

University of Wollongong
School of Mathematics and Applied Statistics

Information Sheet for
Applied Mathematical Modelling III - MATH312

Autumn Session 2008
Wollongong Campus

Subject Coordinator and Lecturer:

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Consultation: 9:00 – 11:00 Monday
12:30 – 12:30 Wednesday

Subject Prerequisites: MATH202 or (MATH283 and ENGG252)

This information sheet must be read in conjunction with the general information on educational issues and student matters provided in the document "Policies and Services of the University, Faculty and School" published by the School of Mathematics and Applied Statistics. A copy may be obtained from the subject coordinator or at <http://www.math.uow.edu.au/subjects/generic.shtml>.

Topics and outline

MATH312 demonstrates how to undertake mathematical modelling of many scientific and engineering processes and problems arising in industry. The main foci are:

- continuum mechanics, including deformation of materials;
- linear elasticity, including basic concepts of the stress-strain relation; and
- nanomechanics, including nanotubes and the Lennard-Jones potential.

Textbook & Reference Books

Text: There is no assigned text for this subject.

References:

- Y. C. Fung, A First Course in Continuum Mechanics, Prentice Hall.
- S. C. Hunter, Mechanics of Continuous Media, Ellis Horwood.
- C. C. Lin and L. A. Segel, Mathematics Applied to Deterministic Problems in the Natural Sciences, MacMillan.
- Schaum's Outline of Theory and Problems of Continuum Mechanics, McGraw-Hill.
- A. N. Cleland, Foundations of Nanomechanics: from Solid-State Theory to Device Applications, Springer.

You are not required to purchase reference books. Several copies of all these books are available in the Library. These readings are recommended only and are not intended to be an exhaustive list. You are encouraged to use the Library catalogue and databases to locate additional readings with similar titles and contents.

Notices

MATH312 has a web site:

<http://www.uow.edu.au/~gcox/math312>

Tutorial solutions and other handouts will be posted at this site during the session. Most files will be in pdf format for downloading. *You should visit this site on a*

regular basis.

Subject Learning Outcomes

After successful completion of this subject, students should be able to

- (i) Use notions of stress and strain and universal conservation laws in the mathematical formulation of problems in solid mechanics.
- (ii) Correctly employ the tensor notation and the Einstein summation convention to derive the basic underlying governing equations of solid mechanics.
- (iii) Derive the governing equations of perfect and linear elasticity.
- (iv) Explain the notions behind nanomechanics and properties of nanotubes and related structures.
- (v) Utilize the Lennard-Jones potential to determine the van der Waals forces between two non-bonded nano-structures.

Lectures, Tutorials & Laboratories

Lectures for MATH312 are

Monday: 11:30 – 12:30 room 1.G02
Wednesday: 10:30 – 11:30 room 1.G02

You are required to attend *all lectures* in MATH312. Attendance will be monitored by a sign-on sheet that will be circulated each lecture. Experience has shown that poor attendance at lectures leads to poor performance in this subject.

There is a one-hour tutorial for MATH312 each week. The tutorial is on

Wednesday: 11:30 – 12:30 room 1.G02

Tutorials begin in Week 2

Attendance at assigned tutorials is *compulsory*. A record of tutorial attendance and your performance at those tutorials will be kept and may be taken into account in determining your final grade if you are on a borderline. You will not be counted as having attended a tutorial merely because you are physically present;

your tutor must also judge that your participation has been satisfactory.

Starting from Week 2, there is a two-hour MAPLE laboratory for MATH312 each week, which is on

Monday: 16:30 – 18:30 room 15.210

Laboratories begin in Week 2

Attendance at assigned laboratories is *compulsory*. A record of laboratory attendance and your performance at those laboratories will be kept and may be taken into account in determining your final grade if you are on a borderline. You will not be counted as having attended a laboratory merely because you are physically present; your demonstrator must also judge that your participation has been satisfactory.

Assessment

Your final mark in MATH312 will be determined as follows*:

Five assignments	–	40%
Final exam	–	60%
Total	–	100%

*Attendance at tutorial classes and lectures may be taken into account.

Scaling of marks is **not** a standard procedure in this subject.

Note that you are not required to “pass” each individual component to receive a Pass grade in MATH312. However, you would seriously jeopardize your chances of passing this subject if you do not aim to be successful in every component of the assessment.

Calculators

Please note that single-line-display calculators are permitted in examinations for this subject. They must not have alphanumeric keyboards (or capabilities) and they must not be programmable in any way. If you are not sure whether your calculator is acceptable, have it checked well before any exam.

Final Examination

The final examination in MATH312 will be as follows:

Duration:	3 hours and 15 minutes
Value:	60% of final mark.

The examination will be held during the examination period in June, at a time to be advised by the University. As a student enrolled in the University of Wollongong, you are required to be available for the entire examination period in June.

Assignments

There are five assignments in MATH312. You will be given a new assignment every second week, starting in Week 3. Each assignment will be handed out at the beginning of the lecture on Monday, and must be handed in two weeks later at the beginning of the

lecture on Monday. Each assignment consists of two parts – a theoretical section to be completed by hand and a numerical section to be completed using MAPLE. Assignments will be marked and returned with solutions two weeks after submission in class. Each assignment contributes a **total** of 8% (giving a combined total of 40%) towards your final mark in MATH312.

- You must show **sufficient** working for each question on the assignments.
- You must follow **all** instructions detailed on the assignments, otherwise marks will be deducted.
- Untidy or illegible work will not be assessed, and will be graded with a zero mark.
- Assignments will **not** be accepted outside classes or after the due date, unless you are successful in applying for special consideration (see later).
- Assignments **must** be submitted with the assignment cover sheet provided and you should make sure your receipt is initialled.
- Faxed or emailed assignments will not be accepted. You must submit your assignment in person.
- Assignments are only **part** of the expected weekly workload.
- You should keep a copy of all work submitted.

The assignments submitted will contribute towards your final assessment. *However, the primary purpose of each assignment is to give you feedback on your progress and understanding of the work.*

If you wish to seek special consideration for a late assignment (because you missed a tutorial), you must apply for special consideration via SOLS, submit your documentation to the University Administration and then you should obtain a Special Consideration Form from the School Admin Assistant (Room 15.110). Submit the assignment with the completed form to the Admin Assistant as early as possible. In any case, assignments submitted more than 7 days after the original due date will not be accepted and other arrangements may be necessary. In this instance, contact the subject coordinator immediately.

Cheating and Plagiarism

The University does not tolerate cheating nor plagiarism and regards them very seriously. For more information, see the document “Policies and Services of the University, Faculty and School” and the section in the University Undergraduate Handbook entitled “Acknowledgement Practice/Plagiarism”, or visit

<http://www.uow.edu.au/handbook/courserules/plagiarism.html>

Consultation

If you are having difficulty with MATH312, you are encouraged to seek advice from your lecturer or the subject coordinator. For administrative matters, you should see the subject coordinator.

If you cannot come at the listed consultation times, contact the subject coordinator to arrange an appointment at a mutually convenient time.

**If you are having any difficulty with MATH312,
you should seek advice before it is too late.**