

MAT1102

ALGEBRA AND  
CALCULUS I

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Faculty of Sciences

Introductory Book

Semester 3 2006

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# Welcome! And read your Course Specification

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Welcome to MAT1102 - *Algebra & Calculus I!* And from the MAT1102 Teaching Team, good luck! We look forward to meeting you and assisting you with your studies.

Bookmark the Course Website now and check the site regularly! Browse it now:  
<http://www.sci.usq.edu.au/courses/MAT1102>

Details about your Teaching Team will be posted there.

Note that you can reach the Teaching Team via *USQAssist* at <http://usqassist.usq.edu.au>, or via the contact information on the course website. Or you can post messages to other students and the Teaching Team via the Mailing Group. More contact information is given on p 12, 13 of this book.

*Read the following pages very carefully.*

They give details on the course objectives, content, texts and assessment, and list the requirements for passing this course.





# Overview

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You will study two modules in parallel: Algebra and Calculus. These topics provide important fundamental tools for applications to science, engineering, business, and most areas of human endeavor. Your ability to apply yourself to a range of applications, and your later studies, depend strongly on your gaining a very good understanding of the concepts in this course, and being proficient with the techniques.

Read the Course Specification just before this very carefully! It lists your requirements for passing, and gives details on the objectives, topics, texts and assessment.

## Find the following vital information in this Introductory Book:

1. **Required Texts:** The two texts required for the course (with *optional* solutions manuals) are listed overleaf (in Texts and Resources), in the Course Specification and in the Study Book. *These two books cover the needs of Algebra & Calculus II as well.* You need the Calculus text immediately, and the Algebra text for Week 3. You can order them online from the USQ Bookshop: see overleaf.
2. **The Study Book** is your guide to the texts, and a source of extra notes. Follow the sections carefully, and be sure to study the additional material included there. The Readings in Appendix A and B are for Algebra Chapter 0 and Chapter 4.
3. **Technology:** Note that you only need a scientific calculator in the examination. However, you will want to use technology for graphing and row-reducing in your Assignments and Homework. A graphics calculator will meet most of your needs, but we encourage and support the use of MATLAB because students doing Engineering or Mathematics need it later. So if you do not have a graphics calculator, gain access to MATLAB or SCILAB which is similar freeware, *as soon as possible*. See Texts and Resources: Software for how to do this. Maple can be used instead, and can be purchased with your Stewart Calculus book: see the USQ Bookshop list.

4. **The Study Schedule:** This weekly schedule indicates the pace at which you need to study in order to complete your work before Assignment due dates and the Examination.
5. **Assignments:** Read the section on Assignments, and Requirements for Presentation carefully. The tasks you must complete and submit will be linked on the Course webpages.

### **Semester 1 Lecture Outlines and Tutorials:**

Note that these on-campus semester 1 materials are included in an additional book, as a learning aid. But be careful not to let them take the place of the Study Book Readings. They are not sufficient study for the course. And be sure to do the Homework Activities to gain speed and build your confidence!

# Texts and Resources

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## Textbooks and Study Book

You need the MAT1102 Study Book and two textbooks. The textbooks are used again in *Algebra & Calculus II*.

You need the Calculus text immediately, and the Algebra text for Week 3. You can order them online from the USQ Bookshop at <http://bookshop.usq.edu.au/>. Enter the course code (mat1102) to see the books listed, with prices.

- Use the Study Book to guide your study of each section, and for additional information. Be sure to read it alongside the appropriate textbook chapters.
- Note that the Study Book Appendices contain the readings for Algebra Chapters 0 and 4.
- You need *Elementary Linear Algebra*, 5th edition (2004) by Larson, Edwards & Falvo, Houghton Mifflin, Boston/New York.
- You need *Calculus, Concepts & Contexts*, 3rd edition (2005) by Stewart, Brooks/Cole Publishing USA.
- You might want to get the Student Solutions Manuals for each of your Texts. They are optional: but cheaper if bought together with the text.

## Technology

*Note that the examination is set in such a way that you only need a scientific calculator.*

However, technology is a great aid for computation and graphing, and you will want a graphing and row-reducing facility for your practice and Assignment work.

A graphics calculator will do most of what you need - probably all except graph lines and planes in 3-dimensions.

However, most of our students are required to use computer packages in later courses, so we offer support for you to learn basic MATLAB or SCILAB commands for graphing and matrix calculations, in the assignments, and provide a Handbook tailored to the needs of this course.

