

MATHS 340

Real and Complex Calculus

Study guide

Course coordinator

Dr Philip Sharp, Room 329, Extn 88884, sharp@math.auckland.ac.nz

Lecturers

Dr Philip Sharp: weeks 1-6, office hours MWF 2-3pm.

A/Prof Bruce Calvert weeks 7-12, room 314, Extn 88780, calvert@math.auckland.ac.nz.

Times

Lectures: MTW 1pm-2pm.

Tutorials: One of Thursday at 1pm, Friday at 1pm or Friday at noon (the third time slot will be used only if the first two slots are full).

Assessment

20% mid-semester test, 5% tutorials, 25% assignments, 50% final exam. For each tutorial you attend and make a reasonable attempt at the questions, you will receive 0.5% towards your final mark, up to a maximum of 5%.

Assignments

Four assignments, each worth 6.25% of your final mark.

Textbook

Advanced Engineering Mathematics, 2ed, Michael D. Greenberg.

Pre-requisite and restriction

Pre-requisite: MATHS 253 or equivalent. Restriction: MATHS 347.

Course Descriptions

Calculus plays a fundamental role in mathematics, answering deep theoretical problems and allowing us to solve very practical problems. Extends the ideas of calculus to two and higher dimensions, showing how to calculate integrals and derivatives in higher dimensions and exploring special relationships between integrals of different dimensions. It also extends calculus to complex variables.

Syllabus

1. Real multi-variate calculus (weeks 1-6). Revision, Taylor's formula, vector products and Cartesian coordinates, differentiation of a vector product, non-Cartesian coordinates, curves and line integrals, double and triple integrals, surfaces and surface integrals, volume integrals, divergence, gradient, curl, Laplacian, Divergence Theorem, Stokes Theorem.
2. Complex variable theory (weeks 7-12). Introduction to complex numbers, branch cuts, logarithms, general powers, differential calculus and analyticity, the C-R equations, complex integration, Cauchy's Theorem,

Fundamental Theorem of Complex Integral Calculus, Cauchy's Integral Theorem, complex and Taylor series, Laurent series, classification of singularities, Residue Theorem and its application.

Fine print

Expectations

Fifteen point courses at The University of Auckland are assumed to use 10 hours per week of student time. In this course the normal pattern of student study for most weeks is expected to be: four hours of lectures and tutorials, three hours lecture preparation and revision, three hours of test preparation and assignments.

Students are expected to attend all lectures and tutorials and to come prepared. This means that you will have previewed the material in the text and done any preliminary examples that have been set.

Maple

The mathematical software Maple will be used in the course. Students will be introduced to Maple in an early tutorial, and then required to use in later tutorials and assignments.

CECIL

Students are requested to log on to CECIL on a regular basis, and use it to get information about the course, assignments, and any matters concerning rooms, resources, or assessments. You can access Cecil at <http://www.cecil.auckland.ac.nz> The course notes and assignments will be on CECIL. As a backup, the course notes and assignments will be on the internet at <http://www.math.auckland.ac.nz/~sharp/340>

Tutorials

I strongly encourage you to attend tutorials.

DELNA

DELNA is The University of Auckland's English Language testing program. Information on the program can be found at <http://www.delna.auckland.ac.nz/>

English Language Assistance

If students require assistance with English there are several services provided by the university and by the Department of Mathematics. The main assistance is EL-

SAC - the English Language Assistance Centre whose website is at <http://www.elsac.auckland.ac.nz/>. This computer-laboratory based service is free and open seven days a week. Tutors are available to help. Alternatively, there are credit-bearing English language courses (ESOL 100/101/102).

The Department of Mathematics offers special tutorial support for Maori and Pasifika students (contact Garry Nathan, Extn 84931) and occasionally runs Mandarin or Cantonese-speaking tutorials (contact Jamie Sneddon, Extn 82121).

Collaborating & Copying

Work that is assessed, assignments and tests, must be done completely by yourself.

You are encouraged to discuss other work with one another, and to work together in class, but any work that is marked must be done completely by yourself. The lecturers view copying and collaborating on assignment work as seriously as copying and collaborating in an examination.

Getting Further Help

For assistance with the material covered in the course, ask questions in class, read the textbook and visit the lectures in their office hours. Do not go to the assistance room.

Harassment & Complaints

Complaints about assignment or tutorial marks are best made to your lecturer who is in a position to do something immediately. More general complaints can be taken up by your class representative who should be elected or appointed in the first couple of lectures.

Harassment on any grounds, such as racial, sexual, religious and academic is totally unacceptable. Complaints about harassment are best taken to the University Mediator (extension 87478) or to any member of the Resolve Network whose names are displayed on posters around the campus.