



# ELEC 4445 / GSOE 9445 Entrepreneurial Engineering

## COURSE STAFF

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**Consultations:** You are encouraged to ask questions on the course material, after the lecture class times in the first instance, rather than via email. Lecturer consultation times will be advised during lectures.

**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.

## COURSE SUMMARY

### Contact Hours

The course consists of 2 hours of lectures per week, and 2 hours of tutorial sessions or guest lectures taking place on:

	Day	Time	Location
<b>Lectures</b>	Thursday	14:00-16:00	Mathews Theatre B
<b>Tutorials / guests</b>	Wednesday	16:00–18:00	Mathews Theatre B

### Context and Aims

This course was developed by the School of Electrical Engineering and Telecommunications to provide an introduction to business creation and its associated entrepreneurial process. It is intended mainly for 4<sup>th</sup> year EE&T students but is open to all engineering students. The course assumes no specific business knowledge and focuses on the creation of high-tech ventures related to engineering.

### Indicative Lecture Schedule

Period	Summary of Lecture Program
Week 1	Course introduction
Week 2	The entrepreneurial process + Guest lecture 1
Week 3	Opportunities Recognising and screening + Guest lecture 2
Week 4	The entrepreneur and the internet + Tutorial 1
Week 5	Venture team and resource requirements + Mid-term exam + Guest lecture 3
Week 6	Obtaining venture and growth capital + Guest lecture 4
Week 7	Disruption + Guest lecture 5

Week 8	Entrepreneurial finance + Guest lecture 6
Week 9	The Deal: valuation, structure and negotiation + Guest lecture 7
Week 10	Rapid growth and troubled times + The destination

## Assessment

Mid-Trimester Exam	25%
Assignments	35%
Final Exam (2 hours)	40%

**Final Examination (40%):** 2 hour closed-book exam covering lectures, tutorials and guest presentations. University approved calculators are allowed. The examination tests analytical and critical thinking and general understanding of the course material in a controlled fashion. Questions may be drawn from any aspect of the course. Marks will be assigned according to the correctness of the responses.

**Quiz (25%):** 1 hour examination to be held nominally during week 7 covering lectures, tutorials and guest presentations (exact date to be confirmed). The quiz tests your general understanding of the course material, and is designed to give you feedback on your progress through the analytical components of the course. Questions may be drawn from any course material up to the end of week 6. Marks will be assigned according to the correctness of the responses.

**Assignments:** 3 assignments to be done in groups of three to four people. Assignment 1 (5%) consists in conducting an interview with an entrepreneur (due date: week 4). Assignment 2 (10%) is in the form of an essay on a chosen high-tech business issue that links to the concept view in class (due date: week 7). Assignment 3 (20%) consists in developing a disruption analysis based on new technologies or business models (due date: week 11). Marks will be assigned according to how completely and correctly the problems have been addressed, the quality of the written material, and the understanding of the course material demonstrated. **Late reports will attract a penalty of 10% per day (including weekends).**

## COURSE DETAILS

### Credits

This is a 6 UoC course and the expected workload is 15 hours per week throughout the 10-week term.

### Relationship to Other Courses

Perhaps the most relevant related course is the 4th year thesis project as it can be used as the basis for the development of a hypothetical business plan during the course of the trimester.

### Pre-requisites and Assumed Knowledge

Although the course has no specific prerequisites, it is assumed that the students are familiar with the basic mathematics required for corporate finance (basic calculus).

### Following Courses

The course is no a prerequisite for any specific course.

### Learning outcomes

After successfully completing this course, students will be expected to:

1. Understand what is involved in starting up a high-tech business in an Australian context, the involved risks and the potential rewards;
2. Understand the role of entrepreneurship in today's society;
3. Understand the entrepreneurial process i.e. the analysis, control and exploitation of business opportunities and available resources;
4. Understand to role of IP and the various mechanism securing its exclusive usage;
5. Understand the various mechanisms for raising capital;
6. Understand the roles of engineers in an entrepreneurial context;
7. Understand alternative career possibilities offered in the context of entrepreneurship and commercialisation of intellectual property.

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**.

