The University of Southern Queensland

Course specification

This version produced 20 Dec 2007.
The current and official versions of the course specifications are available on the web at <http://www.usq.edu.au/coursespecification/current>.
Please consult the web for updates that may occur during the year.

Description: Algebra and Calculus II

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
MAT	2100	66245	2, 2007	ONC	1.00	Toowoomba

Academic group: FOSCI
Academic org: FOS003
Student contribution band: 2
ASCED code: 010101

STAFFING

Examiner: Dmitry Strunin
Moderator: Tim Passmore

REQUISITES

Pre-requisite: MAT1102

RATIONALE

This course follows on directly from MAT1102 Algebra and Calculus I in developing the concepts and techniques of calculus and linear algebra for application to problems in engineering and science, or as a basis for higher study in mathematics.

SYNOPSIS

Module 1 covers multivariable calculus including representation of functions of several variables, surfaces and curves in space, partial differentiation, optimisation, directional derivatives, gradient, divergence and curl, line integrals, iterated integrals, Green's theorem. Module 2 is an introduction to differential equations including direction fields, Euler's method, first order separable, first order linear and second order linear with constant coefficients. Module 3 extends the linear algebra of MAT1102 Algebra and Calculus I to cover vector space, bases, dimensions, rank, nullspace, systems of linear equations, projections, transformations, eigenvalues and eigenvectors, diagonalisation with applications.

OBJECTIVES

On successful completion of this course students will be able to:

1. demonstrate an understanding of differential equations and their solutions (assig.1, 2, hwks, exam);
2. distinguish between linear and non-linear differential equations and describe the properties of the solutions of linear differential equations (assig.1, 2, hwks, exam);
3. apply qualitative and quantitative methods to obtain solutions of differential equations to an appropriate level of accuracy (assig.1, 2, hwks, exam);

4. interpret differential equations and their solutions in terms of models for various physical systems (assig.1, 2, hwks, exam);
5. represent functions of two variables as surfaces in space, or contour diagrams (assig.1, hwks, exam);
6. find partial derivatives of vector and scalar functions of several variables and demonstrate an understanding of their meaning (assig.1, hwks, exam);
7. find directional derivatives and gradients of scalar fields and demonstrate an understanding of their meaning (assig.1, hwks, exam);
8. find and classify the critical points of a scalar function of two variables (hwks, exam);
9. represent curves and surfaces in space by parametric equations, or as a vector function of one or two variables (hwks, exam);
10. evaluate line integrals through vector or scalar fields (hwks, exam);
11. find the curl and divergence of a vector field (hwks, exam);
12. evaluate iterated integrals, demonstrate an understanding of their meaning and apply them appropriately (assig. 2, hwks);
13. apply Green's theorem (hwks, exam);
14. describe the properties of the solutions of linear algebraic equations (assig. 2, hwks, exam);
15. compute appropriate bases for the solution of linear algebra problems including orthogonal projections, linear transformations and eigenvalues and eigenvectors (assig. 2, hwks, exam);
16. communicate explanations and mathematical expositions in a clear and logical fashion (assig. 1, 2, hwks, exam).

TOPICS

	Description	Weighting (%)
1.	Differential Equations - Direction fields - First order linear - Taylor series - Euler's method - Second order linear with constant coefficients - Applications	30.00
2.	Multivariable calculus - Curves in space, vector functions - Geometrical interpretation of derivatives of vector Functions - Surfaces in space, functions of several variables - Partial differentiation - Geometrical interpretation of partial derivatives - Maxima/minima problems - Directional derivatives, gradient of scalar fields - Vector fields, conservative fields, curl and divergence - Line and work integrals - Independence of path - Iterated integrals, order of integration - Areas and volumes - Change of variables in iterated integrals - Green's theorem - Applications of multiple integrals	40.00
3.	Linear Algebra - Vector spaces, spanning sets, bases, linear independence, dimension - Column and row space, rank, null space, nullity - Linear algebraic equations - Norm, orthogonality - Projections, least squares fitting - Linear transformations and operators - Eigenvalues and eigenvectors, diagonalisation - Systems of first order differential equations - Powers of a matrix - Symmetric matrices.	30.00

TEXT and MATERIALS required to be PURCHASED or ACCESSED

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at http://bookshop.usq.edu.au click 'Semester', then enter your 'Course Code' (no spaces).

Larson, R, Edwards, B & Falvo, D 2004, *Elementary Linear Algebra*, 5th edn, Houghton Mifflin, Boston.

Stewart, James 2005, *Calculus: Concepts and Contexts*, 3rd edn, Brooks Cole,

Study Book 2007, *Course MAT2100 Algebra and Calculus II*, USQ Distance and e-Learning Centre, Toowoomba.

REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

Anton, H & Rorres, C 2005, *Elementary linear algebra*, 9th edn, John Wiley, New York.
(Applications Version)

Clegg, D 2005, *Student solutions manual (MV)*, 3rd edn,
(To accompany Stewart, "Calculus: Concepts and Contexts", Brooks/Cole.)

Kreysig, E 2006, *Advanced engineering mathematics*, 9th edn, Wiley, Hoboken, NJ.

Larson, R, Hostetler, R & Edwards, B 2006, *Calculus with analytic geometry*, 8th edn, DC Heath, Lexington.

Larson, R & Edwards, B 2004, *Elementary linear algebra*, 5th edn, Houghton Mifflin, Boston.
(Student Solutions Guide)

Larson, R & Edwards, B 2000, *Technology keystroke guide: elementary linear algebra*, 4th edn, Heath, Lexington.

STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessment	16.00
Examinations	2.00
Lectures	56.00
Private Study	72.00
Tutorials	28.00

ASSESSMENT DETAILS

Description	Marks out of	Wtg(%)	Due date
WEEKLY HOMEWORK	50.00	6.00	25 Jul 2007 (see note 1)
ASSIGNMENT 1	50.00	12.00	10 Sep 2007
ASSIGNMENT 2	50.00	12.00	22 Oct 2007
2 HR OPEN EXAMINATION	100.00	70.00	END S2 (see note 2)

NOTES

1. The weekly homework will be required only for the oncampus students.
2. Examination dates will be available during the Semester. Please refer to Examination timetable when published.

IMPORTANT ASSESSMENT INFORMATION

1 Attendance requirements:
It is the students' responsibility to attend and participate appropriately in all activities (such as lectures, tutorials, laboratories and practical work) scheduled for them, and to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.

2 Requirements for students to complete each assessment item satisfactorily:
To complete the assignments satisfactorily, students must obtain at least a total of 50% of the marks available for the assignments.To complete the examination satisfactorily, students must obtain at least 50% of the marks available for the examination.

3 Penalties for late submission of required work:
If students submit assignments after the due date without prior approval then a penalty of 10% of the total marks gained by the student for the assignment will apply for each working day late.

4 Requirements for student to be awarded a passing grade in the course:
To be assured of receiving a passing grade a student must achieve at least 50% of the total weighted marks available for the course.

5 Method used to combine assessment results to attain final grade:
The final grades for students will be assigned on the basis of the aggregate of the weighted marks obtained for each of the summative assessment items in the course.

6 Examination information:
In an Open Examination, candidates may have access to any material during the examination except the following: electronic communication devices, bulky materials, devices requiring mains power and material likely to disturb other students.

7 Examination period when Deferred/Supplementary examinations will be held:
Any Deferred or Supplementary examinations for this course will be held during the examination period at the end of the semester of the next offering of this course.

8 University Regulations:
Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL

http://www.usq.edu.au/corporateservices/calendar/part5.htm or in the current USQ Handbook.

ASSESSMENT NOTES

9 The due date for an assignment is the date by which a student must despatch the assignment to the USQ. The onus is on the student to provide proof of the despatch date, if requested by the Examiner.

10 Students must retain a copy of each item submitted for assessment. If requested, students will be required to provide a copy of assignments submitted for assessment purposes. Such copies should be despatched to USQ within 24 hours of receipt of a request being made.

11 The examiner may grant an extension of the due date of an assignment in extenuating circumstances.

12 The Faculty will normally only accept assessments that have been written, typed or printed on paper-based media.

13 The Faculty will NOT accept submission of assignments by facsimile.

14 Students who do not have regular access to postal services or who are otherwise disadvantaged by these regulations may be given special consideration. They should contact the examiner of the course to negotiate such special arrangements.

15 In the event that a due date for an assignment falls on a local public holiday in their area, such as a Show holiday, the due date for the assignment will be the next day. Students are to note on the assignment cover the date of the public holiday for the Examiner's convenience.

16 Students who have undertaken all of the required assessments in a course but who have failed to meet some of the specified objectives of a course within the normally prescribed time may be awarded the temporary grade: IM (Incomplete - Make up). An IM grade will only be awarded when, in the opinion of the examiner, a student will be able to achieve the remaining objectives of the course after a period of non directed personal study.

17 Students who, for medical, family/personal, or employment-related reasons, are unable to complete an assignment or to sit for an examination at the scheduled time may apply to defer an assessment in a course. Such a request must be accompanied by appropriate supporting documentation. One of the following temporary grades may be awarded IDS (Incomplete - Deferred Examination; IDM (Incomplete Deferred Make-up); IDB (Incomplete - Both Deferred Examination and Deferred Make-up).