Discrete Mathematics

MATH1061/7861 (lps)

Lecturer: Dr Phillip Isaac.
Note that this profile refers only to the Ipswich campus, and the St Lucia version of the course is different. Lectures and assessment are not the same between campuses.

Course content

The following is intended as a rough guide only.

- Propositional logic, valid arguments, predicate logic
- Elementary number theory
- Mathematical Induction
- Elementary set theory
- Elementary graph theory
- Relations
- Functions
- Algebraic Structures and their applications
- Counting methods and probability
- Recursion

Lecturer

Dr Phillip Isaac
Department of Mathematics (St Lucia)
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Consultation hours:
Since my office is at St Lucia and this course is taught at Ipswich, office hours can be used to contact me by telephone. However, email is a better choice. In addition, I will also be at the Ipswich campus for most of Tuesday, and will attend all tutorial classes, so I am available for consultation then.

Class contact hours: 3L, 1C, 1T
Assumed background:
A sound background in high school mathematics or equivalent (eg. MATH1040).

Course objective:
The broad aim of this course is to provide students with a solid basis for mathematical reasoning and the opportunity to apply this reasoning to problems in mathematics. It is expected that when students complete this course they will be able to construct logically correct and mathematically sound proofs. They will also have met the concepts of logic, set theory, relations, induction, principles of counting, probability, algebraic structures and elementary number theory, all of which play an important role in computer science and mathematics.

Graduate Attributes:
On completion of the 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, 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 computer hardware design, programming and logic.

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.
   - 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.

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 problems from a variety of different ways.
   - an enhanced ability to formulate problems mathematically.
• an enhanced ability to generate approaches for the mathematical solution of problems including the identification and adaptation of existing methods.

4. 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 human endeavour.
• 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


Teaching and Learning Methods

Note that all classes are scheduled for Tuesday. Class times each week are as follows (rooms are available if you visit mySI-net.)

• a THREE-hour lecture: Tuesday 9am – 12 noon, room 12-109
• a ONE-hour contact class: Tuesday 1pm – 2pm, room 12-108
• a ONE-hour tutorial: Tuesday 2pm – 3pm, either room 2-107 or 2-108

It is expected that students will attend all classes.

Note that this course is being presented in flexible delivery mode. Thus there may be some blurring between the different types of class each week. Lectures will follow a reasonably traditional format, with material being presented to you. In contact classes, you will be given additional problems to solve, and we may have some discussion. During tutorials, you will work on tutorial sheets or assignments, with help from tutors. Some weeks we may have shorter lectures and longer contact classes.

Course Materials: This course includes the following materials, some of which will be distributed during semester. The most important teaching resources (which you will require at the start of semester) are items (2) and (3). We will distribute (3) in the first lecture, and you should aim to purchase the textbook (item (2)) before semester starts.

1. Course Profile
3. Workbook: This is a companion workbook to the textbook, containing a skeleton of the lecture notes, extra readings and additional information. We will distribute the workbook for free to students enrolled at Ipswich.
4. Study Guide: A summary of the material to be covered in the course.
5. Course Web Pages: The web pages contain administrative information about the course and also the solutions to all of the examples in the workbook.
Textbook and references


The following books are also available in The University of Queensland, PSE Library or the Undergraduate Library, if you wish to access them.


Library contact:
The liaison librarian for Mathematics is located in the Physical Sciences and Engineering Library in the Hawken Building and may be consulted for assistance in the course:

Leith Woodall
Email: l.woodall@library.uq.edu.au
Extension: 33652367

ASSESSMENT

There will be 4 assignments in this course, each worth 5% of your final grade.

There will be two mid-semester tests in this course, each worth 15% of your final grade. Each test will be 40 minutes long and will be held during usual Tuesday class times. The first test will be held on Tuesday 23 August and will cover weeks 1-4 of lectures. The second test will be held on Tuesday 4 October (first week back after the mid-semester break) and will cover the lecture material from weeks 5-9.

There will be a 2-hour end of semester examination, worth 50% of your final grade, which will cover the entire course material. The end of semester exam will be timetabled by the university administration later in the semester and more details will be given in lectures.

If you cannot sit one of the mid-semester tests at the scheduled time, you should contact the lecturer, who will try to make alternative arrangements for you to sit the test at a suitable time within the following week.

Failure to complete any item of assessment will result in your receiving no credit for that component of the assessment. Late assignments will be accepted prior to solutions being distributed (roughly one week after the due date) on the basis of medical certificates or other compelling reasons. You should contact the lecturer for any advice.
Summary of assessment tasks

<table>
<thead>
<tr>
<th>Assessment Item</th>
<th>Assign. 1</th>
<th>Mid-sem. Test 1</th>
<th>Assign. 2</th>
<th>Assign. 3</th>
<th>Mid-sem. Test 2</th>
<th>Assign. 4</th>
<th>Final Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weighting</td>
<td>5%</td>
<td>15%</td>
<td>5%</td>
<td>5%</td>
<td>15%</td>
<td>5%</td>
<td>50%</td>
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**Study Chart:** A rough study timetable is given below. The assessment dates are firm, but there may be variations to the timetable for covering course material. In particular, we may focus more or less heavily of various parts of the course, and may add or delete sections.

