University of Victoria
Faculty of Science | Department of Mathematics and Statistics
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Course Outline
MATH 236: Introduction to Real Analysis (A02)

Instructors

Dr. Christopher Eagle **Lecture Section**: A02
Email: eaglec@uvic.ca **Office**: DTB A441
Research Interests: Mathematical logic, the foundations of mathematics, functional analysis

General Course Information

Number of Units 1.5

Pre-requisites MATH 101 and MATH 122, or permission of the department.

Office Hours and Assistance

- Wednesdays 1:30-3:30pm, DTB A441
- Fridays 10:00-11:00am, DTB A441
- By appointment

Drop-in Help The Mathematics & Statistics Assistance Centre is a large space where students can go to work, on their own or in groups, and to discuss math & stats problems. The Centre is staffed with talented Teaching Assistants who are happy to discuss primarily first and second year course material with you. Please see http://www.uvic.ca/science/math-statistics/current-students/undergraduate/msac/ for more information.

Math Club Students in Undergraduate Mathematics and Statistics (SUMS) was founded in 2014 as the reincarnation of a previous undergraduate course union that had been inactive for a few years. Please see http://www.uvic.ca/science/math-statistics/current-students/undergraduate/sums/index.php for more information.

Learning Objectives

"Real Analysis" is the rigorous study of calculus and integration. This course is an introduction to Real Analysis – it lays the groundwork. The course is also designed to help students get better at writing proofs. The topics studied include: 1) a rigorous discussion of the properties of the real numbers and proofs of its completeness and compactness properties, 2) sequences, and convergence of sequences, 3) series, and theorems on convergence of series, 4) continuous functions, sequences of continuous functions, uniform and other kinds of convergence.

Course Material and Online Resources

Textbook Elementary Analysis: The Theory of Calculus, 2nd edition, by Kenneth A. Ross. Our library has a digital version available for free. Printed copies of the book may be purchased at the UVic Bookstore.

Course webpage Course materials, including homework assignments, will be available through CourseSpaces.

Class Meetings

Lectures Lectures will be held on Mondays and Thursdays, 11:30am-1:00pm, in Clerihue A303. The first class is on Thursday, September 7.

Evaluation and Grading

In this multi-section course, all of the homework and midterms will be set up by the instructors in collaboration and marking will be monitored to ensure consistency across all sections.
Your final percentage grade will be computed according to the following scheme.

Item	Date(s)	Weight
Homework Assignments	Bi-weekly	30%
Midterms	October 5, November 16 (in class)	25%
Final exam	TBA	45%

Grading Percentage scores will be converted to letter grades according to the university-wide standard table (`http://web.uvic.ca/calendar2017-09/undergrad/info/regulations/grading.html`).

Missing work No late assignments will be accepted except in case of illness, in which case a doctors note will be required. Midterms missed by illness also require a doctors note. If a midterm is missed due to illness, the missing grade will be replaced by your grade on the Final Exam. Missing two midterms will result in an incomplete grade for the course.

Unclaimed work All graded term work in this course will be returned to you during lecture. If you miss the lecture when a graded piece of work is returned, you can make arrangements with me to pick it up from my office at another time. Any term work that is not collected by the end of the final examination period will be recycled.

Final Examination Off-schedule final examinations (i.e., deferred examinations) are given only in accordance with the university policy as outlined in the Calendar. If you are unable to write a final examination due to illness, accident or family affliction, please refer to the following webpages for detailed instructions how to proceed: `http://web.uvic.ca/calendar2017-09/undergrad/info/regulations/concessions.html` and `http://web.uvic.ca/calendar2017-09/undergrad/info/regulations/exams.html`.

Students are **strongly advised not to make plans for travel or employment during the final examination period** as special arrangements will not be made for examinations that conflict with such plans.

Supplemental Examinations. The Department of Mathematics and Statistics does not award 'E' grades or offer Supplemental Examinations in any of its courses.

Accessibility Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach your instructor and/or the Centre for Accessible Learning (CAL) as soon as possible. The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations `http://www.uvic.ca/cal`. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Commitment to Inclusivity and Diversity The University of Victoria is committed to promoting, providing and protecting a positive, supportive and safe learning and working environment for all its members.

