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WESTERN AUSTRALIA  
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# MECH1401

# Engineering Dynamics

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School of Mechanical Engineering  
Faculty of Engineering, Computing and Mathematics

# UNIT OUTLINE

## Semester 2 2011

Version 1.1, July 20

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## ESSENTIAL ADMINISTRATIVE INFORMATION

**Unit Title:** Engineering Dynamics

**Unit Code:** MECH1401

**Unit Coordinator:** Prof Adrian Keating

**School:** Mechanical Engineering

**Credit Value:** 6 points

**Handbook:** <http://units.handbooks.uwa.edu.au/units/mech/mech1401>

**Unit Website:** <http://www.mech.uwa.edu.au/unit/MECH1401/>

This unit is also on webCT: <http://webct6.uwa.edu.au/>

**Jellyfish:** <http://www.mech.uwa.edu.au/login.html>

**Faculty or School Website:** <http://www.mech.uwa.edu.au/>

**Consultation times:** These are listed on each Academic's door and advertised in lectures - All other times by appointment via email

### Important Notice

The Unit Outline (this document) gives the student important information about the unit, its aims, outcomes, materials, programme and assessment.

Note that important information relating to policies, examinations, expectations, copyright, referencing, academic misconduct assistance with communication skills is available on the Faculty website though <http://www.ecm.uwa.edu.au/studentnet/exams>.

You are required to be aware of and fulfill your responsibilities under the University's rules, policies and procedures so it is important that you review the content of these in detail.

## UNIT COORDINATOR

Please do not ask approach after the lecture with detailed questions or assistance with specific problem sets as the room needs to be cleared in preparation for the next lecture. You may approach the lecturer after the lecture for clarification of unit or lecture material. For assistance with material in this unit, tutors are available during assigned tutorial times. Students are advised to make extensive use of the tutors. For academic matters, contact your lecturer, during their assigned consultation times or make an appointment by email.

Every unit has a person who is responsible for the overall administration of that unit. This person is the Unit Coordinator. If you cannot contact the person who is teaching you or if you have further queries about this unit, you may wish to contact the Unit Coordinator using the contact details below. In all correspondences, allow for a response time of three working days.

<b>Unit Coordinator:</b>	Prof. Adrian Keating
<b>Email:</b>	<a href="mailto:mech1401@uwa.edu.au">mech1401@uwa.edu.au</a>
<b>Contact Hours:</b>	By appointment or by email

## TEACHING STAFF

The lecturer(s) for this unit and their contact details are below:

### Part 1: Kinematics, weeks 31-38

<b>Your lecturer:</b>	Prof. Adrian Keating
<b>Email:</b>	<a href="mailto:adrian.keating@uwa.edu.au">adrian.keating@uwa.edu.au</a>
<b>Room &amp; Building:</b>	1.02B ENCM
<b>Contact Hours:</b>	By appointment, email or during consultation times where provided.

### Part 2: Kinetics, weeks 40-44

<b>Your lecturer:</b>	A/Prof Dianne Hesterman
<b>Email:</b>	<a href="mailto:dch@mech.uwa.edu.au">dch@mech.uwa.edu.au</a>
<b>Room &amp; Building:</b>	1.64 ENCM
<b>Contact Hours:</b>	By appointment, email or during consultation times where provided.

**NOTE: Announcements regarding this unit will be made during the lectures, on webCT and/or via email. Please ensure that you check your university email account every few days.**

## INTRODUCTION

Welcome to Engineering Dynamics. This unit builds on content from GENG1001 and introduces the subject of engineering dynamics in more depth. During the course you will learn how to analyse the planar motion of particles, rigid bodies and simple mechanisms (kinematics), and relate motion to force, energy and momentum (kinetics).

You will also learn how to communicate your work in a clear, concise written format that your peers and professional engineers can understand and check.

## LEARNING OUTCOMES

On successful completion of this unit you will be able to:

- 1 Identify a variety of problems in engineering dynamics
- 2 Make appropriate assumptions and apply engineering fundamentals to solve these problems
- 3 Communicate clearly the solution to a problem in written form
- 4 Adapt acquired knowledge to address new dynamics problems
- 5 Reason logically and creatively
- 6 Utilise and synthesise knowledge from different disciplines
- 7 Behave in a professional manner with a focus on life-long learning

## LEARNING ACTIVITIES

Each week you will have three lectures, one computer-based tutorial and a two-hour Friday workshop.

The terminology and underlying theory of various methods used for solving engineering dynamics problems are presented in the lectures as well as a number of worked examples.

Each week a set of on-line problems that draws on recent lectures will be available for practice. It is expected that students attempt these questions on their own and computer labs have been booked should you need these resources (tutorial T1 on MECH1401 timetable). In a limited number of these computer-based tutorials, tutors will be present to provide assistance. You will be notified about the tutorials that have tutors attending.

