DISCRETE MATHEMATICS

MATH1061/7861

Lecturer: Dr Diane Donovan/James LeFevre.
Course content
Topics will include (but not necessarily in this order):

1. Propositional logic, valid arguments, predicate logic
2. Elementary number theory
3. Induction
4. Elementary set theory
5. Elementary graph theory
6. Relations
7. Functions
8. Algebraic Structures and their applications.
9. Counting methods and probability
10. Recursion

Lecturer

Name: Dr Diane Donovan.
Room number/Building: Room 548 Priestley Building (Mathematics).
Phone number: Telephone: 3365 1354 [secretaries 3365 3277].
Email: dmd@maths.uq.edu.au
Consultation hours or Office hours: Monday 2pm and Wednesday 10 am

Name: Mr James LeFevre.
Room number/Building: Room 541 Priestley Building (Mathematics).
Phone number: Telephone: 3365 61421 [secretaries 3365 3277].
Email: jgl@maths.uq.edu.au
Consultation hours or Office hours: Monday 2pm and Wednesday 10 am

Web page: The course profile and course material can be found on the web at the following address: http://www.maths.uq.edu.au/~dmd/teaching/MATH1061/MATH1061-2-2005.htm 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: 3 Lectures (Monday 1pm, and Wednesday 9am and 12noon) 1 Tutorial. See mySInet (https://www.sinet.uq.edu.au/uqsa76pd/UQ/SysCont/syco_di_gst_home.asp) for times of tutorials, contact hours and for room numbers.

Assumed background: A sound background in High School Mathematics.
Course goals/rationale: 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:

IN-DEPTH KNOWLEDGE OF THE FIELD OF STUDY

- An in-depth understanding and well-founded knowledge of the mathematics presented in this course.
- An understanding of the breadth of mathematics.
- An understanding of the applications of mathematics to relevant fields.

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.
- 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.

INDEPENDENCE AND CREATIVITY

- An enhanced ability to work and learn independently.
- An enhanced ability to generate and synthesise ideas.
- 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.

ETHICAL AND SOCIAL UNDERSTANDING

- A knowledge and respect of ethical standards 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 of mathematics to affect our culture and technology.

The development of graduate attributes through course content, learning modes and assessment is outlined in the following table.
<table>
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<tr>
<th>Learning experiences</th>
<th>Lectures</th>
<th>Tutorials</th>
<th>Assignments</th>
<th>Independent study</th>
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</thead>
</table>
| **In-depth knowledge of the field of study** | Subject matter covered  
Synthesis of links across a number of concepts | Exploring depth of concepts through guided exercises which augment material presented in lectures | Exploration and evaluation of deeper concepts. | Guided study of prescribed text and associated reading material |
| **Effective Communication** | Listening, note-taking, questions | Comprehending and writing | The production of own solutions to set exercises. | The production of own solutions to ancillary study material available through the course webpage. |
| **Independence and creativity** | Production of own solutions to carefully selected problems | Individual approach to solution of problems | Studying independently. | |
| **Ethical and social understanding** | Through the discussion of application | Through the preparation of assessable material. | | |


**ASSESSMENT, Required assessment tasks:**

**METHOD OF ASSESSMENT:** There will be both formative and summative assessment in this course. The **Final Grade** in this course will be the aggregate of three components, as set out below.

- 20% for the best 8 of 9 weekly assignments;
- 20% for mid-semester exam
- 60% from a two hour end-of-semester examination.

Students who fail to submit at least 8 assignments you will receive a grade of 0% for the missing assignments and students who fail to sit the mid-semester or final exam will also receive 0% for this component.

**MID-SEMESTER EXAMINATION:** The mid-semeter exam will be held at 1 pm, on 12th September in a room 67-141. To give students an indication of the standard of the mid-semester exam, a copy of a practice mid-semester exam has been included in the course material. Students who have a compelling reason and are unable to attend the mid-semester exam may request in writing an alternate time. The request should be addressed to the Head of the Mathematics Department, The University of Queensland, stating the reason for the
absence. If the request is granted the student will be advised, in lectures and on the Course Web Page, of the alternate date, closer to the time. If a student is ill and unable to attend this exam then he/she must obtain a medical certificate and contact the lecturers by 19 September 2005.

**END OF SEMESTER EXAMINATION:** For the END OF SEMESTER EXAM ONLY students will be able to take one A4 sheet of paper with anything HAND WRITTEN on it. It must be in the student's own handwriting. The end of semester exam will be timetabled by the University administration later in the semester. Copies of the exam timetable are available on the University of Queensland website [http://www.uq.edu.au](http://www.uq.edu.au) and will also be posted in the various libraries around campus. This exam will be of 2 hours duration, with 10 minutes perusal time and will be based on the entire semester’s work. To give students an indication of the standard of the end of semester exam, a copy of the past end of semester exam has been included in the course material. Students may also look at any past MATH1061 or MATH7861 (see also MT161/861) exam paper. Copies of these are available either in the PSE library or from the university's webpage.