You will not be asked to write programs or manage files in this course: simply encouraged to make use of basic graphing and calculating commands to aid understanding and simplify calculations.

If you do not already have a graphics calculator or graphing software, gain access to MATLAB or SCILAB, preferably: otherwise Maple or *Mathematica*. Your Algebra textbook offers a brief introduction to these packages and a range of graphics calculators, and we offer support for MATLAB or SCILAB use in the course.

### Access to Matlab, SCILAB, or Maple:

If you are on-campus, you can use MATLAB freely in the K-block, D-block and Engineering computer laboratories. If you are doing other courses later that use MATLAB, you may want to buy a copy. It is available through the USQ Bookshop.

Or gain free access to SCILAB, which is very similar to MATLAB: download it directly from the web, or purchase the Department of Mathematics & Computing CD that has SCILAB on it, currently around \$10 at the USQ Bookshop. This CD has copies of SCILAB for both Windows and Linux users.

- On the Toolbar, Windows users click on *Win Apps*  
Linux users: find Linux Applications on the Toolbar.
- Under *Extra Software*, click on *Scilab*,  
and then em Scilab version 272 (or later)
- Right click on *scilab272.exe* and save the link target to a folder (15.7MBytes).
- Go to your folder and run the program *scilab272.exe*, and follow the installation instructions.

**Support for the installation of Matlab or SCILAB** is available by phone at (07) 4631 5556, or via email to [matlab@usq.edu.au](mailto:matlab@usq.edu.au)

Alternatively, purchase the version of your Stewart Calculus textbook that comes with Maple.

# Assessment

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*Read the Assessment Details and Important Assessment Information and Assessment Notes in the Mat1102 Course Specification very carefully.* These specify the rules for assessment and the penalties for late submission.

Due dates for assignments are included in the Study Schedule in this book.

## Examination

The three hour Examination is worth 70% of the total marks for the course. Prior to 2005, this course had two 2-hour exams. You now do only one 3 hour Exam.

That Examination is OPEN. That means you may bring any books, notes, and materials which you feel will be useful. *Note that questions in the exam are designed so that you only need a scientific calculator.* However, you may use a graphics calculator or battery powered computer to check your handwork, provided they do not cause other students inconvenience by being noisy or distracting.

The S1 2006 Exam paper is included in this Introductory book.

## Assignments

Semester 3 students must submit Assignment 1 in Week 2, and two later assignments. These count 4%, 13% and 13% of the marks for the course, respectively. They must be posted on or before the due date.

**Important notes on Extensions:** Note that you lose 20% of your mark for every working day your assignment is late, unless you gain an extension, for unforeseen circumstances, *prior to the due date and attach the required supporting documents to your assignment.*

Requests for extension should be submitted via Outreach, preferably via email, so that a written response can be given quickly. Note that the maximum extension granted is normally 1 week, because students who are on schedule for the course

need to be supported with feedback and solutions within a reasonable time. The solutions are normally posted on the course Webpage after a week.

## Requirements for presentation of your assignments

**Important:** Check the Exemplar linked on the Assignment page of the course website, to see the standard of communication you should aim at in your Assignment work.

- Rather than waste time type-setting and struggling with mathematical symbols, show that you can use correct notation competently by hand. Except where you are asked to work online, or print out work done online, hand-written work is more than welcome, provided you are neat and legible.
- While we encourage you to seek help from peers and tutors to resolve difficulties, the final expression of your assignment solutions must be your work alone.

*Do not hand in work that follows the steps, notation, and/or language of another student, or work written up jointly with another student. Breaches of this will be regarded with severity, and action taken.*

- Submit the solutions in the order corresponding to the questions. Number questions and items clearly. If you do not provide a solution, write *Not attempted* after the question number.
- Always show the method used, and conclude clearly.
- If you attach additional pages for a question, label them clearly with the question number, and refer the reader to them clearly at the correct point in your answers. If you do not, the question may appear to be unanswered.
- Do not use technology if you are asked to work by hand, or if it is inappropriate. When you use technology for graphing or calculation, give the commands and input you used, a copy of the output, and a clear interpretation thereof. Do not simply say “Using SCILAB the answer is ...”.
- Include plots of any relevant graphs. Hand-copies of computer generated plots are fully acceptable. All plots must include titles and appropriate labels. These can be added in by hand, if you prefer, or by using the toolbars at the top of the MATLABFigure window. (Alternatively, enter the commands `help title`, `help xlabel` or `help gtext`, respectively, to gain more information than the Handbook offers.)

