



Mechanical and Manufacturing Engineering

Course Outline

Term 2 2019

ENGG3002

Automotive Engineering

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1. Staff contact details

Contact details and consultation times for course convenor

Name: Daniel Egger
Office location: 402H
Email: d.egger@unsw.edu.au
Consultation time: Thursday 2-3pm

Generally, problem-solving session time should be used for direct consultation. If you require further consultation beyond problem-solving sessions, then you may contact me via email to set up a consultation appointment.

Contact details and consultation times for additional lecturers/demonstrators/lab staff

Please see the course [Moodle](#).

2. Important links

- [Moodle](#)
- [Lab Access](#)
- [Computing Facilities](#)
- [Student Resources](#)
- [Course Outlines](#)
- [Engineering Student Support Services Centre](#)
- [Makerspace](#)
- [UNSW Timetable](#)
- [UNSW Handbook](#)
- [UNSW Mechanical and Manufacturing Engineering](#)

3. Course details

Credit points

This is a 6 unit-of-credit (UoC) course and involves 12 hours per week (h/w) of face-to-face contact.

The normal workload expectations of a student are approximately 25 hours per term for each UOC, including class contact hours, other learning activities, preparation and time spent on all assessable work.

You should aim to spend about 37.5 h/w on this course. The additional time should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

Contact hours

	Day	Time	Location
Lectures	Monday	10am – 12noon	Ainsworth G01
	Tuesday	10am – 12noon	Ainsworth G01
	Wednesday	10am – 12noon	Ainsworth G01
	Thursday	10am – 12noon	Ainsworth 201
Problem-Solving Class	Monday	12noon – 1pm	Ainsworth G01
	Tuesday	12noon – 1pm	Ainsworth G01
	Wednesday	12noon – 1pm	Ainsworth G01
	Thursday	12noon – 1pm	Ainsworth G01

Please refer to your class timetable for the learning activities you are enrolled in and attend only those classes.

Summary and Aims of the course

This course provides students with a detailed understanding of the technical design factors and technology used in different vehicles. Throughout the course, students learn about the engineering science underpinning vehicle design and the resultant advantages and disadvantages associated with various mobility technologies. A series of structured tutorials assists students to further develop their understanding relating to key areas of automotive design, vehicle handling, vehicle steering and suspension design. The course is designed to provide students with a working level understanding of the fundamental engineering science and technology used in the design of modern vehicles.

Prior knowledge in mathematical modelling of thermodynamic and vibration systems is assumed.

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.	Describe the key aspects and engineering concepts used in vehicle design.	1.1, 1.3, 1.5, 2.1, 2.2, 2.4
2.	Use applied engineering mathematics to solve automotive performance, ride and vibration and vehicle handling problems.	1.1, 1.2, 1.3, 1.5, 2.1, 2.2, 3.2

Learning Outcome		EA Stage 1 Competencies
3.	Define the key components used in vehicle design and how these affect automotive performance outcomes.	1.1, 1.2, 1.3, 1.5, 2.1, 2.2
4.	Apply engineering concepts to hands-on automotive design solutions.	1.1, 1.2, 1.3, 1.5, 2.1, 2.2, 2.4, 3.1, 3.2, 3.3

4. Teaching strategies

This course will be delivered both in the classroom and online. Full participation in the course means that you will participate fully in both arenas. That is, you will be held accountable for all content, instructions, information, etc. that is delivered either in class or online.

Online: The online forum for participation in this class is the Moodle Platform, specifically the ENGG3002 course at <http://moodle.telt.unsw.edu.au/>. All official online interactions will take place or be linked clearly and appropriately from this site.

In class: There are two in-class activities in a typical week which we refer to as the Lecture and Problem-Solving Class based on the timetable in Section 3. Both the online and in-class segments of this course are organised on the following principles:

1. **Learning:** Student learning is the first priority - teaching and assessment are secondary concerns. Learning here is defined as gaining new ways of understanding the field of automotive engineering; not as simply memorising information. We are trying to transform you into engineers and critical thinkers in the discipline.
2. **Peer Interaction:** Learning is a social activity, and research shows that you will learn most and best when you are actively taught by your peers and, in turn, when you teach them.
3. **Authenticity:** We will have as much authenticity of engineering practice as is possible within the constraints of the course and where it does not restrain your learning.
4. **High standards:** We will have high standards for achievement in the course, and everyone (including staff) will be accountable for putting in the effort to get you to the standard.
5. **Openness:** As much as possible, this course will be conducted in the open where all participants can be aware of it and comment upon it.
6. **Process:** The focus of the course will be on processes, not outcomes. The right outcomes will be a by-product of following the correct processes.

