MATH3570 – Course Outline

Information about the course

Course Authority & Lecturer: Tarig Abdelgadir, Office RC-5107, phone 9385-8817, email tarig.abdelgadir@unsw.edu.au

Consultation: Consultation hours will be announced in Week 1. Please use email if you wish to arrange an appointment outside my “definite” consultation hours.

Credit: This course counts for 3 Units of Credit (3 UOC).

Prerequisites: are at least 12 units of credit (UOC) in second year mathematics courses. MATH3570 is a compulsory course for all students intending to teach High School Mathematics. It is also relevant to applications of mathematics in physics and engineering.

Exclusions: MATH3610, MATH3611, MATH3620, MATH5605, MATH5705

Students with a strong background in mathematics should consider taking the course MATH3611 Higher Analysis instead which serves as a higher equivalent to MATH3570, although it is a 6 UOC course.

Classes: There will be two classes a week:

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Location</th>
<th>Weeks</th>
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</thead>
<tbody>
<tr>
<td>Wednesday</td>
<td>1 pm – 2 pm</td>
<td>RC-1041</td>
<td>1 – 12</td>
</tr>
<tr>
<td>Thursday</td>
<td>11 am – 12 noon</td>
<td>RC-2061</td>
<td>1 – 12</td>
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This semester we lose one lecture in week 8 due to Anzac day. However, we will still aim to finish by the end of week 12.

There are no extra class times for tutorials. Instead 22 of the 23 classes will be divided into 15 lectures and 7 tutorials, and the remaining class will be for the mid-semester test.

The course will consist of 6 topics:

1. Inequalities and Real Numbers (3 lects, 1 tut)
2. Sequences (3 lects, 2 tut)
3. Continuity (3 lects, 2 tut)
4. Differentiability (3 lects, 1 tut)
5. Integrability (3 lects, 1 tut)

Following the lectures for each topic there will be one or two tutorials based on problem sheets for that topic.

Attendance at all classes will be recorded. Overall class attendance will be considered for cases of Requests for Special Consideration.
Web site: The MATH3570 web pages at the UNSW Moodle web site will have links to PDFs of any printed materials for this course - Outline Lecture Notes, Problem sheets, Assignments, Assignment Solutions, Past Mid-Session Tests and Exams and Solutions.

There will also be a link here to the Schools Student Web Portal so that students may check their assessment marks have been correctly recorded.

Course aims

This course aims to re-examine the key ideas behind the Calculus and to give a deeper understanding of the notions of limit, continuity, differentiability and integrability. Students will gain an understanding of the underlying concepts of Calculus and rigorously justify ideas which they have previously met at an intuitive level. The emphasis throughout will be on proof rather than applications.

Relation to other mathematics courses

This course which is compulsory for Mathematics Education majors is designed to give the theoretical background that underpins high school and University Calculus.

Student Learning Outcomes

Students taking this course will develop an appreciation for the theoretical and logical basis for the main results of one variable Calculus.

The ability to provide logical and coherent proofs of Calculus results, and the ability to solve Calculus problems via abstract algebraic methods will be paramount.

Through regularly attending lectures and applying themselves in tutorial exercises, students will develop competency in mathematical presentation, written and verbal skills.

Relation to graduate attributes

The above outcomes are related to the development of the Science Faculty Graduate Attributes, in particular: 1. Research, inquiry and analytical thinking abilities, 4. Communication, 6. Information literacy

Teaching strategies underpinning the course

New ideas and skills are introduced and demonstrated in lectures, then students develop these skills by applying them to specific tasks in tutorials and assessments.
Rationale for learning and teaching strategies

We believe that effective learning is best supported by a climate of enquiry, in which students are actively engaged in the learning process. To ensure effective learning, students should participate in class as outlined below.

We believe that effective learning is achieved when students attend all classes, have prepared effectively for classes by reading through previous lecture notes, in the case of lectures, and, in the case of tutorials, by having made a serious attempt at doing for themselves the tutorial problems prior to the tutorials.

Furthermore, lectures should be viewed by the student as an opportunity to learn, rather than just copy down lecture notes.

Effective learning is achieved when students have a genuine interest in the subject and make a serious effort to master the basic material.

The art of logically setting out mathematics is best learned by watching an expert and paying particular attention to detail. This skill is best learned by regularly attending classes.

Assessment

Assessment in this course will consist of

1. two assignments (10% each), due at the beginning of weeks 4 and 10;
2. one 50 minutes mid-semester test (20%) in week 6;
3. a 2 hour final examination (60%) in the June examination period covering the entire course.

The Assignments will be distributed by the second class of weeks 2 and 8 and are due no later than

- Monday 9 a.m. of week 4 for Assignment 1;
- Monday 9 a.m. of week 10 for Assignment 2.

