

MATHS 255 Principles of Mathematics

Study Guide, Second Semester 2011

This is a one semester, 15 point course, taught at the City Campus.

This course aims to give a broad introduction to mathematical thinking and proofs. The emphasis of the course is that it is not only important to find the right answer to a problem but also to be able to convince others (and ourselves) that the answer is right! That means becoming familiar with the concept of a *mathematical proof*.

Along the way you will be introduced to several fundamental mathematical objects and learn more about some familiar structures (like natural numbers and real numbers). All of this will prepare you well for 3rd year courses in Mathematics.

Many students have difficulty when first asked to write proofs. These proofs have their own language and logic, and you need to be both extremely accurate and as clear as possible. As well, the mathematical concepts can often be quite subtle. After all, it took hundreds of years to develop the mathematical ideas that we will be presenting in a few months!

Proof writing takes practice, and sometimes a lot of revision. In this course we have many assignments and tutorials that you can use to practice and improve your proof techniques. The lectures will also be full of proofs that you can use as examples. Remember: you are learning a whole new set of mathematical skills.

Proposed syllabus.

- Set theory (2 lectures)
- Logic and proofs (2 lectures)
- Relations, orderings (4 lectures)
- Functions (3 lectures)
- Induction (2 lectures)
- Elementary number theory (5 lectures)
- Polynomials (3 lectures)
- Abstract vector spaces (6 lectures)
- Sequences (5 lectures)
- Real numbers (2 lectures)

Prerequisites. MATHS 152 or 250 or PHYSICS 112 or 210 or an A grade in MATHS 208.

Course Material. There is no assigned text. You will find a lot of useful material in *Introductory Mathematics: Algebra and Analysis* by Geoff Smith (Springer). It will be available on short loan in the Science Library. Lecture note summaries will be available on CECIL.

Assessment. This will be based on coursework (25%), the semester test (20%) and the final exam (55%), OR on coursework (15%), the semester test (10%) and the final exam (75%), whichever is higher.

Note that the test and coursework count at least 25% towards your final mark.

The overall coursework mark will be based on four assignments and on marks in the collaborative tutorials (see below). Each assignment contributes up to 5% and each collaborative tutorial contributes up to 1%, to give a total out of 25%.

Work will be marked for its clarity and precision as well as its content. For example, a proof poorly expressed with symbols undefined might be failed even if the ‘idea’ of the proof is correct. Conversely, if a proof is well set up it might gain a pass mark even if the method is completely wrong. We encourage students to work together on the assignments, but remember that what you hand in must be your own work!

The **Semester Test** will be held on **Tuesday**, September 13 from 3:05pm to 3:55pm in Room ClockT029. No makeup test will be given.

The assignments will be available and due on the following days:

Assignment	Available	Due date
1	1st August	12th August
2	15th August	26th August
3	19th September	30th September
4	3rd October	14th October

Assignments will be available on CECIL. All assignments must be handed in by 4:00pm at the **Student Resource Centre** on the due date. The Student Resource Centre will not accept late assignments under any circumstances. Assignments placed in the wrong box will not be marked, so be careful where you put your work.

Lectures and Tutorials. The class will meet every Monday at 1:00pm in CAG10, Tuesday at 3:00pm and Thursday at 1:00pm in ClockT029.

Starting July 27, tutorial sessions will be held every Wednesday at 3:00pm and Friday at 9:00am in Room Eng 3502. There will be six **regular tutorials** with an emphasis on review and working through problems and five **collaborative tutorials**. The collaborative tutorials are run as follows: a tutorial assignment is completed during the tutorial working in groups of 3 to 4 (although we may accept groups 2 or 5 people if necessary). You don’t have to be in the same group each time.

There will be a few short questions designed to be able to be answered in under 40 minutes. 10 minutes before the end you will be required to put your answers onto provided sheets which are handed in. A brief rundown of the answers is then given on an overhead (or on Cecil).

Collaborative	Regular
27/29 July	3/5 August
10/12 August	17/19 August
-	24/25 August
-	14/16 September
21/23 September	28/30 September
5/7 October	12/14 October
19/21 October	-

Handouts and CECIL. The WWW homepage for this course is

http://www.math.auckland.ac.nz/wiki/MATHS_255

Assignments and other material will be available on CECIL, and may not be handed out in class.

Office hours. Jianbei An: Tuesday and Wednesday from 1:00pm to 2:00pm, 70 Symonds St, Room G09.

Rod Gover: TBA.

You are encouraged to approach your lecturer with any questions or suggestions you have about the course.

Lecturers.

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