 Application of systematic engineering synthesis and design processes: CLOs 1, 2, 3, 4, 5
- PE2.4 Application of systematic approaches to the conduct and management of engineering projects:

PE3: Professional and Personal Attributes

- PE3.1 Ethical conduct and professional accountability
- PE3.2 Effective oral and written communication (professional and lay domains):
- PE3.3 Creative, innovative and pro-active demeanour

- PE3.4 Professional use and management of information: CLOs 2, 3, 4, 5
- PE3.5 Orderly management of self, and professional conduct:
- PE3.6 Effective team membership and team leadership:

Additional Course Information

Credits

This is a 6 UoC course and the expected workload is 15 hours per week throughout the 10 week term. The University defines a UoC as requiring 25 hours of total learning effort per semester, spread over lectures, tutorials, labs, and the student's own study time (see <https://my.unsw.edu.au/student/atoz/UnitsOfCredit.html>). Therefore, it is expected that 150 hours will be allocated to this course. This equates to about 15 hours per week over the 10 weeks of the course. As this is primarily a self-study course, most of this effort should be spent by students watching the lectures, reading the recommended supporting material, and doing the assessments.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Weekly Assessments Assessment Format: Individual	20%	
Assignment Assessment Format: Individual	30%	
Final Exam Assessment Format: Individual	50%	

Assessment Details

Weekly Assessments

Assessment Overview

Small progress checks that determine students comprehension of weekly lessons.

Course Learning Outcomes

- CLO1 : List the steps involved in undertaking a space mission
- CLO3 : Discuss the issues involved in fleshing out the system design
- CLO4 : Describe the issues involved in the launch campaign

Assignment

Course Learning Outcomes

- CLO2 : Explain the process involved in obtaining the mission specifications

Final Exam

Assessment Overview

Standard closed-book 2 hour written exam, comprising five compulsory questions.

Course Learning Outcomes

- CLO5 : Describe the in-orbit testing (IOT) of the satellite.

General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 12 February - 18 February	Module	Module 1 Start: <ul style="list-style-type: none">• Introduction to the space mission development• Key concepts of the space mission definition
Week 2 : 19 February - 25 February	Assessment	Module 1: <ul style="list-style-type: none">• Introduction to the space mission development• Key concepts of the space mission definition
Week 3 : 26 February - 3 March	Assessment	Module 1 Quiz
	Module	Module 2 Start: Overview of the main concepts of system engineering for a space mission
Week 4 : 4 March - 10 March	Module	Module 2: Overview of the main concepts of system engineering for a space mission
	Homework	Assignment Released (Due in Week 9)
Week 5 : 11 March - 17 March	Assessment	Module 2 Quiz
	Module	Module 3 Start: Defining a space mission: Functions, Specifications and Architectures
Week 6 : 18 March - 24 March	Other	Module 3: Defining a space mission: Functions, Specifications and Architectures
Week 7 : 25 March - 31 March	Assessment	Module 3 Quiz
	Module	Module 4 Start: Implementing the space mission <ul style="list-style-type: none">• From the functions to the elements• Process reviews
Week 8 : 1 April - 7 April	Assessment	Module 3 Quiz
	Module	Implementing the space mission <ul style="list-style-type: none">• From the functions to the elements• Process reviews
Week 9 : 8 April - 14 April	Assessment	Module 4 Quiz
	Assessment	Assignment due.
Week 10 : 15 April - 21 April	Other	TBC

Attendance Requirements

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

General Schedule Information

The schedule is designed to provide students with a plan to conduct their self-directed study in a timely and efficient manner. Sticking to the schedule will mean that students are moving at the appropriate pace to complete the program of study. The module assessment tasks need to be delivered on time.

Course Resources

Prescribed Resources

This is an online, self-directed course. The provided material includes:

1. Course Notes
2. Module study guides, including the reading schedule
3. Module Quizzes

Recommended Resources

Larson and Wertz, Space Mission Analysis and Design, Space Technology Library, Vol. 8, 1999.

Course Evaluation and Development

This course is subject to continual evaluation and improvement. Your feedback is very valuable and will be taken into consideration to enhance the course.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Elias Aboutanios		EEB 445	293855010		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 Plagiarism

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

General Conduct and Behaviour

Consideration and respect for the needs of your fellow students and teaching staff is an expectation. Conduct which unduly disrupts or interferes with a class is not acceptable and students may be asked to leave the class.

Use of AI for assessments

Your work must be your own. If you use AI in the writing of your assessment, you must acknowledge this and your submission must be substantially your own work. More information can be found on this [website](#).

Workplace Health & Safety (WHS)

WHS for students and staff is of utmost priority. Most courses involve laboratory work. You must follow the [rules about conduct in the laboratory](#). About COVID-19, advice can be found on this [website](#).

School Contact Information

Consultations: Lecturer consultation times will be advised during the first lecture. You are welcome to email the tutor or laboratory demonstrator, who can answer your questions on this course and can also provide you with consultation times. ALL email enquiries should be made from your student email address with ELEC/TELEXXXX in the subject line; otherwise they will not be answered.

Keeping Informed: Announcements may be made during classes, via email (to your student email address) and/or via online learning and teaching platforms – in this course, we will use Moodle <https://moodle.telt.unsw.edu.au/login/index.php>. Please note that you will be deemed to have received this information, so you should take careful note of all announcements.

Student Support Enquiries

For enrolment and progression enquiries please contact Student Services

Web

Electrical Engineering Homepage