UNIVERSITY OF WAIKATO
Department of Mathematics (FCMS)

MATH252-10B *Elements of Analysis*

Paper Outline

Lecturer
Professor Kevin Broughan Rm G3.22 Ph. 838-4423 kab@waikato.ac.nz

Office Hours
Thursday: 3.10 - 5.00pm in G3.22 during teaching weeks.

Website
http://www.math.waikato.ac.nz/~kab

Lectures	**Monday**	**1.10 - 2.00 pm**	**K.G.01**	(Lecture)
	Wednesday	**12.00 - 12.50 pm**	**S.G.03**	(Lecture or Tutorial)
	Thursday	**10.00 - 11.00 am**	**G.3.33**	(Lecture)

There will be approximately 24 lecture hours. Usually there will be a tutorial each week.
In Week 6, commencing Monday 16 August, the Monday and Wednesday classes will be tutorials and the Thursday class TEST 1.

Paper description
This paper is designed to introduce students to the basic ideas of real analysis and some of its applications. This paper is worth 10 points.

The paper introduces basic topics of real analysis.

Objectives

- to understand the importance of limits, approximation and convergence. To know what it means for a sequence or series to converge, and for a function to have a limit
- to appreciate the topology of the real line (completeness and distance)
- to understand valid proofs and how to construct them.

Syllabus

- number systems; field, order and completeness axioms
- boundedness, sup and inf; asymptotics of monotone sequences
- convergence of sequences in $\mathbb{R}$; sum, products and monotonicity of limits
- series in $\mathbb{R}$ (including geometric and harmonic series); comparison test
- absolute and conditional convergence of series; ratio and root tests
- functions and continuous limits on $\mathbb{R}$; continuous functions; intermediate value theorem; maximum value theorem.
- Rolle's, Mean Value and Taylor's theorems and their applications.
- Taylor series.
- The exponential, log, trig and bionomial series. Radius of convergence.

Lecture Notes
These will be available on web-site: http://www.math.waikato.ac.nz/~kab.

Prescribed Text
Schaum's outlines 'Calculus', by Ayres and Mendelson (A&M).

Frequent references will be made to this text on the class website.

Recommended Reading:
"A first course in mathematical analysis" by J.C. Burkill (CUP) alent, by Finney, Weir and Giordano (Addison-Wesley-Longman).

Schedule

- **Assignment 1**: due Wednesday 28 July
- **Assignment 2**: due Wednesday 4 August
- **TEST 1**: **Thursday 19 August - 10.00-11.00am** in **G3.33** (class time)
- **Assignment 3:** due Wednesday 15 September
- **Assignment 4**: due Wednesday 29 September
- **TEST 2**: **Wednesday 6 October - 12.00-12.50pm** in **S.G.03** (class time)

Assignments to be handed into the MATH252B slot under the Maths Reception counter G3.19.

Math Help
These sessions will be held **DAILY** from **1-2pm** in **G.B.13** during teaching weeks.

Assessment
The internal assessment:final examination ratio is 1:1 or 0:1, whichever works in your favour. The internal assessment will consist of **FOUR assignments** each worth 10% of the internal component, and **TWO tests** each worth 30% of the internal component. Details of the final examination to be confirmed.

***Note**:* An unrestricted pass will be awarded only to students who achieve both a final mark of at least 50% AND an examination mark of at least 40% AND attend at least 6 of the Tutorials/Workshops.

Missed items of assessment
If an item of internal assessment is missed due to medical circumstances or other good excuse, the following procedure should be followed: an application should be made to the lecturer for special consideration as soon as it is practicable to do so; the lecturer may require documentary evidence; if the application is for a missed assignment, an extension of time will usually be granted.
If the test is missed, and it is impractical to arrange an alternative test, a mark may be estimated based on the exam mark; otherwise an oral test may be given.

Noticeboards, handouts and return of assessed work
All notices about this paper will be posted on a noticeboard on the 3rd Floor of G Block near the Maths Lab (G3.12). Such notices are deemed to be official notifications. Material will also be posted on the paper web page, or: **http://www.math.waikato.ac.nz/~kab**

Handouts will be given in class and posted on the WWW. Extra copies will be available from the shelves opposite the stairs on the third floor of G Block.

Normally marked items of internal assessment will be available from the lecturer (or in class) within two weeks of submission OR in the right-hand side of the pigeon holes around the corner from the lift.

TESTS scripts to be collected from the **School Receptionist (GG.19)** - **Ground Floor** of **G Block**.

Workload
Students should expect to work 6-7 hours per week, including attendance at lectures and tutorials.

Your attention is drawn to the following policies and regulations contained in the **2010** University Calendar

Assessment Regulations 2005 (pg 119)
Student Discipline Regulations 2008 (pg 697)
Computer Systems Regulations 2005 (pg 715)
Policy on the Use of Maori for Assessment (pg 126)
Ethical Conduct in Human Research and Related Activities Regs 2008 (pg105)
Student Research Regulations 2008 (pg 103)
Student Complaints Policy (pg 712)

For further information please refer to: **http://www.math.waikato.ac.nz/studentinfo.html**