DEPARTMENT OF MATHEMATICS

MATH2300 Linear Algebra and Graph Theory (#2)

Second Semester 2002

Prerequisite: MATH1051 or MT151
Incompatible: MP204 or 274 or 316 or MT252

Lecturers:

Linear Algebra:
Abdollah Khodkar
Room: 67-703; Telephone: 33652302
Email: ak@maths.uq.edu.au
Consultation Hours: Monday and Tuesday 3pm-4pm.

Graph Theory:
Darryn Bryant
Room: 67-540; Telephone: 33651342
Email: db@maths.uq.edu.au
Consultation Hours: Wednesday 2pm.-4pm.

You are welcome to see me at any time. If you knock and I'm not in, you may leave a note under the door. Please feel free to come and see me if you have any questions, concerns or problems.

Lectures:
Monday 11am–12noon Room 67-240,
Thursday 11am–12noon Room 68-320 and
Friday 11am–12noon Room 7-173.

Tutorials: Wednesday and Friday 1pm–2pm Room 43–105.

Assessment:

There will be three tests held in class during the semester and an end of semester examination. Each test is worth 25% and the end of semester examination is also worth 25%. There will be six assignments for Linear Algebra. Each assignment is worth 1%. This extra 6% is a bonus.

Test 1: Monday August 19 in the lecture.
Test 2: Friday September 13 in the lecture.
Test 3: Friday October 18 in the lecture.
End of semester examination in exam period.

Students should refer to Part 5 of the Assessment Rules - Conduct of Examinations.

Assessment Criteria:

Solutions will be marked for accuracy, appropriateness of mathematical techniques and clarity of presentation as will be demonstrated by examples in notes and lectures.

To earn a Grade of 7, a student must achieve a final mark between 85 - 100 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.

To earn a Grade of 6, a student must achieve a final mark between 75 - 84 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.

To earn a Grade of 5, a student must achieve a final mark between 65 - 74 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.

To earn a Grade of 4, a student must achieve a final mark between 50 - 64 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.

To earn a Grade of 3, a student must achieve a final mark between 45 - 49 material. 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 and applied this knowledge in some cases.

To earn a Grade of 2, a student must achieve a final mark between 20 - 44 material. This includes attempts at expressing their deductions and explanations and attempts to answer a few questions accurately.

To earn a Grade of 1, a student must achieve a final mark between 0 - 19 extremely poor understanding of the key concepts.

Textbooks:

There are many books in the PSE and Undergraduate Libraries which touch on the subject. Here are some useful ones.

Linear Algebra:

1. Elementary Linear Algebra, H. Anton, QA184.A571984 (KAD).
2. Linear Algebra and Applications, C. Cullen, QA184.C851988.
3. Linear Algebra, C.W. Curtis, QA184.C871984.
4. Linear Algebra, S.H. Friedberg, A.J. Insel, L.E. Spence, QA184.F81989.
5. Elementary Linear Algebra, R.E. Larson and B.H. Edwards, QA184.L391991 (KAD).
6. Linear Algebra with Applications, S.J. Leon, QA184.L461998 (KAD).
7. Linear Algebra, S. Lipschutz, QA251.L531991.
8. Fundamental structures of algebra, G.D. Mostow, J.H. Sampson, J.-P. Meyer, QA154.M861963 (honours standard).
9. Linear Algebra, M. O'Nan, QA184.O51976.
10. Linear Algebra, L. Smith, QA184.S6319781.
11. Matrix theory and linear algebra, I.N. Herstein, David J. Winter, QA188.H471988.

Graph Theory:

1. Gary Chartrand and Ortrud R. Oellermann, Applied and Algorithmic Graph Theory, McGraw-Hill International Editions, 1993.
2. J.A. Bondy and U.S.R. Murty, Graph Theory with Applications, QA166.B64 1976.
3. F.S. Roberts, Applied Combinatorics, QA164.R6 1984.
4. Tucker, Applied Combinatorics, QA166.T78 1980.
5. F. Harary, Graph theory, QA166.H37 1969.
6. Gary Chartrand and Linda Lesniak, Graphs and Digraphs, (second edition), QA166.B36 1986.
7. Douglas B. West, Introduction to Graph Theory, QA166.W43 1996.

8. Robin J. Wilson, Introduction to Graph Theory (second edition), QA166.W55 1979.

Dates and further information:

Linear Algebra lectures will run from Monday July 29 up to and including Friday September 13.

Graph Theory lectures will run from Monday September 16 up to and including Friday November 1.

Wednesday August 14 is the Exhibition Day holiday.

The mid-semester break is the week from Monday September 30 to Friday October 4.

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.

Course Content:

Linear Algebra: We will cover the following topics:

- Systems of Linear Equations
- Vector Spaces and Supspaces
- Basis and Dimension
- Orthonormal Bases
- Null, Column and Row Space
- Linear Transformations
- Eigenvalues and Eigenvectors

Graph Theory: We will cover the following aspects of graph theory:

- Basics
- Algorithms and Tree Searches
- Planar Graphs
- Matchings and Scheduling
- Vertex and Edge Colourings

Assumed background:

The pre-requisite for this course is MATH1051 or MT151.

For the Linear Algebra component: A knowledge of algebra of matrices and determinants together with an ability to follow mathematical arguments and cope with abstract concepts.

For the Graph Theory component: a reasonable mathematical maturity, and knowledge of techniques such as mathematical induction, proof by contradiction etc., are all that is required. The first few lectures will deal quickly with a lot of basic graph theoretic definitions that we shall need subsequently.