ELEC9765
Space Law and Radio Regulations

Course Outline – Term 3, 2020

Never Stand Still | Faculty of Engineering | School of Electrical Engineering and Telecommunications

Course Staff

Course Convener: A/Prof. Elias Aboutanios EEB445 elias@unsw.edu.au

Consultations: You are encouraged to ask questions on the course material. The primary avenue for asking questions are the discussion forums on Moodle. These should be used at ALL times unless the question is sensitive and must be asked in private. When emailing the lecturer, ALL email enquiries should be made from your UNSW student email address and must include ELEC9765 in the subject line, otherwise they will not be answered. Lecturer consultation times will be be set if needed. These will be announced on Moodle.

Keeping Informed: In this course, Moodle will be the principal medium for announcements and information sharing and it will be your responsibility to continually and consistently check the course webpage to stay informed. Note that you will be deemed to have received the information once it is posted on Moodle. So you should take careful note of all announcements.

Important 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. Current alerts and a list of hotspots can be found here. 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.

Course Summary

Contact Hours

This is an online course. The nominal timetabled course classes, which are included below for completeness, will only be used if deemed necessary. In this case, appropriate announcements will be made ahead of time.

	Days	Time	Location
Lectures	Tuesday	6-9pm	Online

Context and Aims

This course belongs to the Masters Program: ELECTS8338 - Masters of Engineering Science Extension in Space Systems Engineering. The masters provides a comprehensive grounding in space systems engineering including an understanding of space systems and their components, the engineering processes involved in successfully carrying out space missions, and the legal aspects that govern space activities. It is in this context that Space Law and Radio Regulations fits.

Space is a realm for humankind and human space activities transcend national boundaries. Hence there is a need for space regulation to be implemented at both international and national levels. This unique and exciting course gives engineering students seeking a future in the space industry a solid grounding in space law and radio regulations. The course starts with an introduction to legal frameworks and the formulation of laws. It then covers the international treaties that comprise the international regulatory framework for space activities, leading to the study of national legislative systems with a focus on the Australian Space Activities Act. As a course of space law for engineers, a unique feature of the course is that the various engineering, environmental, and regulatory implications of these legal systems to space systems engineering and space activities will be discussed. The course will therefore include a treatment of the interaction between the relevant laws on the one hand, and the engineering and technology on the other.

In this course you will:

- Learn about the fundamental legal frameworks and how they are developed.
- Learn about the historical context of space law and the International Space Treaties governing human space activities.
- Describe the specific 'hard' and 'soft' law principles that have been developed for the regulation of activities in outer space, as well as the unique complexities inherent in designing regulatory principles and guidelines for the space environment.
- Learn about national space legislations and in particular the Australian space legal framework.
- Learn about the radio regulations frameworks and their application to space systems.
- Learn about the environmental aspects of space law (e.g. space debris).
- Learn about the implications of space law to engineering decisions of space systems.
- Learn about the interaction of technology and space law (how each impacts the other).
- Take a look at the future of Space from a legislative perspective (e.g. cubesats, space tourism...).

Course Organisation

This trimester is the first time that the course is offered in an entirely online mode. Therefore, the course organisation may be subject to some tweaks in order to optimise the delivery of the material. Such tweaks will be announced and justified.

The course comprises four modules that span the trimester. These, along with the weeks they occupy are given in the table below:

Weeks	Module	Indicative Topic Breakdown
1-3	Introduction to International and Space Law	• Introduction to International Law • Historical development of space law • International legal framework of space
4,5	Applications of Space Law	• Space Sustainability: Environmental aspects of space activities • Commercial uses of outer space • Remote Sensing • Navigation • Military uses of outer space
6,7	National Space Legislations	• Relationship between international and national laws • Relationship between international and national space laws • History of Australia's space activities • Overview of Australia's Space Laws
8-10	Interaction between Space Law and Technology	• The Impact of Space Law on Engineering Decisions • The impact of Engineering and Technology on Space Law • Recent developments and emerging challenges • Space Law and the Future

Assessment

Module Exercises	30%
Assignment	25%
Final Exam (2 hours)	45 %

Course Details

Credits

This is a 6 UoC course and the expected workload is 10–12 hours per week throughout the 10 week trrimester. The University defines a UoC as requiring 25 hours of total learning effort per trimester (spread over lectures, tutorials, labs, and the student's own study time.) Therefore, it is expected that 150 hours will be allocated to this course.

