Mathematics 3790H – Analysis I: Introduction to analysis

Trent University, Winter 2015 *[In Peterborough!]*

Instructor **Department of Mathematics**

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[E-mail sent to my Trent address sometimes disappears. If it is important, please send it to `sbilaniuk@gmail.com` as well.]

Prerequisites

Prerequisite: Mathematics 1100Y or 1101Y, with at least 60%.
Pre- or co-requisite: Mathematics 2200H, with at least 60%.

Text

Elementary Real Analysis (Second Edition), by B.S. Thomson, J.B. Bruckner, and A.M. Bruckner, 2008, ISBN 1-434841-61-8. The textbook may be downloaded for free at:

`classicalrealanalysis.info/com/documents/TBB-AllChapters-Landscape.pdf` [screen-optimized]
`classicalrealanalysis.info/com/documents/TBB-AllChapters-Portrait.pdf` [print-optimized]

Information on ordering print copies of the text can be found at: `ClassicalRealAnalysis.com`

Meetings

Lectures: Tuesday 14:00-14:50 in CC G4, Wednesday 13:00-13:50 in ECC 212,
and Friday 13:00-13:50 in CC I2.
Seminars: Friday 12:00-12:50 in CC I2.

Marking Scheme

There will be eleven weekly quizzes, eleven weekly assignments, and a take-home final examination. Quizzes will normally be written weekly in the Tuesday lectures and last between ten and twenty minutes each. Assignments will normally be due on Fridays. The final examination will be handed out two weeks before the end of classes and will be due near the end of the examination period in April. (Please consult the handout *Readings and Schedule* for a detailed list of dates.) The work will weigh as follows in the final mark:

Best 10 quizzes (2% each)	20%
Best 10 assignments (4.5% each)	45%
Final Examination	35%

At least 25% of the course marks will be obtained by the final date (Thursday, 5 March, 2015) to withdraw from Winter half-courses without academic penalty.

Assignments will not normally be accepted after the due date. Students who miss more than one quiz or assignment for reasons beyond their control should contact the instructor as soon as possible. Note that there is no attendance requirement *per se*, but the consequences of missing classes are ultimately the students' responsibility to deal with.

This scheme may be modified for individual students in *exceptional* circumstances, such as a lengthy absence due to illness. Any such modification will require the agreement of both the student and the instructor.

Content

MATH 3790H is a introductory course on analysis, with an emphasis on series. Successful students will:

1. Understand the importance of the completeness axiom.
2. Have a rigorous understanding of the theoretical definition of a limit of a sequence, and be able to write proofs of simple convergence results, and know results concerning bounded monotone and Cauchy sequences, the Bolzano-Weierstrass theorem, and an elementary understanding of lim infs and lim sups.
3. Have an understanding of series as limits and be able to compute certain series, and have a rigorous knowledge of comparison tests, and the ratio and root tests.

4. Have a rigorous understanding of the definition of a continuous real valued function, and be able to write simple ε–δ proofs of basic results on continuous functions, and understand the proof of the Intermediate Value Theorem.
5. Be able to distinguish between the definitions of a uniformly continuous and a continuous function.
6. Have a rigorous understanding of the definition of the derivative, and an understanding of the proofs of the Mean Value Theorem and the Extreme Value Theorem.
7. Be able to define power series, find power series expansions of various functions, use the Weierstrass M-test, and understand Taylors Theorem.
8. Develop facility with logical reasoning and the use of multiple quantifiers.

Additional material, including material not in the text, may be covered on assignments and in class, and other sources may be used to augment the text in a couple of places. Please consult the handout *Readings and Schedule* for a tentative description of what material will be covered when.

Academic Integrity

> *Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from a 0 grade on an assignment to expulsion from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent University's Academic Integrity Policy. You have a responsibility to educate yourself – unfamiliarity with the policy is not an excuse. You are strongly encouraged to visit Trent's Academic Integrity website to learn more* – `www.trentu.ca/academicintegrity` .

For clarity, the following guidelines will apply in MATH 3790H:

> You are permitted and encouraged to work with others and ask anyone willing (especially the instructor!) for explanations, hints, and suggestions on the assignments, and to consult whatever sources you wish. However, **all work submitted for credit must be written up entirely by yourself, giving due credit to all relevant sources of help and information. No aid may be given or received on the quizzes and final exam**, except with the intructor's permission.

Access to Instruction

> In some circumstances you may also be eligible for additional help or accommodation:
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> *It is Trent University's intent to create an inclusive learning environment. If a student has a disability and/or health consideration and feels that he/she may need accommodations to succeed in this course, the student should contact the Student Accessibility Services Office (SAS), (BH Suite 132, 748 1281 or e-mail* `accessibilityservices@trentu.ca`*). For Trent University in Oshawa Student Accessibility Services Office contact 905-435-5102 ext. 5024. Complete text can be found under* Access to Instruction *in the* Academic Calendar.

It might also be useful to speak to the instructor directly: in some cases the instructor may be able to get help or extend accommodation beyond what the Disability Services Office can arrange.

Aids

For the quizzes, you may use whatever calculators you wish and an 8.5"×11" (or A4) aid sheet with whatever you want on written on all sides of it. Symbolic computation software such as `Maple` or `Mathematica` may come in handy when doing some of the assignments or to check your answers when studying.

Web Page

Hopefully up-to-date information about the course and all handouts will be posted to:

`www.trentu.ca/mathematics/sb/3790H/`

Note that MATH 3790H will make minimal or no use of Blackboard/LearningSystem.

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