If assignments are not handed in at class, they must be handed to me in person at my office or left at the School’s General Office RC-3070 if I am not in my office.

In the assignments and the mid-semester test, marks will be awarded for correct working, logical setting out and appropriate explanations an not just the final answer. The main rationale for the assignments and test is to give students practice and feedback on logic and the setting out of proofs and arguments in the context of calculus.

Late assignments will not normally be accepted.
Assignments

Rationale: Assignments will give an opportunity for students to try their hand at more difficult problems requiring more than one line of argument and also introduce them to aspects of the subject which are not explicitly covered in lectures.

You will have to sign the University’s anti-plagiarism declaration for each assignment, declaring that the assignment is your own work.

Assignments must be YOUR OWN WORK, or severe penalties will be incurred.

You should consult the University web page on plagiarism

www.student.unsw.edu.au/what-plagiarism

Mid-Semester Test

Rationale: The Mid-Semester Test will give students feedback on their progress and mastery of the material.

There will be short answer questions in which correct answers are sought and there will be some longer questions requiring clear and logical presentation of correct solutions as well as some simple proofs and verbal explanations.

The test will be held in the second class of Week 6, i.e. Thursday 12th April 11 am–12 noon.

You may bring your own non-programmable hand-held Scientific Calculator to the test. Calculators will not be provided for you.

Examination

Duration: Two hours.

Rationale: The final examination will assess student mastery of the material covered in the lectures.

Weighting: 60% of your final mark.

Further details about the final examination will be available in class closer to the time.

Some Past exam papers with solutions will be made available via the Moodle page.
Syllabus and Class Schedule

Additional resources and support

Tutorial Problems

A set of tutorial problems for each topic will be handed out at the start of each topic and will also be available from the UNSW Moodle web pages for MATH3570. These problems are for YOU to do to enhance mastery of the course.

Students should attempt most of the problems BEFORE the tutorial when they will be considered. SOME of the problems will be done in tutorials, but you will learn a lot more if you try to do them before the tutorial.

Textbooks

There is no set text for this course.

The content of the course will be defined by the lectures. Any book on elementary calculus (such as the standard first & second year text Calculus: One and Several Variables by Salas, Hille and Etgen) may prove useful. (This course is concerned only with one variable calculus).

For books more closely connected to the themes of this course, you may consult any of:

- Elementary Mathematical Analysis by Colin Clark (2nd ed. Belmont, 1982), previously published as The Theoretical Side of Calculus.

Also there are many books related to some of the topics.

For example on Infinite series there are three short books:

Infinite sequences and series by K. Knopp

Infinite series by J. Hyslop

Infinite series by I. Hirschmann

All these are available in the UNSW library. Further suggestions may be mentioned in lectures.
The book by Spivak is a classic first university level calculus text with a chatty, readable style but is also quite rigorous on proofs and the foundations of calculus.

The book by Gaughan covers most of the material of this course and is closest to the aims of this course.

The books by Rudin and Marsden are a bit more advanced.

You will not have to buy any of these books but I would highly recommend Spivak’s book, if not for now then for your future career as a mathematics teacher.

Course Evaluation and Development

The School of Mathematics and Statistics evaluates each course each time it is run. We carefully consider the student responses and their implications for course development. It is common practice to discuss informally with students how the course and their mastery of it are progressing.

Administrative matters

Additional Assessment

See the handout entitled Semester 1 2016 - Important Information for Undergraduate students which is attached to the version of the Course outline handout distributed at the first lecture.

For the on-line version of this Course outline, the information on Additional Assessment may be found on the School of Mathematics and Statistics Web page at Current Students > Undergraduate > Help for Students > Information for all UG Students, Semester 1

Please read this document carefully!

These rules have been revised for 2016.

In particular note the last section on Concessional Additional Assessment. Any student in any mathematics courses who receives a preliminary final mark - which includes the exam mark of 45 – 49 is automatically entitled to take the Additional Assessment exam and have a second chance at passing the course. The maximum final mark after Concessional Additional Assessment is 50.

Please note the preliminary final mark includes the exam mark.

Even with 100% assessment in the three assessment tasks: Assignments 1 & 2 and the Mid-semester test, this amounts to only 35% of the final mark, so if you miss the final exam and if you do not put in a request for Special Consideration with a medical certificate for illness etc, then you do not get Additional assessment and you will fail the course!
Plagiarism and academic honesty

Plagiarism is the presentation of the thoughts or work of another as one’s own. Issues you must be aware of regarding plagiarism and the university’s policies on academic honesty and plagiarism can be found at

http://www.student.unsw.edu.au/what-plagiarism