There is also a 2-hour workshop every Friday. In these classes you will have the opportunity to work on your own and also as part of a team. The Friday workshops will be used to review difficult concepts and topics, discuss past exam questions, offer tips on presentation and method, and for assessment. The in-class assessment will comprise both individual and group work on recent topics. Check the Unit Schedule on page 9 for details.

### Jellyfish on-line tutorials

<http://www.mech.uwa.edu.au/login.html>

Jellyfish is an online learning tool. All Jellyfish tutorials, tabled T1 in the unit timetable, are located in computer laboratories. These are non-compulsory self guided tutorial timeslots, designed to allow you access to a PC to complete the Jellyfish problems. Students are expected to work on these questions either during their own time or during the scheduled T1 tutorials. Students should keep a dedicated notebook with detailed working, sketches and drawings for all questions attempted. Jellyfish provides questions to reinforce the topics discussed during the week.

## ASSESSMENT DETAILS

### Assessment Mechanism

The assessment for this unit consists of the following items.

Assessment Tasks	Worth	Due	Unit Learning Outcome Assessed
Workshop tutorials where assessed	40%	Selected Friday workshops	All
Exam	60%	Exam Period	All
<b>TOTAL</b>	<b>100%</b>		

### Penalties

#### Friday Workshops

**Some** of the Friday workshops are assessed. The individual assessment component is conducted “under exam conditions” and is closed book. Any use of notes, electronic data or unauthorised calculators may result in you being ineligible to submit your answers for grading. Students who are late will not be allowed to enter the venue until after the individual assessment is completed. After the individual assessment, groups will be asked to solve a number of dynamics problems. Students who arrive late for this component will not receive marks for the group assessment.

## Friday workshops

### **Marking Criteria**

Some of the Friday workshops are assessed.

Each assessed workshop will comprise an individual and/or group assessment. The lecture topic/s of the previous few weeks will be covered in these assessments and the problems may be similar to the Jellyfish questions and/or the worked examples covered in lectures and the Friday practice sessions.

#### Individual Assessment

The individual assessment will be a closed book, short answer or multiple-choice, 30-45 minute test. No books, mobile phones or electronic data will be permitted during this test. An equation sheet will be provided. You will find a copy of the equation sheet on the unit web page. An approved calculator may be used. The test will check whether you have understood the fundamental concepts of the methods presented.

#### Group Assessment

At the beginning of the unit you will be assigned to a group comprising 3 or 4 students. You will be expected to work with this group for the entire semester. The group assessment will involve solving one or two engineering dynamics problems as a team. In some cases, only one problem will be submitted and marked. Each group will be expected to solve the problems and prepare a clear written solution, including diagrams, coordinate systems, reasoning and numerical answers.

### **Submission Details**

See Unit Schedule for dates and topics. Assessment is completed and submitted in class.

### **Marking timeline**

Students should allow a marking turnaround of two weeks for written assignments.

## Exam

### **Marking Criteria**

The exam is a three-hour, closed book exam. Closed book means that you cannot take any notes, books, electronic data or audio-visual material into the exam with you. An equation sheet will be provided. You will find a copy of the equation sheet on the unit web page. An approved calculator may be used.

The paper will comprise five questions and you will be expected to prepare clear written solutions for all questions, including diagrams, coordinate systems, assumptions, reasoning and numerical answers. Each question will be marked out of 20. The marking criteria will be similar to that used for the group assessments.

## TEXT BOOK & RESOURCES

- **RECOMMENDED READING: Engineering Mechanics - Dynamics**, JL Meriam & LG Kraige, Wiley Publishing, any SI edition. The library has this book in closed reserve or for short-term loan. There are also copies available for purchase at the University Bookshop.
- Other books on engineering dynamics that are available in the library:  
Engineering Mechanics – Dynamics, A Bedford & W Fowler, Pearson – Prentice Hall  
Engineering Mechanics – Dynamics, RC Hibbler, Pearson – Prentice Hall  
Vector Mechanics for Engineers – Dynamics, FP Beer & ER Johnston, McGraw Hill
- Some on-line notes for this unit are available at:  
<http://www.mech.uwa.edu.au/unit/MECH1401/Notes>
- A number of universities publish notes, on-line lectures and ipod casts covering engineering subjects (for example, see <http://ocw.mit.edu/index.htm>)

## STUDENT FEEDBACK ON THIS UNIT

1. We welcome your feedback as one way to keep improving this unit. Later this semester, you will be encouraged to give unit feedback through **SURF**, UWA's online student feedback system, and also through a **SPOT** survey, which will allow you to offer more detailed feedback on the unit.
2. Recent changes to this unit in response to student feedback include more worked examples in the lectures, modifying the assessment mechanism to better reflect the unit outcomes and reduced assessment.

