



THE UNIVERSITY OF
NEW SOUTH WALES

The School of Electrical Engineering and Telecommunications

ELEC9762

Space Mission Development

Barnaby Osborne

Course Outline

Session 1, 2015

Course Staff

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Class Times and Locations

Delivery of this module will be by scheduled reading and formative activities (available on the course moodle page), with the formal lectures will be delivered in a 4 day block mode mid-semester (teaching week 8). Class times during the formal lectures will be from 9:00am to 5:00pm daily.

Monday	09:00-16:00:	Lecture	Place TBD
Tuesday	09:00-16:00:	Lecture	Place TBD
Wednesday	09:00-16:00	Lecture	Place TBD
Thursday	09:00-16:00	Lecture	Place TBD

*For the map references of the classroom locations see the Campus Map at:
<http://www.facilities.unsw.edu.au/Maps/pdf/kensington.pdf>.

Consultation

The lectures are the primary avenues of contact between the teaching staff and the students. The consultations are not meant to replace these, but to allow the students to raise concerns (or ask questions) they might have with the lecturer in charge should the standard contact channels prove inadequate. Consultations can be arranged by appointment. Students should contact the lecturer by email with the question and if an answer cannot be provided by email, an appointment will be made. Please ensure that your emails are always sent to 4123_admin@ee.unsw.edu.au. Any changes to this arrangement will announced on the subject website, through a broadcast email on 4123@ee.unsw.edu.au, and during the classes.

Course Information

Course Load and Weight

This course is worth 6 units of credit (UoC).

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. For a Master's course, the only expected formal contact hours are the lectures, which accounts for about 32-40 hours out of this total. The students should then allocate around 110 hours of additional private hours to the subject over the semester.

Description and 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)

Relationship of the Course to the Program and Other Courses

The Space Mission Development course is a Core Specialisation Course within the Masters of Engineering Science *Extended* - Satellite Systems Engineering program (ELECSS 8539). It is a recommended elective which 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.

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.

Teaching Methods

The material of this course will be presented through a combination of lectures and in class tutorials. The lectures will focus on the presentation of the core content of the course. The fundamental principles of and the specific system implementation cases will be illustrated with examples, demonstrations and simulations. Attendance at the lectures is compulsory, and moreover students are expected to prepare for the lecture in advance, as the sections of the textbook or lecture notes to be read will be available prior to each lecture. The lecture slides will take a different perspective from these written notes, and both the lecture notes and lecture overheads together constitute examinable material.

There will also be a 50-minute in-class test during the semester. There will be no formal tutorial or laboratory sessions in this course.

Please note that classes start exactly on the hour. During a three hour sessions there will normally be a ten-minute break.

Learning Outcomes

Graduate Attributes

There are three graduate attributes that are met by this course:

1. An in-depth engagement with the relevant disciplinary knowledge in its interdisciplinary context
2. The capacity for analytical and critical thinking and for creative problem-solving
3. The ability to engage in independent and reflective learning

Learning Outcomes

At the end of the course there are five key learning outcomes from this course. These are listed along with their relationships to the graduate attributes in the below table:

Learning outcome	Graduate Attribute		
	1	2	3
List the steps involved in undertaking a space mission	✓	✓	✓
Explain the process involved in obtaining the mission specifications	✓	✓	✓
Discuss the issues involved in fleshing out the system design	✓	✓	✓
Describe the issues involved in the launch campaign	✓	✓	✓
Describe the in-orbit testing (IOT) of the satellite.	✓	✓	✓

Assessment

Assessment will be by:

- Examination 40%
- Assignment 50%
- Mid-Semester Test 10%

The mid-semester test will be set based on the pre-reading exercises on moodle.

The assignment will be an individual essay due at the end of the semester and will draw from all the presented material in the course. An assignment description will be available on moodle shortly after the beginning of the course.

The exam will take place during the exam period at the end of semester. It will be a 2hr exam and draw from any aspect of the handouts, taught and on-line material.

It is not a requirement that each element of assessment are passed in order to pass the module.

Resources

Lecture notes have been prepared and will be available to students that cover the core content of the course. Additionally a detailed case study of the mission development of the Cassini/Huygens mission is also provided that will be referred to during the course. You will be told which sections of the text and/or handouts to read before each class so that you are prepared for the subject material and can ask questions about any topics that you are unsure about. You are recommended to take your own notes or annotate your own copy of the lecture notes or handouts.

Course Schedule

The week by week schedule of topics covered in this course, along with the intended in-course assessment is given in the below:

Day	Topic	Hours
1	Introduction to the Module	0.5
	Space Mission Definition	2
	Mission Development Tools	3
	Group Activity	2.5
2	Specifying the Mission	8
3	Specification to Functions	2
	Functions to Elementary Units	6
4	Transitioning to Implementation	6
	Huygens Case Study	2

Plagiarism

The University takes plagiarism very seriously and those committing this act are dealt with strictly. According to the University website, “*Plagiarism is taking the ideas or words of others and passing them off as your own. Plagiarism is a type of intellectual theft. Plagiarism can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. Plagiarism can have serious consequences...*”

In addition to being dishonest and unethical, plagiarism severely hinders the learning process of the person engaging in it. For more information please refer to the UNSW Plagiarism Policy at <http://www.lc.unsw.edu.au/plagiarism/>.

Continual Course Improvement

This course is under constant revision in order to improve the learning outcomes for the students. Any constructive feedback would be greatly appreciated and can be communicated to the lecturer in charge. Also we encourage the students, at the end of the semester, to provide us with their feedback (positive or negative) on the course and their experience of it via the Course and Teaching Evaluation and Improvement Process.

Administrative Matters

For information 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's policies and procedures at <http://scoff.ee.unsw.edu.au/>.