Relationship to Other Courses

This is a masters course that forms part of the ELECOS8338 Satellite Systems Engineering Stream. It is also available to Undergraduate students as a substitution for an L4 elective (subject to approval by the Course and Program Authorities).

Pre-requisites and Assumed Knowledge

There is no assumed knowledge for this course.

Following Courses

Although this course is an integral part of the ELECOS8338 stream, and is recommended to be taken in the first semester of the degree, it is not a pre-requisite for any of the other courses.

Learning outcomes

After successful completion of this course, you should be able to:

1. Describe the legal systems governing space activities.
2. Describe the radio regulations of space activities.
3. Describe the treaties on the use of outer space and their implications for the nations that are signatory to them.
4. Explain the need for national space legislation and describe the Australian Space Activities Act.
5. Describe the legal processes that engineers carrying out space missions have to navigate.
6. Describe the various uses of outer space, the engineering decisions involved, and the legal principles that govern them.

This course is designed to provide the above learning outcomes which arise from targeted graduate capabilities listed in Appendix A. The targeted graduate capabilities broadly support the UNSW and Faculty of Engineering graduate capabilities (listed in Appendix B). This course also addresses the Engineers Australia (National Accreditation Body) Stage I competency standard as outlined in Appendix C.

Teaching Strategies

Delivery Mode

The delivery of material in this course will be primarily via Moodle (reading material), forum discussions, and the targeted assessment. This is not a standard technical subject, and as such it cannot be taught in the standard lecture delivery format. Instead, reading material will be given and should be read by the students. Laws are subject to interpretation and although there often is a generally accepted or dominant interpretation, legal opinions can vary. Therefore, the research and discussions are essential in this course. It is extremely important that students do their readings and preparation and engage in the learning activities.

As detailed in the table above, the course comprises 4 modules covering the major areas that will be learned. This subject is aimed at giving engineers a grounding in space law in order to empower them to better and more efficiently carry out space missions. As such, the topics start with an introduction to international law, moving through the framework and applications of space law and finally finishing with interaction between space law and technology. This last aspect is a key element of the course as we discuss the impact of space law on engineering decisions and on the way space missions are undertaken.

Each module comprises a number of topics. The following will be provided for each module:

- Study guide: A study guide that gives the topic breakdown will be provided. This study guide effectively lists subtopics, ideas, concepts, words, and items that are to be researched and studied.
- A reading guide: Suggested readings will be given for each module. These readings may be chapters of books, papers, articles, websites, videos, etc... Whenever possible, the article will be posted. But in general, you are expected to be able to source them from relevant databases. The readings are provided as a starting point and you are expected to do your own research beyond the suggested materials. Note that whenever a reading is marked as required, you are expected to complete that reading.

- Module Exercise: Each module will conclude with an exercise that is assessable. The test is to be completed on Moodle before the deadline. Each test will be marked out of 10.

Learning in this Course

You are expected to read the material given and research the topics listed in order to answer the questions given for each topic. Reading additional texts will further enhance your learning experience. Group learning is also encouraged. UNSW assumes that self-directed study of this kind is undertaken. Furthermore, you are highly encouraged to actively engage in discussions on the forum. This medium is very useful and highly effective for your learning.

Assessment

The assessment scheme in this course reflects the intention to assess your learning progress through the semester. The assessment is implemented in the form of the module exercises, one assignment, and a final exam.

Module Exercises

The module exercises have been explained in the previous section. The primary purpose of these exercises is not to assess you, but to achieve the following goals:

1. to ensure you actively engage in your learning,
2. to allow you to test your learning for each module, and
3. to provide opportunities for you to get feedback on your learning.

Assignment

The assignment allows self-directed study leading to the solution of partly structured problems. Marks will be assigned according to how completely and correctly the questions have been answered, and the understanding of the course material demonstrated by the report.

The assignment will be posted on Moodle in week 4 and is due in week 10. Submission will be done via Moodle. Late reports will attract a penalty of 10% per day (including weekends).

Final Exam

The exam in this course is a standard two-hour open-book examination. University approved calculators are allowed. The examination tests critical thinking and general understanding of the course material in a controlled fashion. Questions may be drawn from any any material delivered during the course, unless specifically indicated otherwise by the lecturer. Marks will be assigned according to the correctness of the responses. Please note that you must pass the final exam in order to pass the course.

