MATH2400: Mathematical Analysis

Course Profile for MATH2400 Mathematical Analysis, semester 1 2002

(2 unit, 3L 1T)

Course Objective

MATH2400 aims to introduce students to rigorous examination of some basic concepts of mathematical analysis. It will prepare you for pure and applied mathematics in third and fourth years.

Contact and Advice

The course coordinator is Dr Phil Diamond room 744 in the Priestley Building, (building 67). If you have any comments or suggestions on the course or have questions on the course material, contact the coordinator by phone on 3365 3253 or by email at pmd@maths.uq.edu.au. You are welcome to come with all questions, no matter how small. The official consultation hours are Wed - Fri 4:00-5:00 pm.

Unfortunately, tutors are not paid to answer queries out of class hours, so you should contact lecturers directly. If you have questions about your current or future program of study, contact the chief academic advisor, honours advisor or postgraduate advisor.

Assumed Background

The formal prerequisite MT152 or MATH1052.

It is a student’s own responsibility to fill in any gaps in their assumed knowledge. You may need to undertake background reading to understand the lecture material.

Teaching Mode

Three lectures and one tutorial weekly.

In tutorial, students will be expected to solve tutorial problems that will be handed out each week and call for assistance from lecturer or tutors.

Solutions to all tutorial problems will be handed out at appropriate intervals. Students should feel free to approach the lecturer at times other than consultation hours.

Detailed Syllabus

MATH2400 will cover the following topics. Specific details are covered in lectures.
Convergence of sequences, bounded and monotone sequences, series, tests for convergence, limits of functions, continuous functions, intermediate value theorem, uniform continuity, series and sequences of functions, uniform convergences, Cauchy condition, differentiable functions, mean value theorem, Taylor’s theorem, integrals, criteria for integrability, vector functions on Rn, continuity and differentiability of vector functions, implicit and inverse function theorems, multiple integrals.

Information Changes

Any changes to course information will be announced in lectures and the information will be reproduced on the web page (http://www.maths.uq.edu.au/~jhc/MATH2400). It is your responsibility to keep up to date with all information presented in your lecture group.

Resources

Course Notes: Notes are available at the course web page. There is no recommended textbook, but the following two books are good references:
- J.E. Marsden, M.J. Hoffman, Elementary Classical Analysis,

Web: The course web page is at http://www.maths.uq.edu.au/~jhc/MATH2400Information about the course and other resources are available there.

Assessment

Assessment Scheme: There will be 4 assignments, which will contribute 30% to the final assessment. The remaining 70% will be derived from a 2 hour examination paper at the end of the semester. Students will be expected to display competence in both theoretical and practical areas of the syllabus.

Submission of assignments: Assignments must be submitted in your tutorial session.

If you miss an assessment item: In case of illness (or bereavement) you may be exempted from an assignment if a medical certificate (or other documentation) is received by the course co-ordinator within one week of the due date of the assignment. If you are exempted, then your assignment marks are weighted on a pro-rata basis. Note that ad hoc excuses (car trouble and the like!) will not be accepted; only documentation in connection with illness or bereavement. If you enrolled late then exemption will automatically be granted for anything missed before the date of enrolment.

Missed assessment items: Failure to complete any item of assessment will result in a mark for zero for that component.

Plagiarism: Collaboration on assignments is allowed, even encouraged. However, you must write out your solution in your own words. Identical assignments may be penalised. Do not directly copy ideas or assignments
from fellow students. Plagiarism is the act of using other students or author’s ideas and words or solutions without acknowledgement. It is a form of cheating and is considered as misconduct under official university policy and may attract severe penalties. You must not engage in plagiarism in any of your assignments. For more information, consult the library UseIt on Plagiarism:


● **Midsemester Examination:** Held in around week 6 in lecture time. It is worth 20%. The exam will be 1 hour long. Calculators without ASCII capabilities are permitted.

● **Final Examination:** The final exam is closed book 2 hours long. All calculators are permitted.

● **Assessment Criteria:**
  - To earn a Grade of 7, a student must achieve a final mark of at least 85% and demonstrate an excellent understanding of all of the theory. 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.
  - To earn a Grade of 6, a student must achieve a final mark of at least 75% and demonstrate a comprehensive understanding of the theory of advanced analysis. 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 achieve a final mark of at least 65% and demonstrate an adequate understanding of the course theory. 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 achieve a final mark of at least 50% and demonstrate an understanding of the basic concepts of advanced analysis. 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 of at least 45% and demonstrate some knowledge of the basic concepts of advanced analysis. 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 achieve a final mark of at least 20% and demonstrate some knowledge of the basic concepts of advanced analysis. This includes attempts at expressing their deductions and explanations and attempts to answer a few questions accurately.
  - A student will receive a Grade of 1 if they achieve a final mark of at most 19% or demonstrate extremely poor knowledge of the basic concepts in the course material. This includes attempts at answering some questions but showing an extremely poor understanding of the key concepts.

**Personal Situation**

● **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.

- **Personal Crises:** If you feel that problems in your life are interfering with your university performance, you should consult Student Support Services in the Student Union complex. They offer academic and personal support in a confidential environment for free to students. They can provide a letter to give to lecturers which will help your case for a special exam (there is no longer special consideration for examinations), *but do not leave it too late*. If you are concerned about privacy with regard to medical certificates, please contact the University Health Service. With your permission, the Director will contact your treating practitioner to clarify the extent of your medical condition or other incapacity, and provide lecturers with a report - the Director is bound by confidentiality obligations. In any case, we prefer this course of action, as we are not qualified to assess medical evidence. The procedure outlined here accords with the University’s policy on student privacy and confidentiality.