



# Course Outline

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**MECH**

**COMPOSITE MATERIALS AND MECHANICS**



# 1. Staff Contact Details

## Contact Hours

	Day	Time	Location
Lectures	Wednesday	1pm - 3pm	J17 Ainsworth G02 (weeks 1 – 12)

## Aims of the Course

On successful completion of this course, students should be able to; (a) Understand the use of fibre-reinforced composites in structural applications, and (b) Develop a basic understanding of the use of composite materials, micromechanics of layered composites, analysis and design of composite structures and failure analysis of laminated panels.

## How this course is related to other courses and relevant professional standards

Composite Materials and Mechanics takes the themes of the fundamentals of material science and engineering and applies them in an engineering context.

The objective of this course is to develop a solid understanding of the properties of composite materials, micromechanics and lamination theory, together with the analysis and manufacture of lightweight composite structures in a unified and integrated manner for an undergraduate/graduate student. These are fundamental to mechanical, civil and material science engineering and related programs such as mechatronic engineering, naval architecture, aerospace engineering and biomedical engineering as well as manufacturing and industrial design.

## Student Learning Outcomes

This course is designed to address the below learning outcomes and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

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

Learning Outcome		EA Stage 1 Competencies
1.	Recognize the fundamentals of orthotropic materials and mechanics of materials	PE1.1, 1.2
2.	Demonstrate the fundamentals of directional stresses and strains.	PE1.3
3.	Develops a solid understanding in the properties of composite materials.	PE1.3
4.	Develops an understanding of micromechanics and lamination theory together with the analysis and manufacture of lightweight composite structures in a unified and integrated manner	PE1.3

### 3. Teaching strategies

Co ponent	Act v t es
Lectures	<ul style="list-style-type: none"><li>• Find out what you must learn.</li><li>• See methods that are not in the textbook.</li><li>• Follow worked examples.</li><li>• Hear announcements on course changes.</li></ul>
Laboratory/Problem solving class	<ul style="list-style-type: none"><li>• Be guided by course notes and demonstrators.</li><li>• Ask questions.</li><li>• Do problems, as set out in the course notes.</li><li>• Work with colleagues.</li></ul>
Private study (including Moodle)	<ul style="list-style-type: none"><li>• Review lecture material and textbook.</li><li>• Do set problems and assignments.</li><li>• Discuss with fellow students.</li><li>• Join Moodle discussions of problems.</li><li>• Download materials from Moodle.</li><li>• Keep up with notices and find out marks via Moodle.</li></ul>
Assessments (assignments, laboratories and final exam)	<ul style="list-style-type: none"><li>• Demonstrate your basic knowledge and skills.</li><li>• Learn from feedback.</li><li>• Demonstrate higher understanding and problem solving.</li></ul>

## 4. Course schedule

Composites Materials Mechanics and Manufacturing		
Wk	Lecture (2 hr) – Wed 13:00-15:00	Problem Solving Class/Laboratory (2 hr) – Fri 09:00-11:00
1	Introduction to Composite Materials	
2	Processing of fibre reinforced composites (DL)	-Lab tour -WHS/RM forms organized
3	Processing of fibre reinforced composites (DL)	-Explanation of materials and demonstration of equipment. <i>A n n a r o n o n</i> <i>o p o a r a a p a o n r a n o g r</i> <i>r p r a D o n n o D</i> <i>p r r - -</i>
4	Composite Strength and Stiffness	- Sample problem solving class
5	Micro-mechanical Analysis, Elastic properties of uni-directional lamina	- Sample problem solving class

## 5. Assessment

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Provisional Examination timetables are generally published on myUNSW in May for Semester 1 and September for Semester 2

For further information on exams, please see [Administrative Matters](#).

### Ca a or

You will need to provide your own calculator, of a make and model approved by UNSW, for the examinations. The list of approved calculators is shown at <https://student.unsw.edu.au/exam-approved-calculators-and-computers>

## **7. Course evaluation and development**

Feedback on the course is gathered periodically using various means, including the Course and Teaching Evaluation and Improvement (CATEI) process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

This course is being offered for the first time in 2015.

## **8. Academic honesty and plagiarism**

UNSW has an ongoing commitment to fostering a culture of learning informed by academic

## 9. Administrative Matters

You are expected to have read and be familiar with *Administrative Matters*, available on the School website: [www.engineering.unsw.edu.au/mechanical-engineering/sites/mech/files/u41/S2-2015-Administrative-Matters\\_20150721.pdf](http://www.engineering.unsw.edu.au/mechanical-engineering/sites/mech/files/u41/S2-2015-Administrative-Matters_20150721.pdf)

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## Appendix A: Engineers Australia (EA) Professional Engineer Competency Standards

	Pro ra Intended Learn n Outco es
PE Knowledge and 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
PE Engineering Application	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
PE 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