MONASH University
Information Technology

MAT1841
Mathematics for computer science 1

Unit Guide

Semester 1, 2010

Last updated: 19 Feb 2010

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MAT1841 Mathematics for computer science 1 - Semester 1, 2010

Chief Examiner:

Tom Hall

Contact hours: 1:00 - 2:00 Monday

Lecturer(s) / Leader(s):

Clayton

Tom Hall

Contact hours: 1:00 - 2:00 Monday

Introduction

Welcome to MAT1841, Mathematics for Computer Science 1. This 6 point unit is one of two mathematics units in first year that provide mathematical strategies and ways of thinking that will help throughout the course.

Unit synopsis

Linear algebra: vectors and matrices, Matrix algebra with applications to flow problems and Markov chains; matrix inversion methods. Probability and combinatorics: elementary probability theory, random variables, probability distributions, expected value; counting arguments in combinatorics; statistics for Experimental Design. Calculus: Partial differentiation, finding maximum and minimum of functions of several variables and constructing Taylor series expansions.

Learning outcomes

At the completion of this unit students will:

- have knowledge of linear algebra, elementary probability theory, experimental design, and elementary calculus;
- have an understanding of the basics of linear algebra, the principles of probability and experimental design, counting principles in combinatorics, and the fundamentals of calculus;
- have skills to manipulate matrices, design simple quantitative experiments, differentiate functions of several variables, find the maximum and minimum of functions of several variables, and construct Taylor series for functions.

Contact hours

3 hrs lectures/wk, 1 hr tutorial/wk

Workload

3 lecture hours

1 practice class hour

5 hours of study and work on exercise sheets

Unit relationships

Prohibitions

GAS1601, GAS1613, GAS1614, GAS1631, GAS1641

Teaching and learning method

Teaching approach

3 hours of lectures, 1 hour of practice class and 5 to 10 hours of study per week.

Mathematics is learnt by doing, that is, doing the exercises set for each week. Mathematics cannot be learned by just reading.

Timetable information

For information on timetabling for on-campus classes please refer to MUTTS, http://mutts.monash.edu.au/MUTTS/

Tutorial allocation

On-campus students should register for tutorials/laboratories using the Allocate+ system: http://allocate.its.monash.edu.au/

Unit Schedule

Week	Date*	Topic	Study guide	Key dates
1	01/03/10	Selections and arrangements, Pascal's triangle, Techniques of counting	Lecture Booklet	
2	08/03/10	Partitions, Combinatorial identities, Inclusion and Exclusion, pigeonhole principle	Lecture Booklet	
3	15/03/10	Elementary probability theory, Bayesian analysis. Random variables: discrete, continuous	Lecture Booklet	
4	22/03/10	Mean and standard deviation, Binomial distribution, Normal distribution, t-distribution	Lecture Booklet	
5	29/03/10	Systems of linear equations, Gaussian elimination	Lecture Booklet	Assignment 1 due Thursday 25 March
Mid semester break				
6	12/04/10	Homogeneous systems, Application to network flow, Matrix algebra	Lecture Booklet	
7	19/04/10	Application to Markov chains	Lecture Booklet	
8	26/04/10	Matrix inverses, Determinants, Application to coding	Lecture Booklet	Assignment 2 due Thursday 22 April
9	03/05/10	Differentiation of functions	Lecture Booklet	
10	10/05/10	Parametric differentiation, higher differentiation Power series and Taylor polynomials	Lecture Booklet	
11	17/05/10	Functions of several variables, partial differentiation, Tangent planes and linear approximations, Higher partial derivatives	Lecture Booklet	Assignment 3 due Thursday 20 May
12	24/05/10		Lecture Booklet	

		Taylor polynomial of degree 2 (quadratic approximation), Stationary points, Second derivative test for functions of 2 variables		
13	31/05/10	Revision work on past exams	Past exams	

*Please note that these dates may only apply to Australian campuses of Monash University. Off-shore students need to check the dates with their unit leader.