# Course Webpage and Discussion Group

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## The Course Webpage

Bookmark and regularly check the MAT1102 web page during the semester:

<http://www.sci.usq.edu.au/courses/MAT1102>

There you will find many valuable resources:

- a link to the MAT1102 Mailing List;
- any corrections and important messages.
- assignment solutions, once they are released;
- further learning resources;

Queries may also be emailed to the MAT1102 Examiner.

## The Course Mailing/Discussion List

**Note that we do *not* use the USQ*Connect* WebCT MAT1102 site or Discussion Group on your Study Desk.**

**Subscribe now to the MAT1102 Mailing/Discussion List** at <http://www.sci.usq.edu.au/mailman/listinfo/mat1102.s3>, and check the messages there regularly. If you do not, you will miss out on notices and messages.

This email discussion group is for important notices, questions and discussion among students and teachers in this course. It is different to the USQ*Connect* type in that the messages can come directly to your Inbox, if you want that. When you subscribe, say if you want them to come directly to your Inbox, or if you prefer to access them in the batches on that site.

# Learning Support and Materials

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Be sure you have the pre-requisite background mathematics skills, to keep pace with this course. If not, you must refresh.

- Make sure you submit the Refreshment test in Week 1, so we can guide you and try to support your studies.
- USQ's support centre, LTSU, will try to assist you. Watch the Course Webpage and Discussion Group for information on Learning Support arrangements we make.
- In the meantime, you can refresh your school mathematics in the following ways:
  - Submit your mathematics refreshment test to us, as indicated on the Course Webpage.
  - Drop into The Learning Centre to talk with one of our tutors.
  - Make an appointment for a consultation.  
Ph 07 4631 2751 or email [tlc@usq.edu.au](mailto:tlc@usq.edu.au)

The LTSU Learning Centre also provides pre-requisite mathematics and academic language help (essays, reports etc) at the following times:

- Mathematics: Mon to Fri 12-2pm, Mon to Thurs 5-7 pm.  
Ph 07 46 31 1819.
- Academic Language: Mon to Fri 1-3pm, Mon to Thurs 4-6pm.  
Ph 07 46 31 2751.

## **Residential school**

Note that there is no residential school for this course. However, if you are on-campus at any time, do introduce yourself to the Examiner, and make an appointment with a lecturer or tutor if you'd like help with your studies.

# USQ Support and Enquiries

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## Types of enquiries

You have access to a wide variety of support services at USQ. Follow the details below or visit the Current Students website at <http://www.usq.edu.au/currentstudents/default.htm> for information.

### General enquiries

USQ*Assist* is the most efficient method for requesting assistance for:

- administrative queries
- assignment submissions
- study assistance
- contacting your lecturer.

### Technical enquiries

Enquiries relating to access to USQ*Connect*, the USQ*StudyDesk*, or other technical issues can also be directed to USQ*Assist*.

If you cannot access USQ*Assist*, contact the Student IT HelpDesk on +61 7 4631 1510 or email [usqconnect@usq.edu.au](mailto:usqconnect@usq.edu.au) for assistance. The Student IT HelpDesk is staffed weekdays between 8.00am and 5.00pm (AEST-Australian Eastern Standard Time), with voicemail after hours.

## Types of support

There are a number of ways of accessing support services.

USQ*Assist* is a web self-serve facility for you to:

- find answers to common questions at any time
- ask any question
- track the progress of your question
- keep a record of questions and responses.

To access *USQ Assist* go to <http://usqassist.usq.edu.au> or click on *USQ Assist* in *USQ Connect*.

**Telephone support:**

If you prefer to telephone, call Outreach Services on 07 46312285 for assistance. Outreach Services is staffed weekdays between 8.30am and 5.30pm (AEST), with voicemail after hours. If you are in Eastern Australia, contact your Regional Liaison Officer.

International students: call your Agent, or the USQ International Office on +61 7 46312362. USQ International is staffed weekdays between 9.00am and 5.00pm (AEST), with voicemail after hours.

Be sure your telephone numbers (if applicable) and email address are recorded accurately, to avoid delays.

**Fax:**

International students fax the USQ International Office on +61 7 46362211. All other students fax the Distance and e-Learning Centre on 07 46361049.

