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# I. Staff contact d

## Contact details and consultation times for course convenor

Professor Gangadhara Prusty

## Contact hours

	Day	Time	Location
<b>Lectures</b> (Weeks 1-12)	Monday	12noon - 2pm	Civil Engineering 101
<b>Problem Solving Sessions / Laboratory</b> (Weeks 2-13)	Monday	2pm – 4pm	Quadrangle 1047 / Solid Lab
	Monday	4pm – 6pm	Quadrangle 1047 / Solid Lab

Lectures commence in week 1 and run until week 12. Problem Solving Sessions / Laboratory commence in week 2 and run until week 13.

## Summary of the course

- (a) Composite material constituents and their properties
  - (b) Manufacturing methods and processes
  - (c) Micromechanical analysis of composite strength and stiffness:
    - Assumptions and limitations
    - Longitudinal strength and stiffness
    - In-plane shear modulus and poisson's ratio
  - (d) Elastic properties of the unidirectional lamina:
    - Engineering constants
    - Stress-strain relationship of a thin lamina
    - Transformation of stress and strain and elastic constants
    - Typical elastic properties of a unidirectional lamina
  - (e) Analysis of laminated composites
    - Basic assumptions
    - Strain-displacement relationship
    - Laminate stiffness
    - Determination of lamina stress and strain
    - Types of laminate configuration
  - (f) Failure theories and strength of unidirectional lamina:
    - Micro-mechanics of failure of unidirectional lamina
    - Failure theories
    - Importance of shear stress
    - Choice of failure criteria
    - Typical strength properties
  - (g) Design of components:
    - International standards for tests and certification
  - (h) Finite element modelling and analysis of composite panels
  - (i) Structural health monitoring and non-destructive testing methods
- \* Topics during the weekly teaching format might be varied or changed

## **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.

### 3. Teaching strategies







Systematic approach to outline the steps for a problem and use the necessary fundamental concepts covered in the lectures and problem solving classes.  
Correctness of the solution with the aid of necessary diagrams/sketches and the use of appropriate units.

### Presentation requirements

All submissions should have a standard School cover sheet which is available at [https://eng-intranet.unsw.edu.au/mech-engineering/policies\\_forms/SiteAssets/MME%20Individual%20Assignment%20Cover%20Sheet.pdf](https://eng-intranet.unsw.edu.au/mech-engineering/policies_forms/SiteAssets/MME%20Individual%20Assignment%20Cover%20Sheet.pdf) and this subject's Moodle page. All submissions are expected to be neat and clearly set out. All calculations should be shown as, in the event of incorrect answers, marks are awarded for method and understanding. 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:

$$\begin{aligned} A_{\text{bow}} &= 0.0035 A m f V && \text{(Equation in symbols)} \\ &= 0.0035 \ 480 \ 0.95 \ 1.0 \ 18.00 && \text{(Numbers substituted)} \\ &= 28.7 \text{ m}^2 && \text{(Answer with units)} \end{aligned}$$

### Special consideration and supplementary assessment

For details of applying for special consideration and conditions for the award of supplementary assessment, see the School [intranet](#), and the information on UNSW's [Special Consideration page](#).

## 6 resources for students

### Reference Texts

1. Isaac M. Daniel and Ori Ishai, Engineering Mechanics of Composite Materials, Oxford University Press, 1994.
2. Mel M. Schwartz, Composite Materials, Vol 2, Prentice Hall, New Jersey, 1997.
3. R. A. Shenoi and J. F. Wellicome, Composite Materials in Maritime Structures, Vol 1&2, Cambridge University Press, U.K., 1993.

Moodle site for MECH 9420. Access via <https://moodle.telt.unsw.edu.au/login>

Library (e.g. <http://info.library.unsw.edu.au/web/services/services.html>).

School's website <http://www.engineering.unsw.edu.au/mechanical-engineering/>



Further information on School policy and procedures in the event of plagiarism is available on the [intranet](#).

## 9 Administration

All students are expected to read and be familiar with School guidelines and policies, available on the intranet. In particular, students should be familiar with the following:

[Attendance, Participation and Class Etiquette](#)

[UNSW Email Address](#)

[Computing Facilities](#)

[Assessment Matters](#) (including guidelines for assignments, exams and special consideration)

[Academic Honesty and Plagiarism](#)

[Student Equity and Disabilities Unit](#)

[Health and Safety](#)

[Student Support Services](#)