### Syllabus

Course introduction: the entrepreneurial revolution; the entrepreneurial process; opportunities recognizing and screening; entrepreneur and the internet; entrepreneur; obtaining venture and growth capital; resource requirements; disruption; entrepreneurial finance; rapid growth and troubled times; harvesting the wealth.

## TEACHING STRATEGIES

**Delivery Mode**The course consists of the following elements: lectures, tutorials and guest lectures:

**Lectures:** The lectures will introduce the basis concepts of entrepreneurial engineering.

**Tutorials:** The tutorials will covers the more technical aspects of the course, namely corporate finance at an introductory level. They will also serve as guiding sessions for the development of the assignments.

**Guest lectures:** They will provide the student with insights into the entrepreneurial process from industry participants ranging from Venture Capitalist, past- and current-entrepreneurs, young graduates involves in startup, CTOs of technology related companies, etc.

## Learning in this course

You are expected to attend all lectures, tutorials, labs, and mid-trimester exams 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. UNSW *assumes* that self-directed study of this kind is undertaken in addition to attending face-to-face classes throughout the course.

## Tutorial classes

You should attempt all of your problem sheet questions in advance of attending the tutorial classes. The importance of adequate preparation prior to each tutorial cannot be overemphasized, as the effectiveness and usefulness of the tutorial depends to a large extent on this preparation. Group learning is encouraged. Answers for these questions will be discussed during the tutorial class and the tutor will cover the more complex questions in the tutorial class. In addition, during the tutorial class, 1-2 new questions that are not in your notes may be provided by the tutor, for you to try in class.

## ASSESSMENT

Assessment is based three assignments, one intra-trimester quiz and one final examination.

**Final Examination (40%):** 2 hour closed-book exam covering lectures, tutorials and guest presentations. University approved calculators are allowed. The examination tests analytical and critical thinking and general understanding of the course material in a controlled fashion. Questions may be drawn from any aspect of the course. Marks will be assigned according to the correctness of the responses.

**Quiz (25%):** 1 hour examination to be held nominally during week 7 covering lectures, tutorials and guest presentations (exact date to be confirmed). The quiz tests your general understanding of the course material, and is designed to give you feedback on your progress through the analytical components of the course. Questions may be drawn from any course material up to the end of week 6. Marks will be assigned according to the correctness of the responses.

**Assignments:** 3 assignments to be done in groups of three to four people. Assignment 1 (5%) consists in conducting an interview with an entrepreneur (due date: week 6). Assignment 2 (5%) is in the form of an essay on a chosen high-tech business issue that links to the concept view in class (due date: week 9). Assignment 3 (25%) consists in developing a disruption analysis based on new technologies or business models (due date: week 13). Marks will be assigned according to how completely and correctly the problems have been addressed, the quality of the written material, and the understanding of the course material demonstrated. ***Late reports will attract a penalty of 10% per day (including weekends).***

## Relationship of Assessment Methods to Learning Outcomes

Assessment	Learning outcomes						
	1	2	3	4	5	6	7
Assignments	✓	✓	✓		✓	✓	✓
Mid-trimester exam			✓	✓			
Final exam			✓	✓			

## COURSE RESOURCES

### Textbooks

Extensive lecture notes covering both the standard lectures and guest lecturers' material will be distributed in class and also made available online through Blackboard 9. Nevertheless the following reference material is recommended:

1. New Venture Creation – Entrepreneurship for the 21st Century, 6th Edition, J.A. Timmons and S. Spinelli, McGraw-Hill Irwin, 2004.
2. Introduction to corporate finance, A. Frino, T. Cusack, K. Wilson, Prentice-Hall, 2001.

### 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

### Dates to note

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

### 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://student.unsw.edu.au/guide>), 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 face-to-face 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.

#### 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 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>.

## 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 online student survey myExperience. 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: <https://student.unsw.edu.au/guide>  
<https://www.engineering.unsw.edu.au/electrical-engineering/resources>

# 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 capable independent and collaborative enquiry, through a series of tutorials spanning the duration of the course.
- Developing ethical practitioners who are collaborative and effective team workers, through group activities, seminars and tutorials.
- 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	
<b>PE1: Knowledge and Skill Base</b>	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	
<b>PE2: Engineering Application Ability</b>	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	✓
<b>PE3: Professional and Personal Attributes</b>	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	✓