

Foundations of Analysis, MATH-4090, Spring 2019

Instructor:

Maya Kiehl (Prof. Kiehl), kiehlm@rpi.edu, 276-2307, Amos Eaton 326

Teaching Assistant:

Dan Kosmas, kosmad@rpi.edu, Amos Eaton 316W

Textbooks:

- Required: *Analysis With an Introduction to Proof* by Steven R. Lay (fifth edition)

Course Web Page: Check LMS

Student Learning Outcomes: Upon successfully completing this course, students will be able to demonstrate that they can

- write high quality mathematical proofs.
- read mathematical proofs and explain how each sentence contributes to deducing the assertion.
- solve problems in analysis.
- write LaTeX syntax for mathematics and mathematical equations.

Homework: There will be 11 homework assignments due on Fridays. Each homework will consist of problem(s) that must be done in LaTeX, with a hard copy submitted at the beginning of class on the due date. Some homework assignments will also require the LaTeX code to be submitted on LMS in order to get full credit. The rules for collaborating on homework problems with others are as follows:

- Students may get help on problems from the instructor or the TA.
- Students may not get help on problems from anyone outside of the class without explicit permission from the instructors.
- Students may get help from other students in the class, provided they follow the rules below
 - Before working with anyone, each student must read the **entire** homework problem set and (minimally) do the following
 - * Look up and memorize all relevant definitions and Theorems.
 - * Make an outline of what needs to be shown.
 - * Make an attempt at writing the proof.
 - Once the above has been satisfied, students may collaborate on figuring out how to write the proof and on refining and improving proofs.
 - Once the students have completed the proof, they must separate from one another and rewrite the proofs on their own.
- Each submission must be written independently and not copied from a shared set of notes. If a student has worked with or consulted other students then they must
 - Put away all materials (electronic and otherwise) that were obtained via collaboration.
 - Rethink and rewrite the proof from scratch.
 - List the students with whom they collaborated at the end of the homework.
- LaTeX code and LaTeX files may NOT be copied or shared with other students.
- Submissions with glaring similarities will violate academic integrity policies. The penalties for violating academic integrity policies are shown in a subsequent section on this syllabus.
- Students are responsible for protecting their work and preventing it from being copied by others. In the event of an academic integrity policy, all students involved will be held accountable and penalized.

LaTeX: Learning LaTeX is part of the course. Students must use LaTeX in writing homework. Students will be required to submit the original LaTeX code on LMS for some of the homeworks. This is to help provide feedback to students about the appropriate ways of writing LaTeX to make it a useful system. In addition, there will be questions about LaTeX syntax on exams. Students should review log files from the LaTeX compiler to make certain that the LaTeX syntax is correct. (LaTeX compilers sometimes overlook incorrect syntax which may produce correct looking output but may eventually lead to intractable difficulties as the document grows.) Sample LaTeX files for homework will be provided for download and usage.

LaTeX is free to download. While the download and installation is time consuming, the advantage of downloading LaTeX is that you can edit files locally on your own machine without connection to the Internet and you can easily control your own source files. Most downloads come with a LaTeX editor, but LaTeX may be edited with any text editor. There is a choice of downloads with two major ones being TexLive and MikTeX. Either will suffice for this class.

Alternatively, students may use an online LaTeX editor such as “Overleaf”. While this makes it a little easier to get started, it requires Internet connectivity and it controls your files. Note that the homework rules above explicitly forbid sharing LaTeX files in any fashion and thus prohibit using any of the sharing facilities of online programs such as “Overleaf”..

In-Class Quizzes There will be 9 in-class quizzes. Each quiz will be based on the problems on the corresponding recitation worksheet.

In-Class Exams: There are 3 in-class exams on the following dates.

- Exam 1: Friday, February 8
- Exam 2: Friday, March 22
- Exam 3: Tuesday, April 23

Final Exam: The final exam will be optional. If taken, it will replace the lowest of the 3 in-class exams (if it is higher).