**Postal address:**

The Administrator, Distance and e-Learning Centre  
University of Southern Queensland  
Toowoomba Qld 4350  
Australia

# USQ *Connect*

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## Study Desk

USQ *Connect* Study Desk has a home page for each of your courses. The MAT1102 page contains links to past exams, and to the Course Website. Note that it is *not* on USQ *Connect*, and we do not use the Discussion List there.

**Bookmark** <http://www.sci.usq.edu.au/courses/MAT1102>, **the Homepage, check regularly, and register urgently for the Discussion List at** <http://www.sci.usq.edu.au/mailman/listinfo/mat1102.s3>.

USQ *Connect* provides you with online access to other information, services and course resources relevant to your studies from a central point. To access USQ *Connect*, from the USQ Homepage at <http://www.usq.edu.au> click on USQ *Connect*, or go directly to the URL at <http://usqconnect.usq.edu.au>. Use your USQ *Connect* username and password to access the system. You will be notified of this username and password by Student Administration on your first Letter of Enrolment Notice.

**USQ Admin**, also accessed through USQ *Connect*, allows you to access a number of administrative functions such as changing your contact details, checking your enrolment details, accessing learning circles, checking final grades, viewing your exam timetable, changing your exam centre, and more.

**Other links:** USQ *Connect* also gives access to the Library and the Academic Learning Support site, as well as the Quick Links list of University sections and services.

## Course Evaluation

Feedback from students studying USQ courses is very valuable to the university. Each semester, a number of courses are selected for student evaluation. If a course that you are studying is selected for evaluation you will receive an email message requesting your feedback. The email will include the link to the electronic survey form and give directions for its completion.

## Study Schedule, S3 2006

Week	Study Book Sections	Assessment
<b>1</b> 13-17 Nov	Alg 0.1,0.2 Calc 1.1-1.3	
<b>2</b> 20-24 Nov	Alg 0.3, 0.4 Calc 1.4-1.6	Assignment 1 (4%) due Fri 24 Nov 2006. See Course Website
<b>3</b> 27 Nov -1 Dec	Alg 0.5, 1.1 Calc 2.1-2.6	
<b>4</b> 4-8 Dec	Alg 1.2, 1.3 Calc 2.7,2.8,2.9	
<b>5</b> 11-15 Dec	Alg 1.4, 2.1 Calc 3.1-3.5	
<b>6</b> 18-22 Dec	Alg 2.2,2.3 (2.4 optional) Calc 3.6, 3.7, 4.1,4.2	Assignment 2 (13%) due Mon 18 Dec 2006
<b>7</b> 25-29 Dec		<b>Break</b>
<b>8</b> 1 - 5 Jan	Alg 2.5, 3.1 Calc 4.3-4.6	
<b>9</b> 8-12 Jan	Alg 3.2, 3.3, 3.4 Calc 4.7-4.9, 5.1	
<b>10</b> 15-19 Jan	Alg 4.1, 4.2 Calc 5.2-5.6	Assignment 3 (13%) due Mon 15 Jan 2007.
<b>11</b> 22-26 Jan	Alg 4.3,4.4 Calc 5.7-5.9	
<b>12</b> 29 Jan - 2 Feb	Alg 4.5,4.6 Calc 6.1-6.5	
<b>13, 14</b> 5 Feb - 16 Feb		<b>Examination Period</b>

# Assignments 1, 2 and 3

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Know the rules and requirements for this course, and take care to meet your responsibilities!

The assessment requirements and rules for passing this course are in the Course Specifications at the beginning of this book, and in the sections on Assessment and Technology.

Note that you must submit all items of assessment on time. Make sure you plan your studies, and allow yourself enough time!

Find the Assignments on the Course Webpage as soon as possible: the first is due by 24 November!

<http://www.sci.usq.edu.au/courses/MAT1102>.

**Assignment 1, weighting 4%, is due Friday 24 November.**

**Assignments 2 and 3 are weighted 13 % each.**

**They are due Mondays 18 December and 15 January, respectively.**

## **Semester 1 Lecture slides and Tutorials:**

Note that these are included in a separate book, as an aid to your studies. But be careful to stay on time with your studies: the S1 study schedule was different to yours.

# Past Examination Paper

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**The 3-hour MAT1102 June 2006 Examination is included here.**

Other past papers can be accessed via the MAT1102 link on your StudyDesk. Only go a few years back, because the course changes slowly. And note that you no longer write 2 papers.