Unit Resources

Prescribed text(s) and readings

There are no set textbooks but the following are for reference:

Nicholson, W.K., Elementary Linear Algebra with Applications (3rd ed.), PWS-Kent 1990 Box, G.P.E., Statistics for Experimenters, New York: Wiley, c1978. Hargrave-Andrew Library 001.424 B788S Street, A.P. and Wallis, W.D., Combinatorics : a first course, Winnipeg, Canada: Charles Babbage Research Centre, 1982. Mos 511.5 S915Co Stewart, J., Calculus (5th ed,), Thomson Brooks/Cole, 2003, Hargrave-Andrew Library 513.61 S849C Text books are available from the Monash University Book Shops. Availability from other suppliers cannot be assured. The Bookshop orders texts in specifically for this unit. You are advised to purchase your text book early.

Recommended text(s) and readings

There are no set textbooks but the following are for reference:

Nicholson, W.K., Elementary Linear Algebra with Applications (3rd ed.), PWS-Kent 1990 Box, G.P.E., Statistics for Experimenters, New York: Wiley, c1978. Hargrave-Andrew Library 001.424 B788S Street, A.P. and Wallis, W.D., Combinatorics : a first course, Winnipeg, Canada: Charles Babbage Research Centre, 1982. Mos 511.5 S915Co Stewart, J., Calculus (5th ed,), Thomson Brooks/Cole, 2003, Hargrave-Andrew Library 513.61 S849C

Equipment and consumables required or provided

Students studying off-campus are required to have the minimum system configuration specified by the Faculty as a condition of accepting admission, and regular Internet access. On-campus students, and those studying at supported study locations may use the facilities available in the computing labs. Information about computer use for students is available from the ITS Student Resource Guide in the Monash University Handbook. You will need to allocate up to **2** hours per week for use of a computer, including time for newsgroups/discussion groups.

Study resources

Study resources we will provide for your study are:

Lectures

Practice classes and exercise sheets

Sample exam and suggested solutions in lecture

Assessment

Overview

Examination (3 hours): 70%; In-semester assessment: 30%

Faculty assessment policy

To pass a unit which includes an examination as part of the assessment a student must obtain:

- 40% or more in the unit's examination, and
- 40% or more in the unit's total non-examination assessment, and
- an overall unit mark of 50% or more.

If a student does not achieve 40% or more in the unit examination or the unit non-examination total assessment, and the total mark for the unit is greater than 50% then a mark of no greater than 49-N will be recorded for the unit.

Examination

- **Weighting:** 70%
  Length: 3 hours
  Type (open/closed book): Closed book
  Remarks:

  Calculators are not permitted to be taken into the exam, and will not be needed. Where a calculation would be needed, the expression to be evaluated can be written and left without evaluation, and marks will not be reduced for no evaluation.

See Appendix for End of semester special consideration / deferred exams process.

Due dates and extensions

Please make every effort to submit work by the due dates. It is your responsibility to structure your study program around assignment deadlines, family, work and other commitments. Factors such as normal work pressures, vacations, etc. are not regarded as appropriate reasons for granting extensions. Students are advised to NOT assume that granting of an extension is a matter of course.

Students requesting an extension for any assessment during semester (eg. Assignments, tests or presentations) are required to submit a Special Consideration application form (in-semester exam/assessment task), along with original copies of supporting documentation, directly to their lecturer within two working days before the assessment submission deadline. Lecturers will provide specific outcomes directly to students via email within 2 working days. The lecturer reserves the right to refuse late applications.

A copy of the email or other written communication of an extension must be attached to the assignment submission.

Refer to the Faculty Special consideration webpage or further details and to access application forms: http://www.infotech.monash.edu.au/resources/student/equity/special-consideration.html

Late assignment

Assignments received after the due date will be subject to a penalty of **5% per day, including weekends. Assignments received later than one week (seven days) after the due date will not normally be accepted. In some cases, this period may be shorter if there is a need to release sample solutions.**

Return dates

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.

Appendix

Please visit the following URL: http://www.infotech.monash.edu.au/units/appendix.html for further information about:

- Continuous improvement
- Unit evaluations
- Communication, participation and feedback
- Library access
- Monash University Studies Online (MUSO)
- Plagiarism, cheating and collusion
- Register of counselling about plagiarism
- Non-discriminatory language
- Students with disability
- End of semester special consideration / deferred exams