Class Lectures and iClickers: On Tuesdays and Fridays, there will be “lecture” sessions.

- Posting: The typed lecture notes will be posted on LMS, the notes written on the board will not be posted.
- iClickers: There will be substantial use of the iClicker system. Students need to participate in the iClickers to get this portion of the grade. The grade will be weighted toward active participation. Students participating in at least 85% of the iClicker questions who also get at least 50% of the total number of iClicker questions correct can anticipate full credit.

Recitation Worksheets: On Wednesdays, there will be “recitation” sessions. During these sessions, students will work in groups to complete worksheets and get feedback on their proofs and solutions. The grades will be based on active participation and the completion of certain worksheet problems or submission of worksheets. The problems on the worksheets will be the basis for the in-class quizzes and will be part of the study guides for the exams.

Parts of the worksheets will be posted on LMS in advance. Recitation participation will be a combination of attendance and **active** participation. To get full credit for **active** participation in recitation, students must engage in dialogue with at least one member of the teaching team during the recitation period. Dialogue that meets the criteria of participation includes asking questions about proofs (structure, content), or explaining a proof from the worksheet.

Judgment Free Feedback: Occasionally, supplemental proofs will be given that students may prepare to submit (generally on a Tuesday) to receive ungraded critique by the following Friday(or sooner). This will not factor directly into the grade. The total number of problems critiqued for each student will depend on the number of total student submissions in a given week. Each student submitting proofs will get a critique on at least one proof in their submission, but may be able to get more critiques if fewer students submit proofs. This is a way for students to experiment and gain experience with proof writing in a stress-free, grade-free, judgment-free environment.

Grades: The homework, latex, lecture participation, recitation participation and final exam will be weighted as follows:

Lecture Participation (iClickers)	5%
Recitation Participation	5%
~10 Homework Assignments	20%
~10 In-Class Quizzes	10%
3 In-class Exams	60% (20% each)
Optional Final Exam	(Replaces the low exam grade if higher)

Using these weights and the percentages for each item, the final course score will be computed and then based on this score, letter grades will be assigned based on the first applicable category below (note - course grades will not be rounded when determine grade assignments):

93% + is an A	90% + is an A-	
87% + is a B+	83% + is a B	80% + is a B-
77% + is a C+	73% + is a C	70% + is a C-
65% + is a D+	55% + is a D	
0% + is a F.		

Appeals: Changes to exam, quiz, or homework grades will be made only if something has been overlooked. All appeals must be made within 1 week of the time the exam, quiz or homework is returned to the class. Please pick up all material on a timely basis.

Absences, Late Policies Missing an exam or quiz without a valid, documented excuse results in a grade of zero and cannot be made up. Class participation and participation in recitations and iClickers may not be made up. Homework is due at the times posted on LMS. Late homework will receive substantial penalties (see below) and will not be accepted after 4 days.

During class, but not at beginning	-1
On due date, after class	-2
One day late	-2
Two days late	-3
Three days late	-4
Four days late	-5
More than four days late	no credit

For excused absences, please contact or visit the office of Student Experience. The web page for this outlines some sample cases of what does and does not qualify as an excuse and can be found at:

<http://studentlife.rpi.edu/student-success/excused-absence>

Academic Integrity: Student-teacher relationships are built on trust. Acts which violate this trust undermine the educational process. The Rensselaer Handbook of Student Rights and Responsibilities defines various forms of Academic Dishonesty and you should make yourself familiar with these. Exams must be done individually and cheating will result in a grade of zero and a report to the Dean of Students. Students may work together on homework provided they follow the rules in the preceding section on homework. Students must work individually, without assistance on exam and quizzes. If rules are violated, students will receive a zero on the assignment, exam or quiz and a report will be made to the Dean of Students. Repeat offenders will fail the class.

Check LMS frequently throughout the semester for information and updates.