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture date</th>
<th>Approximate course material</th>
<th>Assessment due dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tues 26 July</td>
<td>Chapter 1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Tues 2 Aug</td>
<td>Chapters 1 and 2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tues 9 Aug</td>
<td>Chapter 3</td>
<td>Tues 9 Aug: Assign 1 due</td>
</tr>
<tr>
<td>4</td>
<td>Tues 16 Aug</td>
<td>Chapter 3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Tues 23 Aug</td>
<td>Chapter 4</td>
<td>Tues 23 Aug: TEST 1</td>
</tr>
<tr>
<td>6</td>
<td>Tues 30 Aug</td>
<td>Chapter 5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Tues 6 Sept</td>
<td>Chapter 11</td>
<td>Tues 6 Sept: Assign 2 due</td>
</tr>
<tr>
<td>8</td>
<td>Tues 13 Sept</td>
<td>Chapter 10</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Tues 20 Sept</td>
<td>Chapter 7</td>
<td>Tues 20 Sept: Assign 3 due</td>
</tr>
<tr>
<td></td>
<td>BREAK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Tues 4 Oct</td>
<td>Chapter 7, Extra material G</td>
<td>Tues 4 Oct: TEST 2</td>
</tr>
<tr>
<td>11</td>
<td>Tues 11 Oct</td>
<td>Chapter 6</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Tues 18 Oct</td>
<td>Chapter 6</td>
<td>Tues 18 Oct: Assign 4 due</td>
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<tr>
<td>13</td>
<td>Tues 25 Oct</td>
<td>Revision</td>
<td></td>
</tr>
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</table>
Assessment criteria

Solutions submitted for each piece of submitted work will be marked for accuracy, appropriateness of mathematical techniques and clarity of presentation, as will be demonstrated by exemplars presented in lectures. Sample marking schemes will be discussed in lectures.

To earn a Grade of 7, a student must demonstrate an excellent understanding of concepts presented in this course. This includes clear expression of nearly all deductions and explanations, the use of appropriate and efficient mathematical techniques and accurate answers to nearly all questions and tasks with appropriate justification. A final mark of 85% or more will result in a grade of 7.

To earn a Grade of 6, a student must demonstrate a comprehensive understanding of concepts presented in this course. 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. A final mark of between 75% and 84% will result in a grade of 6.

To earn a Grade of 5, a student must demonstrate an adequate understanding of the concepts presented in this course. 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. A final mark of between 65% and 74% will result in a grade of 5.

To earn a Grade of 4, a student must demonstrate an understanding of the basic concepts presented in this course. 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. A final mark of between 50% and 64% will result in a grade of 4.

To earn a Grade of 3, a student must demonstrate some knowledge of the basic concepts presented in this course. This includes occasional expression of their deductions and explanations, the use of a few appropriate and efficient mathematical techniques and attempts to answer a few questions accurately and with appropriate justification. They will have demonstrated knowledge of techniques used to solve problems. A final mark of 45% - 49% will result in a grade of 3.

To earn a Grade of 2, a student must demonstrate some knowledge of the concepts presented in this course. This includes attempts at expressing their deductions and explanations and attempts to answer a few questions accurately. A final mark of 20% - 44% will result in a grade of 2.

A student will earn a Grade of 1 if they show a poor knowledge of the basic concepts presented in this course. This includes attempts at answering some questions but showing an extremely poor understanding of the key concepts. A final mark of 19% or less will result in a grade of 1.
Course homepage

http://www.maths.uq.edu.au/courses/MATH1061Ips

Any changes to course information will be announced in lectures and the information will be reproduced on this page. It is your responsibility to keep up to date with all information presented in your lecture group.

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 Program and Course Information page on the UQ website


Plagiarism:

Below is the University’s definition of plagiarism

Plagiarism is the action or practice of taking and using as one’s own the thoughts or writings of another (without acknowledgement). The following practices constitute acts of plagiarism and are a major infringement of the University’s academic values:

(a) where paragraphs, sentences, a single sentence or significant part of a sentence which are copied directly, are not enclosed in quotation marks and appropriately footnoted;

(b) 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;

(c) where an idea which appears elsewhere in print, film or electronic medium is used or developed without reference being made to the author or the source of that idea.

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.

For more information on the University policy on plagiarism, please refer to

http://www.uq.edu.au/hupp/contents/view.asp?s1=3&s2=40&s3=12
Supplementary examinations

In some programs, 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. EPSA Faculty policy on the award of supplementary exams may be found at


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.

More information on the University’s examination policy may be found at


EPSA Faculty policy on the award of supplementary exams may be found at


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 six 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


EPSA Faculty policy on feedback and re-marking may be found at

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.

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 visit the web page 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 semester 2 2005 will be Dr Peter Adams, room 547 Priestley building, (email pa@maths.uq.edu.au)