ELEC9762

Space Mission Development

Term 1, 2023

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Elias Aboutanios	elias@unsw.edu.au		EEB 445	0293855010

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

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)

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

Course Details

Units of Credit 6

Summary of the Course

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

This course looks at the process involved in getting a mission from the proposal stage to the launch stage, including the test and evaluation processes. It will cover mission related aspects ranging from definition of the mission, through the mission specification and development to the launch and commissioning. 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).

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. List the steps involved in undertaking a space mission	PE1.1, PE1.3, PE1.5, PE1.6, PE2.1, PE2.2, PE2.3, PE2.4
2. Explain the process involved in obtaining the mission specifications	PE1.1, PE1.3, PE1.5, PE2.1, PE2.2, PE2.3, PE2.4, PE3.4
3. Discuss the issues involved in fleshing out the system design	PE1.1, PE1.3, PE1.5, PE2.1, PE2.2, PE2.3, PE2.4, PE3.4
4. Describe the issues involved in the launch campaign	PE1.1, PE1.3, PE1.5, PE2.2, PE2.3, PE2.4, PE3.4
5. Describe the in-orbit testing (IOT) of the satellite.	PE1.1, PE1.3, PE1.4, PE1.5, PE2.2, PE2.3, PE2.4, PE3.4

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.

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.

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.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Weekly Assessments	20%	Not Applicable	1, 3, 4
2. Assignment	30%	Not Applicable	2
3. Final Exam	50%	Not Applicable	5

Assessment 1: Weekly Assessments

The module assessment tasks are progress checks that permit you to gauge what you got out of the lessons and how well you understood the material. These are compulsory and must be taken by the deadline for each.

Assessment criteria

The assessment tasks are marked based on the degree of understanding you display. This is intended to give you feedback, thus enabling you to go back and strengthen your knowledge.

Assessment 2: Assignment

The assignment allows self-directed study leading to the solution of partly structured problems. The assignment will be released in week 4 and will be due by the end of week 10. Assignment submission will be through Moodle. Late reports will attract a penalty of 10% per day (including weekends).

Assessment criteria

Marks will be assigned according to how completely and correctly the problems have been addressed, the quality of the code written for the assignment (must be attached to the report), and the understanding
of the course material demonstrated by the report.

Assessment 3: Final Exam

This is an open book exam. Announcements on the exam logistics will be made later in the term.

Attendance Requirements

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

Course Schedule

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.

View class timetable

Timetable

Date	Type	Content
Week 1: 13 February - 17 February		
	Module	Module 1 1. Introduction to the space mission development 2. Key concepts of the space mission defintion
Week 2: 20 February - 24 February	Module	Module 1 1. Introduction to the space mission development 2. Key concepts of the space mission defintion
Week 3: 27 February - 3 March	Module	Conclude Module 1 Release Module 2: Overview of the main concepts of system engineering for a space mission
Week 4: 6 March - 10 March	Module	Module 2: Overview of the main concepts of system engineering for a space mission
Week 5: 13 March - 17 March	Module	Conclude Module 2 Release Module 3: Defining a space mission: Functions, Specifications and Architetures
Week 6: 20 March - 24 March	Module	Module 3: Defining a space mission: Functions, Specifications and Architetures
Week 7: 27 March - 31 March	Module	Conclude Module 3: Release Module 4: Implementing the space

		mission 1. From the functions to the elements 2. Process reviews
Week 8: 3 April - 7 April	Module	Module 4: Implementing the space mission 1. From the functions to the elements 2. Process reviews
Week 9: 10 April - 14 April	Module	Conclude Module 4
Week 10: 17 April - 21 April	Group Work	Case study

Academic Honesty and Plagiarism

Academic Honesty and Plagiarism

Plagiarism is the unacknowledged use of other people's work, including the copying of assignment works and laboratory results from other students. Plagiarism is considered a form of academic misconduct, and the University has very strict rules that include some severe penalties. For UNSW policies, penalties and information to help you avoid plagiarism, see https://student.unsw.edu.au/plagiarism. To find out if you understand plagiarism correctly, try this short quiz: https://student.unsw.edu.au/plagiarism-quiz.

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.

Academic Information

COVID19 - Important Health Related Notice

Your health and the health of those in your class is critically important. You must stay at home if you are sick or have been advised to self-isolate by NSW health or government authorities. **You will not be penalised for missing a face-to-face activity due to illness or a requirement to self-isolate**. We will work with you to ensure continuity of learning during your isolation and have plans in place for you to catch up on any content or learning activities you may miss. Where this might not be possible, an application for fee remission may be discussed.

If you are required to self-isolate and/or need emotional or financial support, please contact the Nucleus: Student Hub. If you are unable to complete an assessment, or attend a class with an attendance or participation requirement, please let your teacher know and apply for special consideration through the Special Consideration portal. To advise the University of a positive COVID-19 test result or if you suspect you have COVID-19 and are being tested, please fill in this form.

UNSW requires all staff and students to follow NSW Health advice. Any failure to act in accordance with that advice may amount to a breach of the Student Code of Conduct. Please refer to the Safe Return to Campus guide for students for more information on safe practices.

Dates to note

Important Dates available at: https://student.unsw.edu.au/dates

Student Responsibilities and Conduct

Students are expected to be familiar with and adhere to all UNSW policies (see https://student.unsw.edu.au/policy), and particular attention is drawn to the following:

Workload

It is expected that you will spend at least **15 hours per week** studying a 6 UoC course, from Week 1 until the final assessment, including both formal classes and *independent, self-directed study*. In periods where you need to complete assignments or prepare for examinations, the workload may be greater. Over-commitment has been a common source of failure for many students. You should take the required workload into account when planning how to balance study with employment and other activities.

Attendance

Regular and punctual attendance at all classes is expected. UNSW regulations state that if students attend less than 80% of scheduled classes they may be refused final assessment.

Work Health and Safety

UNSW policy requires each person to work safely and responsibly, in order to avoid personal injury and to protect the safety of others.

Special Consideration and Supplementary Examinations

You must submit all assignments and attend all examinations scheduled for your course. You can apply for special consideration when illness or other circumstances beyond your control interfere with an assessment performance. If you need to submit an application for special consideration for an exam or assessment, you must submit the application **prior to the start** of the exam or before the assessment is submitted, except where illness or misadventure prevent you from doing so. Be aware of the "fit to sit/submit" rule which means that if you sit an exam or submit an assignment, you are declaring yourself well enough to do so and cannot later apply for Special Consideration. For more information and how to apply, see https://student.unsw.edu.au/special-consideration.

Administrative Matters

On issues and procedures regarding such matters as special needs, equity and diversity, occupational health and safety, enrolment, rights, and general expectations of students, please refer to the School and UNSW policies:

https://student.unsw.edu.au/guide

https://www.unsw.edu.au/engineering/our-schools/electrical-engineering-telecommunications/student-life/resources

Disclaimer

This Course Outline sets out 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 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 (as updated in Moodle), the description in the Course Outline/Moodle applies.

Image Credit

N/A

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	✓
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	✓
PE2.3 Application of systematic engineering synthesis and design processes	✓
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	✓
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in professional and lay domains	
PE3.3 Creative, innovative and pro-active demeanour	
PE3.4 Professional use and management of information	✓
PE3.5 Orderly management of self, and professional conduct	
PE3.6 Effective team membership and team leadership	