Departmental Policies and Ethics

(See `https://www.uvic.ca/science/math-statistics/current-students/undergraduate/course-policies/index.php` for more information.)

Attendance The university Calendar states 'Students are expected to attend all classes in which they are enrolled.' (see `http://web.uvic.ca/calendar2017-09/undergrad/info/regulations/attendance.html`). Our courses are conducted on that basis. If you miss an announcement (information concerning midterms, corrections to assignment, etc.) because you did not attend class, you must accept the consequences of not having learned of the change.

Guidelines on Religious Observances Where classes or examinations are scheduled on the holy days of a religion, students may notify their instructors, at least two weeks in advance, of their intention to observe the holy day(s) by absenting themselves from classes or examinations. Instructors will provide reasonable opportunities for such students to make up work or missed examinations.

Academic Integrity Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offenses.

The responsibility of the institution

Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage

through cheating on essays, exams, and projects.

The responsibility of the student

Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the students transcript, or a suspension.

It is your responsibility to understand the University's policy on academic integrity: `http://web.uvic.ca/calendar2017-09/undergrad/info/regulations/academic-integrity.html`

How to Succeed in This Course

To gain familiarity with the abstract ideas involved in this course, you must do lots of exercises many more than will be assigned for credit. The text contains an excellent selection of problems. Students should work on them regularly. The more problems you have solved from each section of the textbook the better prepared you will be for the tests and final exam. If you try to solve a problem and get stuck, please come ask me about it!

Formal problem sets for credit will be published biweekly starting in the first week, and will be due two weeks from the date of posting. Assignments will be posted on the course website. A significant part of this course is about teaching you to write mathematics well, so you should take care to present your solutions meticulously you will lose grades for sloppy or imprecise reasoning. Part of writing mathematics is just that: *writing*, words and sentences, in a clearly organized way. If you have questions about the presentation of your ideas, please speak to me before your assignment is due.

Course Survey

I value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential course experience survey (CES) regarding your learning experience. The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey, you will receive an email inviting you to do so. If you do not receive an email invitation, you can go directly to `http://ces.uvic.ca`. You will need to use your UVic NetLink ID to access the survey, which can be done on your laptop, tablet, or mobile device. I will remind you nearer the time, but please be thinking about this important activity, especially the following three questions, during the course.

1. What strengths did your instructor demonstrate that held you learn in this course?
2. Please provide specific suggestions as to how the instructor could have helped you learn more effectively.
3. Please provide specific suggestions as to how this course could be improved.

In addition to the formal feedback at the end of the course, I also welcome your comments throughout the term.

Class schedule

A schedule of topics to be covered is on the next page. Note that dates and topics are approximate – the best way to make sure you know where we are in the material is to come to class regularly.

Week of	Lecture material and textbook sections	Important Dates
4/9/17	Introduction, Section 1 The natural numbers Review of induction	First day of classes: Wednesday, September 6
11/9/17	Sections 2, 3 The rational numbers The real numbers	
18/9/17	Sections 3, 4 More on the real numbers The completeness axiom	
25/9/17	Sections 5, 7 The meaning of $+\infty$ and $-\infty$ Limits of sequences	
2/10/17	Sections 7, 8 More on limits of sequences	**Test 1**: Thursday, October 5 (in class)
9/10/17	Section 9 Limit theorems for sequences	Thanksgiving Day (no classes): 9/10/17.
16/10/17	Sections 9, 10 More limit theorems for sequences Monotone sequences	
23/10/17	Sections 10, 11, 12 Cauchy sequences Subsequences lim sup and lim inf	
30/10/17	Sections 14, 15 Series The Alternating Series Test	
6/11/17	Sections 15, 17 The Integral Test Continuous functions	
13/11/17	No new material (Reading break and Test 2)	Reading break (no classes): 13/11/17–15/11/17 **Test 2**: Thursday, November 16 (in class)
20/11/17	Sections 18, 19 Properties of continuous functions Uniformly continuous functions	
27/11/17	Section 20 Limits of functions Review	Last day of classes: Friday, December 1
4/12/17	**Exam Period** begins: 4/12/17	
12/12/17	**Exam Period**	
19/12/17	**Exam Period** ends: 18/12/17	