Relationship of Assessment Methods to Learning Outcomes

	Learning Outcomes						
Assessment	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Laboratory practical assessments	✓		✓				
Lab exam				✓			
Mid-semester exam		✓					✓
Assignment						✓	
Final exam					✓		

Course Resources

Textbooks

This course does not have a prescribed textbook and relevant reading from any source is encouraged. However, recommended text include (but are not limited to) the list below. Additional reference material may be posted on Moodle

Reference books

- Diederiks-Verscoor and Kopal, An Introduction to Space Law, Wolters Kluwer, 2008
- Lyall and Larsen, Space Law: A Treatise, Ashgate Publishing, 2009
- Jakhu, National Regulation of Space Activities, Springer, 2010

On-line resources

Moodle

As a part of the teaching component, Moodle will be used to disseminate teaching materials, host forums and occasionally quizzes. Assessment marks will also be made available via Moodle: https://moodle.telt.unsw.edu.au/login/index.php.

Mailing list

Announcements concerning course information will be given in the lectures and/or on Moodle and/or via email (which will be sent to your student email address).

Other Matters

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.

Student Responsibilities and Conduct

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

Workload

It is expected that you will spend at least **ten to twelve hours per week** studying a 6 UoC course, from Week 1 until the final assessment, including both face-to-face classes and independent, self-directed study. In periods where you need to 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.

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.

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 should seek assistance early if you suffer illness or misadventure which affects your course progress. All applications for special consideration must be **lodged online through myUNSW within 3 working days of the assessment**, not to course or school staff. For more detail, consult: https://student.unsw.edu.au/special-consideration.

Continual Course Improvement

This course is under constant revision in order to improve the learning outcomes for all students. Please forward any feedback (positive or negative) on the course to the course convener or via the Course and Teaching Evaluation and Improvement Process. You can also provide feedback to ELSOC who will raise your concerns at student focus group meetings. As a result of previous feedback obtained for this course and in our efforts to provide a rich and meaningful learning experience, we have continued to evaluate and modify our delivery and assessment methods.

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:
http://www.engineering.unsw.edu.au/electrical-engineering/policies-and-procedures
https://my.unsw.edu.au/student/atoz/ABC.html

Appendices

Appendix A: Targeted Graduate Capabilities

Electrical Engineering and Telecommunications programs are designed to address the following targeted capabilities which were developed by the school in conjunction with the requirements of professional and industry bodies:

- The ability to apply knowledge of basic science and fundamental technologies;
- The skills to communicate effectively, not only with engineers but also with the wider community;
- The capability to undertake challenging analysis and design problems and find optimal solutions;
- Expertise in decomposing a problem into its constituent parts, and in defining the scope of each part;
- A working knowledge of how to locate required information and use information resources to their maximum advantage;
- Proficiency in developing and implementing project plans, investigating alternative solutions, and critically evaluating differing strategies;
- An understanding of the social, cultural and global responsibilities of the professional engineer;
- The ability to work effectively as an individual or in a team;
- An understanding of professional and ethical responsibilities;
- The ability to engage in lifelong independent and reflective learning.

Appendix B: UNSW Graduate Capabilities

The course delivery methods and course content directly or indirectly addresses a number of core UNSW graduate capabilities, as follows:

- Developing scholars who have a deep understanding of their discipline, through lectures and solution of analytical problems in tutorials and assessed by assignments and written examinations.
- Developing rigorous analysis, critique, and reflection, and ability to apply knowledge and skills to solving problems. These will be achieved by the laboratory experiments and interactive checkpoint assessments and lab exams during the labs.
- Developing digital and information literacy and lifelong learning skills through assignment work.
- Developing independent, self-directed professionals who are enterprising, innovative, creative and responsive to change, through challenging design and project tasks.
- Developing citizens who can apply their discipline in other contexts, are culturally aware and environmentally responsible, through interdisciplinary tasks, seminars and group activities.

Appendix C: Engineers Australia (EA) Professional Engineer Competency Standard

	Program Intended Learning Outcomes	
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals	✓
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing	✓
	PE1.3 In-depth understanding of specialist bodies of knowledge	✓
	PE1.4 Discernment of knowledge development and research directions	
	PE1.5 Knowledge of engineering design practice	✓
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice	
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex 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	✓
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	✓
	PE3.5 Orderly management of self, and professional conduct	
	PE3.6 Effective team membership and team leadership	✓