## STUDY GUIDES

The Faculty website provides useful information on a range of topics, including study guides for the various engineering disciplines and dual degrees that involve engineering.

The study guides can be found at: <http://www.ecm.uwa.edu.au/students/study-guides>

Each guide shows the units that you need to complete for a particular engineering discipline and also suggests an annual plan.

## ACADEMIC MISCONDUCT

### *Academic Conduct Essentials*

It is a University requirement that all newly enrolled students complete a short compulsory online unit called Academic Conduct Essentials (ACE) within the first 10 weeks of semester. ACE can be accessed via WebCT (<http://webct.uwa.edu.au/webct/entryPageIns.dowebct>).

To find out more about Academic Integrity, look at these great resources:

- Student Services, who run workshops on Academic Integrity  
<http://www.studentservices.uwa.edu.au/ss/learning>
- <http://www.ryerson.ca/academicintegrity/> a series of flash videos from a Canadian University exploring Academic Integrity
- <http://www.lc.unsw.edu.au/onlib/plag.html> which takes you to an on-line quiz where you test your understanding of plagiarism, and where there are links to other universities' academic integrity pages.

## STUDENTS' RIGHTS AND RESPONSIBILITIES

It is the responsibility of every student to be aware of all relevant legislation, policies and procedures relating to their rights and responsibilities as a student. These include:

- the Student Charter,
- the University's Guiding Ethical Principles,
- the University's policy and statements on plagiarism and academic integrity,
- copyright principles and responsibilities,
- the University's policies on appropriate use of software and computer facilities,
- the use of calculators in exams
- students' responsibility to check enrolment,

- deadlines, appeals, and grievance resolution,
- student feedback,
- other policies and procedures
- electronic communication with students

See <http://www.ecm.uwa.edu.au/studentnet/exams> for comprehensive information on all of the above.

The Student Guild employs a number of Education Officers who provide information, support and advocacy with a range of academic matters

#### **Guild Student Centre**

Opening Hours: 8.30am - 5.00pm, Monday to Friday  
 Location: Ground floor, Guild Village, near Bankwest ATM machine.  
 Mailing Address: M300, 35 Stirling Highway, Crawley Western Australia 6009  
 Phone: +61 8 6488 2295  
 Fax: +61 8 6488 1200  
 Email (general): [enquiries@guild.uwa.edu.au](mailto:enquiries@guild.uwa.edu.au)  
 Email (confidential): [education@guild.uwa.edu.au](mailto:education@guild.uwa.edu.au)

Web page: [http://www.guild.uwa.edu.au/home/student\\_assistance/academic\\_help](http://www.guild.uwa.edu.au/home/student_assistance/academic_help)

## **ADDITIONAL INFORMATION**

### **Telephone Contacts:**

If you have a query relating to administrative matters such as:-

- requests for deferment of study
- difficulties with accessing online study materials
- obtaining assessment results

please contact your Unit Coordinator using [mech1401@uwa.edu.au](mailto:mech1401@uwa.edu.au)

If you have a query relating to other matters such as:-

- missed assessments
- missing part of Semester
- being considered for special consideration

please contact the ECM Student Office: [enquiries-ecm@uwa.edu.au](mailto:enquiries-ecm@uwa.edu.au)

Location: James Oval Entrance to Civil and Mechanical Engineering Building

Web page: <http://www.ecm.uwa.edu.au/students/student-centres>

## UNIT SCHEDULE

**Note:** The intended schedule for this unit is shown in the table below. The schedule and assessment is to be used as a guide and is subject to change.

### Semester 2 2011

Wk	week starting	TOPIC:	Friday Workshop
31	1 August	Introduction, Coordinate Systems	COMPULSORY TUTORIAL Information session and assignment of groups
32	8 August	Coordinate Systems	ASSESSED session
33	15 August	Relative Motion / Connected Motion	Practice session
34	22 August	Connected Motion	ASSESSED session
35	29 August	Planar Kinematics of a Rigid Body	Practice session
36	5 September	Planar Kinematics of Mechanisms	ASSESSED session
37	12 September	Planar Kinematics of Mechanisms	Practice session
38	19 September	Rotating Axes	ASSESSED session
39	26 September	<b>BREAK</b>	
40	3 October	Systems of Particles	ASSESSED session
41	10 October	Mass Moments of Inertia	Practice session
42	17 October	Rigid Body Kinetics	ASSESSED session
43	24 October	Rigid Body Kinetics	Practice session
44	31 October	Rigid Body Kinetics / Revision	ASSESSED session
45	7 November		Study Week
46	14 November		Examinations
47	21 November		Examinations