The lectures in this course will cover core concepts and background theory in automotive engineering. The lecture material is available to students electronically before each class via Moodle.

The Problem-Solving Classes are designed to provide you with feedback and discussion on the assignments (referred to as Problem Sets). Students are required to work through the Problems Sets during the Problem-Solving Class and also during their own personal study time.

A case study will be used to help students enhance their understanding of the fundamental course concepts. A field trip will be organised to provide a hands-on experience to enrich the learning experience. Upon completion of the field trip, students will complete a technical report. The students will be provided with guided questions and feedback to support their technical writing.

5. Course schedule

Week	Topic	Location	Day and Time
1a	Introduction to automotive engineering	AW G01	Mon 10am-12noon
1b	Engine Technology	AW G01	Tue 10am-12noon
1c	Transmissions and Drivelines	AW G01	Wed 10am-12noon
1d	Transmissions and Drivelines	AW 201	Thur 10am-12noon
2a	Vehicle handling	AW G01	Mon 10am-12noon
2b	Industry Guest Speaker	AW G01	Tue 10am-12noon
2c	Tyres	AW G01	Wed 10am-12noon
2d	Brakes	AW 201	Thur 10am-12noon
3a	Ride and Vibration	AW G01	Mon 10am-12noon
3b	Suspension	AW G01	Tue 10am-12noon
3c	Vehicle Aerodynamics	AW G01	Wed 10am-12noon
3d	Revision	AW 201	Thur 10am-12noon

6. Assessment

Assessment overview

Assessment	Group Project? (# Students per group)	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
3 x Problem Sets	No	NA	30% (10% each)	1, 2, 3, 4	Understanding of lecture material	Weeks 2, 3 and 4. Sunday 11:59pm	5 days after the respective due date	One week after submission
Technical Report	No	10 pages	20%	1, 2, 3	Correctness, completeness and professionalism of report	Week 3 Sunday 11:59pm	5 days after the due date	Two weeks after submission
Final exam	No	2 hours	50%	1, 2, 3, 4	All course content from weeks 1-3 inclusive	Exam period, date TBC	N/A	Upon release of final results

Assignments

Presentation

All non-electronic submissions should have a standard School cover sheet, which is available from this course's 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.

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.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day.

Work submitted after the 'deadline for absolute fail' is not accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These are clearly indicated in the course outline, and such assessments receive a mark of zero if not completed by the specified date. Examples include:

- a. Weekly online tests or laboratory work worth a small proportion of the subject mark,
or
- b. Online quizzes where answers are released to students on completion, or
- c. Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date, or
- d. Pass/Fail assessment tasks.

Marking

Marking guidelines for assignment submissions will be provided at the same time as assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

Examinations

You must be available for all tests and examinations. Final examinations for each course are held during the University examination periods: February for Summer Term, May for T1, August for T2, and November/December for T3.

Please visit myUNSW for Provisional Examination timetable publish dates.

For further information on exams, please see the [Exams](#) webpage.

Calculators

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 available at student.unsw.edu.au/exam-approved-calculators-and-computers

It is your responsibility to ensure that your calculator is of an approved make and model, and to obtain an “Approved” sticker for it from the [Engineering Student Support Services Centre](#) prior to the examination. Calculators not bearing an “Approved” sticker will not be allowed into the examination room.

Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to submitting an assessment or sitting an exam.

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 information on UNSW's [Special Consideration page](#).

7. Expected resources for students

Suggested Additional Readings:

- Stone. R. and Ball, J.K., *Automotive Engineering Fundamentals*, SAE International.
- Milliken, W.F. and Milliken, D.L., *Race Car Vehicle Dynamics*, 5th Edition, SAE International.
- Haney, P., *The Racing and High Performance Tyre*, 2nd Edition, InfoTire and SAE International.

UNSW Library website: <https://www.library.unsw.edu.au/>

Moodle: <https://moodle.telt.unsw.edu.au/login/index.php>

8. Course evaluation and development

Feedback on the course is gathered periodically using various means, including the UNSW myExperience 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.

9. Academic honesty and plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

10. Administrative matters and links

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

- [Attendance](#)
- [UNSW Email Address](#)
- [Computing Facilities](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Student Equity and Disabilities Unit](#)
- [Health and Safety](#)
- [Lab Access](#)

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	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