

Department of Mathematics

Second Semester, 2011

Study Guide

Modelling and Computation

MATHS 162 S

(15 Points)

Lecturers & Contacts

The *lecturers* are:

Allison Heard, Building 439 L0, Extn 88816, Email: a.heard@auckland.ac.nz
Office hours: to be announced later.

Steve Taylor, Building 439 L0, Extn 886622, Email: s.taylor@auckland.ac.nz
Office hours: to be announced later.

The *course coordinator* is

Allison Heard,
Please see Allison for all administrative matters including assignments.

Times & Rooms

The course will be taught in 3 hours of lectures and one tutorial per week.

The lectures will be as follows: Monday 3pm, Thursday 3pm, Friday 3pm all in Lib B10.

Tutorials will be on Tuesdays and Wednesdays in the basement teaching laboratory (BTL, B75) in or in ground floor teaching laboratory (GTL or G75). You should have enrolled for a tutorial time on Student Services Online. The laboratory for your tutorial will be shown there.

The first tutorial will be held on Tuesday 19 July.

Course Description

This is a one semester, 15 point course. In this course students learn how to solve a variety of real world problems. Analytical solution methods are used in combination with MATLAB programs to solve these problems

The topics covered are: difference equations, solution of nonlinear equations, systems of linear equations, simulation and mathematical modelling.

Pre-requisites and Restrictions

Students entering this course should have prior or concurrent enrolment in MATHS 108, 150 or 153, ENGINEERING SCIENCE 111, ENGINEERING GEN 150 or PHYSICS 111.

This course is not restricted against any other Mathematics courses.

Aim

- ❖ To introduce students to the use of mathematics to model real world problems.

Expectations

Pre-requisite Knowledge

Students taking this course are expected to have a working knowledge of the basic elements of Year 12 and Year 13 Mathematics.

Effort

First and second semester courses at The University of Auckland are assumed to require 10 hours per week of student time. In this course the normal pattern of student study is expected to be (each week):

- 3 hours lectures
- 1 hour tutorial
- 3 hours lecture preparation/revision
- 3 hours assignments /test preparation.

Students are expected to attend all lectures and tutorials – and to come prepared. This means that you will have previewed the material in the text and done any preliminary examples that have been set.

Assignments

There will be four marked assignments.

The due dates are Thursday 11 August, 15 September, 29 September and 13 October.

In addition there will be an Assignment 0 which should be done by Friday 29 July. This assignment is not to be handed in and will not be marked. Solutions will be available on Cecil.

Assignments must be handed in to the correct box by 4pm on the due date.

Assignments are handed in to the boxes on the Ground Floor outside SciSpace (G16). Three days before the assignment due date, boxes will be labelled for this course. If you wish to hand your assignment in *earlier*, then there will be a box for any early assignments. This box will be cleared daily, the assignments date stamped and kept until the due date. Any assignments in this box after the due date *will not be marked*.

Any *queries* about the marking of assignments should be raised with the course coordinator *within one week* of getting the assignment back.

Repeating

Departmental and Faculty approval is required for students to take any course a third time. Approval for a 3rd attempt at Maths 162 will not be given unless you have passed Maths 108.

Textbook

The coursebook containing the lecture notes and some exercises is available from UBS (University Bookshop).

CECIL

This will be used for course materials, coursework marks and announcements.

Tutorials

There will be ten laboratory tutorials in the semester. They are every Tuesday or Wednesday of the semester except 13 and 14 September. The practical test will be held on Tuesday 13 September. All tutorials are in B75, the basement teaching lab (BTL), or G75 the ground floor teaching lab (GTL).

Tests

A MATLAB practical test will be held on Tuesday 13 September. Full details will be available later. You will have little difficulty with this test if you attend the tutorials.

The theory test will probably be held at 6.30pm on Wednesday 28 September (room details later). This **will be confirmed later**.

Assessment

Assessment will be 50% coursework and 50% examination.

The coursework will comprise:

- Four assignments 15%
- Practical test (MATLAB) 10%
- Mid-semester test 20%
- Tutorials 5%

The examination will be 50%

English Language Assistance

If students require assistance with English there are several services provided by the university and by the Department of Mathematics. The main assistance is ELSAC – the English Language Assistance Centre at Web site:

<http://www.elsac.auckland.ac.nz/>

The Department of Mathematics offers special tutorial support for Maori and Pasifika students (contact Garry Nathan, Extn 84931), and occasionally runs Mandarin or Cantonese-speaking tutorials (contact Jamie Sneddon, Extn 82121).

Collaborating & Cheating

You are encouraged to discuss problems with one another and to work together on assignments, but you must not copy another person's assignment. Assignment marks contribute to the final mark you receive in this course. We view cheating on assignment work as seriously as cheating in an examination.

