Information for students

1. **Aims:** To introduce students to the foundational ideas and results in modern topology and analysis so as to equip them for further studies in these areas or to be able to use this knowledge in other fields such as differential equations and mathematical physics.

2. **Objectives:** At the end of this subject, students should:
   - understand how the notion of limit, introduced informally in Mathematics I is made rigorous and applied in the more general settings of normed vector spaces and metric spaces;
   - understand what a metric space is and how notions such as continuity are interpreted in this framework and appreciate the importance of the notion of compactness;
   - understand the structure of normed linear spaces and Hilbert spaces and the basic key theorems concerning them.

3. **Content:**
   - Sets, functions, real numbers, sup and inf, limits, lim sup and lim inf, Cauchy sequences and convergence.
   - Metric spaces, compactness and completeness, uniform continuity.
   - Hilbert spaces, spectral theory.

See also the separate Course Outline handout.

4. **Lectures and Tutorials.** There are three one-hour lectures per week (Tues, Thurs, Fri at 2.10 in Mathematics Building room G05) of which one will be a tutorial every second week.

5. **Assessment.** There will be 6 assignments (class exercises) during the course and a final exam. The final mark will be calculated as follows. Let \( e \) be the mark for the exam out of 100 and \( a \) the mark for the best 5 assignments out of 20 then the final mark out of 100 is:

   \[
   \max\{e, \frac{80}{100}e + a\}.
   \]

6. **References.** The following books may be useful. This is just a selection of what is available and you may find something more useful for you.

   - Belding & Mitchell, *Foundations of Analysis*, 517 B427f
   - Fitzpatrick, *Real Analysis*, 517.51 F559r
   - Simmons, George F. *Introduction to topology and modern analysis*. 513.83 S592
   - Apostol, Tom M. *Mathematical analysis*. 517 A64m.2
   - Kreyszig, Erwin. *Introductory functional analysis with applications*. 517.98 K92
   - Rudin, W. *Functional analysis* 517.5 R916

7. **Other.** I will assign one hour during the week when I am available for consultation. If for some reason you are unable to come during one of those hours or you want special attention, you should make an appointment to see me, the simplest way to do that is to email me or telephone me. I am also happy to answer questions by email.

   Extra copies of class exercises, tutorials and other handouts will be available from the Pure Mathematics Level III cupboard outside Room 203a of the Mathematics Building and usually on myUni.

8. **Contact details.** You can find me in the Engineering Mathematics Building, first floor, room 106. The phone there is 8303 4174 and my email is michael.murray@adelaide.edu.au.

Associate Professor Michael K. Murray
2002/2/25