**ASSIGNMENT QUESTIONS:** Assignments will be handed out and they are available on the course webpage. Students must hand all assignments in to the box labelled MATH1061/7861 on level 4 of the Mathematics Building, (number 67) by 5pm Thursday. It is not possible for lecturers to collect assignments. The assignments will be marked, and returned to you at your tutorial. Solutions to assignment questions will be available on the web.

Please see the attached Weekly Planner for a week-by-week plan.

**Late ASSIGNMENTS** will only be accepted with a medical certificate and within a week of the due date.

**Assessment criteria**

List the assessment criteria by which the student’s level of achievement in the course will be judged.

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

- Define, explain and interrelate the key concepts involved in the course and the individual research topic chosen for the essay.
- Apply the theory to solve associated problems presented in familiar and unfamiliar settings.
- Present accurate and logical solutions to prepared assignment problems.

**Criteria for the award of grades**

Your grade for this course will be determined by which of the following levels of achievement that you consistently display in the items of summative assessment.

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.

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.

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.

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.

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 and tasks accurately and with appropriate justification. They will have demonstrated knowledge of techniques used to solve problems.

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 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.

Assessment policy

Students who do not submit assignments or sit the midsemester exam, or the final exam will receive a mark of 0 for the relevant missed component.

Assignments are due by 5pm on the appropriate Thursday. (See planner for specific dates.) Late assignments will only be accepted for valid reasons, such as a doctor's certificate. The student must contact the lecturer within 1 week of the due date.

If assignments are found to be plagiarised, a mark of zero will be given.

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


Plagiarism:

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.

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.

If assignments or the written essay are found to be plagiarised, a mark of zero will be given.

For more information on the University policy on plagiarism, please refer to http://www.uq.edu.au/hupp/index.html?page=25128&pid=25075

**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.

EPSA Faculty policy on the award of 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=7640&pid=7563

**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 assessment policy may be found

EPSA Faculty policy on the award of special exams may be found via the Faculty Guidelines on Examinations from the EPSA student page

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 assessment feedback and re-marking may be found at

Teaching and Learning Methods

Subject material will be presented in lectures, and it is expected that all students will attend all lectures. Detailed notes will be supplied to the students. There will be ten tutorial sheets and students are expected to work through all problems in these tutorial sheets. Solutions will be placed on the web at a later date. If students do not understand techniques or solutions presented in lectures or tutorial sheet then you should seek assistance from the lecturer. Students are expected to revise all material for the end of semester examination.


WORKBOOK: This is a companion workbook to the set text, containing learning activities, problems and additional information. Students may buy a copy from Union Copying Services (UQ Union complex) or down-load a copy of from the Course Web Page.

ADDITIONAL RESOURCE MATERIALS: The following are also available in the University of Queensland, PSE Library or the Undergraduate Library:


**Library contact:**
The liaison librarian for the physical sciences disciplines 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: lwoodall@library.uq.edu.au  
Extension: 52367

**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 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 2005 will be Dr Peter Adams, Room 547 Priestley building, (email pa@maths.uq.edu.au)
### WEEKLY PLANNER:

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<th>Date</th>
<th>Important Information</th>
<th>Assignment</th>
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<tr>
<td>1</td>
<td>Jul 25</td>
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<tr>
<td>2</td>
<td>Aug 1</td>
<td>Essay Topics Available</td>
<td>Assignment 1 due by 5pm on 4/8/05</td>
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<td>3</td>
<td>Aug 8</td>
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<td>Assignment 2 due by 5pm on 11/8/05</td>
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<td>4</td>
<td>Aug 15</td>
<td>Wednesday a public holiday</td>
<td>No assignment due</td>
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<td>5</td>
<td>Aug 22</td>
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<td>Assignment 3 due by 5pm on 25/8/05</td>
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<td>6</td>
<td>Aug 29</td>
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<td>Assignment 4 due by 5pm on 1/9/05</td>
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<td>7</td>
<td>Sep 5</td>
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<td>Assignment 5 due by 5pm on 8/9/05</td>
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<td>8</td>
<td>Sep 12</td>
<td>Midsemester exam 1 pm Monday 12\textsuperscript{th} of September</td>
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<td>9</td>
<td>Sep 19</td>
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<td>Assignment 6 due by 5pm on 22/9/05</td>
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<td>Sep 26</td>
<td>Mid semester break</td>
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<td>10</td>
<td>Oct 3</td>
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<td>Assignment 7 due by 5pm on 6/10/05</td>
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<td>11</td>
<td>Oct 10</td>
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<td>Assignment 8 due by 5pm on 13/10/05</td>
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<td>Oct 17</td>
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<td>Assignment 9 due by 5pm on 120/10/05</td>
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<td>Oct 24</td>
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<td>Revision Period</td>
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