Acceptable forms of collaboration:

- Getting help in understanding from staff and tutors.
- Discussing assignments and methods of solution with other students.

Unacceptable forms of collaboration ("cheating"):

- Copying all or part of another student's assignment, or allowing someone else to do all or part of your assignment for you.
- Allowing another student to copy all or part of your assignment, or doing all or part of an assignment for somebody else. This is treated as seriously as copying another student's assignment.

If you are in any doubt about the permissible degree of collaboration, then please discuss it with a staff member.

Getting Further Help

For assistance with the material covered in the course:

- Ask questions in class.
- Ask about the material in the Tuesday tutorial.
- You can also get help and advice from the tutors in the **Assistance Room** next to Sci Space on the ground floor of the Maths building (open on weekdays from 10am to 4pm).
- Visit the lecturer during office hours (see “Lecturers and Contacts” for details).
- The Student Learning Centre (SLC) in the Information Commons offers some one-to-one assistance. You pay \$10 to join the SLC and this entitles you to book SLC assistance for the entire calendar year.

Harassment & Complaints

Complaints about assignment or tutorial marks are best made to your lecturer who is in a position to do something immediately. More general complaints can be taken up by your class representative who should be elected or appointed in the first couple of lectures. You may also approach the Head of Department or the Departmental Manager for Mathematics (extension 88063).

Harassment on any grounds, such as racial, sexual, religious and academic is totally unacceptable. Complaints about harassment are best taken to the University Mediation Service (extension 88905).

Computer Laboratories

How to Find the Computer Laboratories

The computer laboratories are in the south east end of the Mathematics Building, and we use the laboratories in the basement or sometimes ground floor. To get there **first** go to the ground floor either from the Mathematics/Statistics Assistance Room, or over the walkway from the Science Student Centre. For basement laboratories **then** go down one floor by the stairs (or lift if you must!).

BTL and GTL are used for tutorials. BCL is open from 9am to 8pm, except Fridays when it closes at 5pm, and students may go there to do their assignments and other course work. Demonstrators are on duty to help you. They wear brightly coloured sashes and so are easily seen.

MATLAB

MATLAB is available in the laboratories and will be used for tutorials and assignments.

If you intend doing mathematics courses after MATHS 162 consider purchasing your own copy of MATLAB. Buy this from the Student Resource Centre (SRC) in the basement of the Mathematics building. The price is \$98.

Using the computer laboratories

First you must log on to the system.

- Press `control + alt + delete`. These keys must all be pressed at the same time.
- In the space labelled `User name`, enter your user name. In the space labelled `Password`, type your NetAccount password. This is the same as the password you use in Students Services Online.

Now to use Matlab

- Click on the `Start` icon on the bottom left of the screen
- A menu will come up. Choose `All Programs`, then `Math and Stats` then `Matlab R2010b – Science licensed`
- Wait ... then the Matlab logo will appear, then the Matlab windows
- The Command Window is the window in the centre
- Type your Matlab commands beside the prompt `>>` and press `Return` on the keyboard
- The answer will be displayed in the Command Window.
- Remember that we use
 - * for multiplication, / for division, ^ for powers

Other applications are used in a similar way.

Script files

To open a new file to type your commands into, click on the blank page icon in the top left corner of the MATLAB application or use the File menu (`File/New/Blank M-file`). Type your commands into this window.

Saving your work

When you have a file that you wish to save then

- Choose `File / Save As`
- Click Desktop icon
- Double click on `Users Home Directory`. This is your storage on the system, called your `H:` drive. You can create folders within it to organise your work. For saving elsewhere see the next two points.
- Some applications, such as MATLAB, will only run saved files. It is possible to save files *just for the present session* by instead double clicking `Computer` then `usrtemp`. Be aware that this will disappear when you log off!
- To save on a USB stick, plug your USB stick into the back of the computer. Double click `Computer` and your USB stick will show up as removable storage. Double click on it. When you have finished with your USB stick, click the `Computer` icon on the bottom bar (third from left), click on `E` (your USB) and click the `Eject` button at the top. **Remember to take your USB stick out of the computer!**

Current Working Directory

Above the Command Window you will find the Current Directory. This is where the computer is expecting to find any files that you wish to run. You can change the Current Directory by clicking on the button labelled `...` and navigating to the directory you want to be current. For example, you might choose your `H:` drive (`Users Home Directory`), or a subfolder of it.

When you have finished

Click the `Start` icon on the bottom left of the screen and then click `Log off`. If you don't do this someone can use the computer as if they were you.

Access to basement laboratories

