Course Outline

Term 1 2020

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Contents

1. Staff contact details

Contact details and consultation times for course convenor

Name: Professor [illegible]

Student learning outcomes

This course is designed to address the learning outcomes below 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.	Recognise the fundamentals of orthotropic materials and mechanics of materials	1.1, 1.3, 1.6
2.	Demonstrate the fundamentals of directional stresses and strains	1.1, 1.3, 1.6
3.	Develop a solid understanding in the properties of composite materials	1.3, 1.5, 2.1
4.	Develop an understanding of micromechanics and lamination theory together with the analysis and manufacture of lightweight composite structures in a unified and integrated manner	2.1, 2.2, 2.3
5.	Learn how to design a composite structure and be able to test and confirm its mechanical properties	2.2, 2.3, 2.4

4. Teaching strategies

Component	Activities
Lectures	Find out what you must learn. See methods that are not in the textbook. Follow worked examples. Hear announcements on course changes.
Laboratory/Problem solving class	Be guided by course notes and demonstrators. Ask questions. Do problems, as set out in the course notes. Work with colleagues.
Private study (including Moodle)	Review lecture material and textbook. Do set problems and assignments. Discuss with fellow students. Join Moodle discussions of problems. Download materials from Moodle. Keep up with notices and find out marks via Moodle.
Assessments (assignments, laboratories and final exam)	Demonstrate your basic knowledge and skills. Learn from feedback. Demonstrate higher understanding and problem solving.

5.

Lecture/Problem-Solving Session Topic Schedule

Composites 3M: Materials, Mechanics and Manufacturing		
Week	**Lecture (2 hr) – Colombo Theatre A**	**Problem Solving Session/Laboratory (2 hr) – (as allocated to you)**
1	Introduction to Composite Materials	
2	Materials and processing of fibre-reinforced composites (DL)	Lab tour -Explanation of materials and demonstration of equipment. -One-hour consultation for Assignment 1 *Assignment 1 issued-a review document on composite materials-applications, relevant to your degree program. Submission due in Wk 3 (15%)*
3	Composite Strength and Stiffness	- Sample problem solving class *Assignment 1 due*
4	Micro-mechanical Analysis, Elastic properties of uni-directional lamina	- Sample problem solving class *Assignment 2 issued- report on the materials, manufacturing method and characterisation. Submission due in Wk 7 (25%)*
4	**Test 1**	**20% Lecture notes (1-3)**

PSS and Laboratory Schedule

	PSS			Automated Composites Lab (ACL)			
Week	Day	Time	Location	Day	Time	Location	Task
2				Wed	12-1 pm	L102 & 103, Willis Annexe (J18)	Composites lab tour and demonstration will happen during 12-2 p.m. (Lecture time of this week only)

	PSS			Automated Composites Lab (ACL)				
	Wed	1pm-3pm	OMB 150					
	Wed	3pm-5pm	Ainsworth G02					
	Thu	1pm-3pm	Ainsworth 202					
7	Tues	10am-12pm	Ainsworth 101	TBA	TBA	TBA	ACL, Willis Annexe (L102-103)	Assignment 3: Composite manufacturing (VRI)
	Tues	1pm-3pm	Ainsworth 102					
	Tues	3pm-5pm	Ainsworth 102					
	Wed	1pm-3pm	OMB 150					
	Wed	3pm-5pm	Ainsworth G02					
	Thu	1pm-3pm	Ainsworth 202					
8	Tues	10am-12pm	Ainsworth 101	TBA	TBA	TBA	ACL, Willis Annexe (L102-103)	Assignment 3: Composite manufacturing (VRI) & Tensile/3PB test

6. Assessment

Assessment overview

Task	Assessment	Group Project?	If Group, # Students per group	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
T1	Assignment 1	No	N/A	5000 words (10 pages)	15%	1, 2, 3	Understanding of industry specific applications of composites and critical views on the published literature	5 pm Friday in week 3 (6th March 2020)	Week 3	Week 5 *(20th March 2020)*
	Assignment 2	Yes	12	15 pages + Additional 5 pages for graphs/plots and discussions	25%	1, 2, 5	Use of experiment and Simulation technology for composites. Report writing, communication skills and understanding of experimental procedures	5 pm Friday in week 7 (3rd April 2020)	Week 7	Week 9 *(17th April 2020)*
	Assignment 3	Yes	19	10 pages + Additional 5 pages for graphs/plots and discussions	20%	1, 4, 5	Hands-on sample manufacture, experiments, report writing and communication skills	5 pm Friday in week 10 (24th April 2020)	Week 10	Week 11*(1st May 2020)*
T2	Test 1	No	N/A	1 Hour Examination	20%	1, 2, 3	Lecture notes (Wk-1-3)	Week 4	N/A	Week 6 (27th March 2020)
	Test 2	No	N/A	1 Hour Examination	20%					

Assignments

Purpose

We need to find out how well you have:

grasped the fundamentals of micro-mechanics of composites
become proficient in developing your understanding for engineering applications
become proficient in calculation layout and development
developed correct, professional technique
become proficient in using composite materials fundamentals to solve practical problems and apply
come to see the w
prepared yourself for your future career

Scheme

The final grade in MECH9420 will be based on the sum of the scores from each of the assessment components.

Final grades may be adjusted by scaling with the approval of the appropriate departmental meeting.

Presentation

All submissions should have a standard School cover sheet
Moodle page.

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with due respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

Further details of individual assessment tasks will be provided on Moodle, including submission procedures and the criteria by which grades will be assigned.

The preferred set-out of any numerical calculation is similar to the following:

$A_{\text{bow}} = 0.0035AmfV$	(Equation in symbols)
$= 0.0035 \quad 480 \quad 0.95 \quad 1.0 \quad 18.00$	(Numbers substituted)
$= 28.7\ \text{m}^2$	(Answer with units)

Submission

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of 20 percent (20%) of the maximum mark possible for that assessment item, per calendar day.

Please note that UNSW now has a Fit to Sit / Submit rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the Special Consideration page.

7. Expected resources for students

Reference Texts

1.

[illegible] Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning