Basic Mathematics (Ipswich)

School of Physical Sciences

MATH1040

Michael Jennings
MATH1040: Basic Mathematics
Semester 1 2006

1. GENERAL COURSE INFORMATION

Brief description of course content

Review of algebraic manipulations, set notation, functions, straight lines, quadratic equations, simple graphs, introductory probability, trigonometry, limits, differentiation, graph sketching, applications, integration techniques, exponential & logarithmic functions.

Lecturer

Michael Jennings
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Phone: 336-53255
Email: msj@maths.uq.edu.au
Consultation hours: 10am – 12pm Monday
10am – 12pm Thursday

The course profile and course material can be found on the web at the following address:

http://www.maths.uq.edu.au/courses/MATH1040Ips/

This also contains up-to-date news about the course material and announcements for students. Please check this regularly during the semester.

Class contact hours: 3L, 1T (Check times and venues with mySI-net for any late changes)

There are NO tutorials in the first week.
Timetable (correct as of 16/03/06):

<table>
<thead>
<tr>
<th>Location</th>
<th>Group</th>
<th>Day</th>
<th>Start</th>
<th>End</th>
<th>Building</th>
<th>Room</th>
<th>Start - End Date</th>
<th>Class not taught on the specified date(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ipswich</td>
<td>L</td>
<td>TUE</td>
<td>4:00pm</td>
<td>5:50pm</td>
<td>12</td>
<td>109</td>
<td>27/02 - 03/06</td>
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<tr>
<td>L</td>
<td>WED</td>
<td>5:00pm</td>
<td>5:50pm</td>
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<td>12</td>
<td>112</td>
<td>27/02 - 03/06</td>
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<tr>
<td>T1</td>
<td>TUE</td>
<td>3:00pm</td>
<td>3:50pm</td>
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<td>12</td>
<td>108</td>
<td>27/02 - 03/06</td>
<td>28/02</td>
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<tr>
<td>T2</td>
<td>WED</td>
<td>3:00pm</td>
<td>3:50pm</td>
<td></td>
<td>02</td>
<td>108</td>
<td>27/02 - 03/06</td>
<td>01/03</td>
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<tr>
<td>T3</td>
<td>WED</td>
<td>4:00pm</td>
<td>4:50pm</td>
<td></td>
<td>02</td>
<td>108</td>
<td>27/02 - 03/06</td>
<td>01/03</td>
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Assumed background:

There is no assumed background for this course. However, the course will not be easy and students should expect to work hard to get good results.

2. AIMS, OBJECTIVES AND GRADUATE ATTRIBUTES

Course Aims:

The aim of this course is to allow any student to reach a suitable standard of mathematics (roughly equivalent to Senior Mathematics B) in order to enable them to tackle a first level Mathematics course such as MATH1050 and then MATH1051, as well as MATH1061 and/or STAT1201. It will also enable students to cope with a reasonable level of mathematics in their other (non-maths) courses.

Learning Objectives:

On successfully completing this course, students will:

- Be able to perform basic algebraic manipulations;
- Be familiar with the concept of sigma notation;
- Be able to perform basic operations on sets and use set theory to model simple situations;
- Be able to understand and apply the basic concepts of probability;
- Have a good understanding of linear and quadratic expressions, including an ability to plot these functions;
- Be able to solve small systems of equations;
- Understand functions and how they are used to model real-life situations;
- Be familiar with logarithms and exponentials and their applications to modelling;
- Be familiar with the concept of limits and their relationship to differentiation;
- Be able to use a variety of differentiation methods and understand some applications of differentiation;
- Understand the basic rules of integration;
- Be able to express mathematical ideas clearly, using correct notation.
Graduate Attributes:

On completion of this course the graduate will have developed the following attributes:

1. In-depth Knowledge of the Field of Study
   - An in-depth understanding and well-founded knowledge of the mathematics presented in this course, by encountering mathematical techniques and theorems, and using this material to solve problems.
   - An understanding of the breadth of mathematics, gained by encountering techniques to which the graduate has not previously been exposed.
   - An understanding of the applications of mathematics to relevant fields, by considering applications of mathematics to fields such as modelling, economics and engineering.

2. Effective Communication
   - An enhanced ability to present a logical sequence of reasoning using appropriate mathematical notation and language.
   - An enhanced ability to interact effectively with others in order to work towards a common goal, by discussing mathematical problems and trying to derive appropriate solutions.
   - An enhanced ability to select and use the appropriate level, style and means of written communication, using the symbolic, graphical, and diagrammatic forms relevant to the context, and displaying the ability to unambiguously and rigorously communicate mathematical facts and reasoning.

3. Independence and Creativity
   - An enhanced ability to work and learn independently, by needing to independently solve complex mathematical problems as part of assignment and examination work.
   - An enhanced ability to generate and synthesize ideas, by approaching difficult problems from a variety of different ways.
   - An enhanced ability to formulate problems mathematically, starting with a textual description, extracting the key mathematical components, and then applying appropriate mathematical skills and procedures to solve the problems.
   - An enhanced ability to generate approaches for the mathematical solution of problems including the identification and adaptation of existing methods.

4. Critical Judgement
   - The ability to define and analyse problems by identifying the key issues from a text-based scenario and solving the problem using appropriate mathematical techniques as part of assignments.
   - The ability to apply critical reasoning to issues through independent thought and informed judgement by encountering familiar and novel problems in assignments and exams.
   - The ability to evaluate opinions, make decisions and to reflect critically on the justifications for decisions through critiquing work from various sources, including passages from mathematical texts and websites as part of assignments.

5. Ethical and Social Understanding
   - A knowledge and respect of general ethical scientific standards, particularly in relation to working in the area of mathematics.
• An appreciation of the history of mathematics as an ongoing and important human activity.
• An appreciation of the power and importance of mathematics in affecting our culture and technology.

For more information on the University policy on development of graduate attributes in courses, refer to the web http://www.uq.edu.au/hupp/contents/view.asp?s1=3&s2=20&s3=5.

3. LEARNING RESOURCES

Required Resources:

There are two major teaching resources for this course: lecture notes and a study guide.

Each lecture, we will work through a number of pages of notes in the form of slides, writing various hints, solutions and comments on the notes.

In addition, MATH1040 has a study guide, which provides a form of “overview” for the lecture notes. It directs you to the important sections in the lecture notes, highlights key concepts and indicates where many students have difficulties.

The study guide also includes extra practice questions and solutions for each section of the lecture notes. Finally, the study guide gives previous exams (mid-semester and final) with worked solutions, which you can use to help with your study.

We strongly urge you to either purchase a copy of both the lecture notes ($13.20) and study guide ($11.25) from either the University Copy Shop or your lecturer, or that you print these from the web.

It is important that you obtain a copy of the notes from this year since they have changed greatly since last year.

Assignments, solutions, workbook questions and sample exams will all be distributed in lectures.

There is no text book for this course this year (previously, there was a text called Introductory Mathematics, with authors Petocz, Petocz and Wood, but this book did not cover much of the material from the course). However, if you know someone with a copy of the book who will let you borrow it, then it may be of some use to you. It is designed specifically for university students who have no more than a Grade 10 background in mathematics. There are three copies available in the PSE library; call number is QA11.P4 1992.

Recommended Resources:

If you wish to read more books on mathematics, then the following references are recommended.

• Ambrose, College Algebra (QA154.2.A4 1976)
• Enticknap and Morgan, Elementary Mathematics (QA39.2.E56 1980)
• Mueller and Albrecht, *Contemporary Algebra and Trigonometry* (QA152.2.M83 1975)
• Salas and Salas, *Precalculus* (QA39.2.S23 1975)
• Weinstein, *Precalculus Mathematics, a Fundamental Approach* (QA39.2./W43 1973)
• Faddeyev and Sominskii, *Elementary Algebra* (QA152.F1513 1965)
• Willerding and Hoffman, *College Algebra and Trigonometry* (QA154.W59 1971)
• Dupree and Harmon, *Modern College Algebra* (QA154.D93 1965)
• Mizrahi and Sullivan, *Calculus with Applications to Business and Life Sciences* (QA303.M688 1976)
• Dobson and Stokoe, *Self-Paced Introductory Mathematics* (QA37.2.D63 1979)

Additional course resources, past examination papers and subject area FindIts are available on the Library website ([http://www.library.uq.edu.au/eres/](http://www.library.uq.edu.au/eres/))

The University offers a range of resources and services to support student learning. Details are available on the myServices website ([https://student.my.uq.edu.au/](https://student.my.uq.edu.au/))

**Library contact:**
The liaison librarian for the physical sciences disciplines is located in the Physical Sciences and Engineering Library in the Hawken Building (at St Lucia) and may be consulted for assistance in the course:

Leith Woodall  
Email: lwoodall@library.uq.edu.au  
Extension: 52367

### 4. TEACHING AND LEARNING ACTIVITIES

MATH1040 is worth 2 units. There are four contact hours scheduled for each week. Check mySI-net for class times and rooms.

There are three hours of lectures per week. You should attend all of the lectures each week. We will work through lots of material in lectures and you should obtain a copy of the slides (see the section on “Learning Resources” above).

Each week there are three tutorial slots. You should attend at least one tutorial per week. There should be spare room in each time slot should you choose to attend multiple tutorials.

You will work through the weekly assignments in tutorials and have a chance to ask questions or receive personalised help. Tutorial problems for the whole semester will be handed out in the first week. Students are expected to consider these problems before attending tutorials. There will also be plenty of other problems if students would like extra work.
5. ASSESSMENT

Required assessment tasks:

Assessment will consist of weekly assignments, workbook entries, a mid-semester exam and a longer exam at the end of semester.

- The mid-semester exam will be approximately 1½ hours long. It is most likely that it will be held on Tuesday 11 April, although details of this will be finalised in the first week of class. It will contribute 25% towards the final assessment.

- Marks will be awarded for tutorial assignment work. In each of the 11 weeks, there will be a small assignment covering the concepts of the previous week’s class. Each assignment is marked by the tutor and awarded a mark out of twenty. Each assignment is equally weighted and marks from assignments will contribute 10% towards the final assessment.

- Marks will be also awarded for workbook entries. In each week of semester there will be some questions relating to the student’s experiences of maths, how they might better learn course material and how they would present mathematical material. Each entry will be compiled into a workbook, to be submitted in three stages. The lecturer will mark each stage out of 50 and marks from the entire workbook will contribute 15% towards the final assessment.

- The exam at the end of semester will be of two hours’ duration and will contribute 50% towards the final assessment. It will cover material from the entire course.

You are strongly urged to complete all items of assessment.

Assessment dates:

<table>
<thead>
<tr>
<th>Assignment 1</th>
<th>Wednesday 15/3</th>
<th>Week 3</th>
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<tr>
<td>Assignment 2</td>
<td>Wednesday 22/3</td>
<td>Week 4</td>
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<tr>
<td>Assignment 3</td>
<td>Wednesday 29/3</td>
<td>Week 5</td>
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<tr>
<td>Assignment 4</td>
<td>Wednesday 5/4</td>
<td>Week 6</td>
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<tr>
<td>Workbook section 1</td>
<td>Wednesday 5/4</td>
<td>Week 6</td>
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<tr>
<td>Mid-semester exam</td>
<td>Tuesday 11/4 (1pm to 3pm)</td>
<td>Week 7</td>
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**Mid-semester break 14/4 – 23/4**

**Anzac Day 25/4**

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<thead>
<tr>
<th>Assignment 5</th>
<th>Wednesday 26/4</th>
<th>Week 8</th>
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**Labour Day 1/5**

<table>
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<tr>
<th>Assignment 6</th>
<th>Wednesday 3/5</th>
<th>Week 9</th>
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<tbody>
<tr>
<td>Assignment 7</td>
<td>Wednesday 10/5</td>
<td>Week 10</td>
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<tr>
<td>Workbook section 2</td>
<td>Wednesday 10/5</td>
<td>Week 10</td>
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**Ipswich Show Holiday 11/5**

<table>
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<tr>
<th>Assignment 8</th>
<th>Wednesday 17/5</th>
<th>Week 11</th>
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<tr>
<td>Assignment 9</td>
<td>Wednesday 24/5</td>
<td>Week 12</td>
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<tr>
<td>Assignment 10</td>
<td>Wednesday 31/5</td>
<td>Week 13</td>
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<tr>
<td>Assignment 11</td>
<td>Friday 2/6</td>
<td>Week 13</td>
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<tr>
<td>Workbook section 3</td>
<td>Friday 2/6</td>
<td>Week 13</td>
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Assessment criteria

Answers to examination questions and tutorial exercises will be assessed in terms of the extent to which they demonstrate the ability of the student to:

- Accurately identify the problem to be solved;
- Choose and correctly apply appropriate mathematical techniques to problems;
- Present solutions clearly, using correct mathematical notation.

Answers to workbook questions will be assessed in terms of the extent to which they demonstrate the ability of the student to:

- Critically reflect upon their learning experience;
- Present entries with clarity, using appropriate language;
- Accurately present mathematical ideas;
- Establish creative techniques for better understand basic mathematical concepts;
- Critically assess other learning resources such as mathematical texts and websites.

Criteria for the award of grades:

To earn a **Grade of 7** a student must demonstrate an excellent understanding of the course material. This includes clear expression of nearly all their deductions and explanations, the use of appropriate and efficient mathematical techniques and accurate answers to nearly all questions and tasks with appropriate justification. They will be able to apply mathematical techniques to completely solve both theoretical and practical problems. Students who obtain a final mark of 85% or more will obtain a 7.

To earn a **Grade of 6** a student must demonstrate a comprehensive understanding of the course material. This includes clear expression of most of their deductions and explanations, the general use of appropriate and efficient mathematical techniques and accurate answers to most questions and tasks with appropriate justification. They will be able to apply mathematical techniques to partially solve both theoretical and practical problems. Students who obtain a final mark of between 75% and 84% will obtain a 6.

To earn a **Grade of 5** a student must demonstrate an adequate understanding of the course material. This includes clear expression of some of their deductions and explanations, the use of appropriate and efficient mathematical techniques in some situations and accurate answers to some questions and tasks with appropriate justification. They will be able to apply mathematical techniques to solve fundamental problems. Students who obtain a final mark of between 65% and 74% will obtain a 5.

To earn a **Grade of 4** a student must demonstrate an understanding of the basic concepts in the course material. This includes occasionally expressing their deductions and explanations clearly, the occasional use of appropriate and efficient mathematical techniques and accurate answers to a few questions and tasks with appropriate justification. They will have demonstrated knowledge of techniques used to solve problems and applied this knowledge in some cases. Students who obtain a final mark of between 50% and 64% will obtain a 4.
To earn a **Grade of 3** a student must demonstrate some understanding of the theory of the topics listed in the course outline and demonstrate some knowledge of the techniques used to solve problems, but fails to satisfy all the basic requirements for a pass.

To earn a **Grade of 2** a student must demonstrate some knowledge of the basic concepts in the course material. This includes attempts at expressing their deductions and explanations and attempts to answer a few questions accurately. Students who obtain a final mark of between 20% and 44% will obtain a 2.

A student will earn a **Grade of 1** if they show a poor knowledge of the basic concepts in the course material. This includes attempts at answering some questions but showing an extremely poor understanding of the key concepts. Students who obtain a final mark of less than 20% will obtain a 1.

### 6. POLICIES & GUIDELINES

**Assessment policy:**

Students should be familiar with the rules which relate to assessment in their degrees as well as general university policy such as found in the General Award Rules. These are all set out on the myAdvisor page on the UQ website ([http://www.uq.edu.au/student/GeneralRules2006/2006GARs.htm](http://www.uq.edu.au/student/GeneralRules2006/2006GARs.htm))

**Policy on late submission of material:**
If you cannot sit the mid-semester exam at the scheduled time, you should contact the lecturer, who will try to make alternate arrangements for you to sit the exam at a suitable time within the next teaching week. If this is not possible, then your final grade will be calculated without considering the mark for the mid-semester exam.

Late assignments or workbook sections will only be accepted on the basis of medical certificates or other appropriate reasons. You should contact the lecturer for any advice.

**Calculators:**
Calculators will not be permitted in either exam. If you can do basic arithmetic, then you shouldn’t need one. We will advise you of any unusual numbers you need (e.g. we may say “Note that sin(30) = 0.5”).

However, you may use a calculator when completing tutorial assignments and workbook entries.

**Plagiarism:**

The University has adopted the following definition of plagiarism:
“Plagiarism is the action or practice of taking and using as one’s own the thoughts or writings of another, without acknowledgment. The following practices constitute acts of plagiarism and are a major infringement of the University's academic values:

- Where paragraphs, sentences, a single sentence or significant parts of a sentence are copied directly, and are not enclosed in quotation marks and appropriately footnoted;

- Where direct quotations are not used, but are paraphrased or summarised, and the source of the material is not acknowledged either by footnoting or other simple reference within the text of the paper; and

- Where an idea which appears elsewhere in printed, electronic or audio-visual material is used or developed without reference being made to the author or the source of that material.”

When a student knowingly plagiarises someone’s work, there is intent to gain an advantage and this may constitute misconduct.

Students are encouraged to study together and to discuss ideas, but this should not result in students handing in the same or similar assessment work. Do not allow another student to copy your work. While students may discuss approaches to tackling a tutorial problem, care must be taken to submit individual and different answers to the problem. Submitting the same or largely similar answers to an assignment or tutorial problem may constitute misconduct, and various actions (such as grading that piece of assessment as worth 0 marks or more formal and serious penalties) may be undertaken against you.


**Supplementary examinations:**

A supplementary examination may be awarded in one course to students who obtain a grade of 2 or 3 in the final semester of their program and require this course to finish their degree. You should check the rules for your degree program for information on the possible award of supplementary examinations. Applications for supplementary examinations must be made to the Director of Studies in the Faculty.

**Special examinations:**

If a student is unable to sit a scheduled examination for medical or other adverse reasons, she/he can and should apply for a special examination. Applications made on medical grounds should be accompanied by a medical certificate; those on other grounds must be supported by a personal declaration stating the facts on which the application relies.

Applications for special examinations for central and end-of-semester exams must be made through the Student Centre. Applications for special examinations in school exams are made to the course coordinator.

EPSA Faculty policy on the award of special and supplementary exams may be found via the Faculty Guidelines on Examinations from the EPSA student page http://www.epsa.uq.edu.au/index.html?page=9329&pid=0 for special exams and http://www.epsa.uq.edu.au/index.html?page=7675&pid=0 for supplementary exams.

**Feedback on assessment:**

You may request feedback on assessment in this course progressively throughout the semester from the course coordinator. Feedback on assessment may include discussion, written comments on work, model answers, lists of common mistakes and the like.

Students may peruse examinations scripts and obtain feedback on performance in a final examination provided that the request is made within six months of the release of final course results. After a period of twelve months following the release of results, examination scripts may be destroyed.

Information on the University’s policy on access to feedback on assessment may be found at http://www.uq.edu.au/hupp/index.html?page=25114&pid=25075

EPSA Faculty policy on assessment feedback and re-marking may be found at http://www.epsa.uq.edu.au/index.html?page=7674&pid=7564

**Students with disabilities:**

Any student with a disability who may require alternative academic arrangements in the course is encouraged to seek advice at the commencement of the semester from a Disability Adviser at Student Support Services. Refer to the University policy – Students with A Disability (Disability Action plan) HUPP 3.40.6

**Assistance for Students:**

Students with English language difficulties should contact the course coordinator or tutors for the course.

Students with English language difficulties who require development of their English skills should contact the Institute for Continuing and TESOL Education on extension 56565.

The Learning Assistance Unit located in the Relaxation Block in Student Support Services. You may consult learning advisers in the unit to provide assistance with study skills, writing assignments and the like. Individual sessions are available. Student Support Services also offers workshops to assist students. For more information, phone 51704 or on the web http://www.sss.uq.edu.au/index.html.

**Student Liaison Officer:**

The School of Physical Sciences has a Student Liaison Officer as an independent source of advice to assist students with resolving academic difficulties.
The Student Liaison officer during 2006 will be Professor Peter Adams, Room 547 Priestley Building (email pa@maths.uq.edu.au).

Other Policies and Guidelines:

Occupational Health and Safety: Students should be familiar with the University policy on Occupational Health and Safety in the Laboratory (Undergraduate Student) HUPP 2.30.14

Course Learning Summary:

- Numbers and arithmetic;
- Algebra;
- Summation notation;
- Introduction to Sets;
- Probability;
- Straight lines and their graphs;
- Intersecting lines and simultaneous equations;
- Functions;
- Quadratic equations and polynomials;
- Logarithms and exponentials;
- Miscellaneous non-linear functions;
- Introductory trigonometry;
- Simple limits;
- Derivatives and rates of change;
- Applications of derivatives;
- Integration