Math 4603: Advanced Calculus I, Summer 2016
University of Minnesota

Instructor Information

Instructor’s Name: Harris Ahmed Mohammed Ismail
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Course Website: [http://www.math.umn.edu/~moham189/Summer_2016.shtml](http://www.math.umn.edu/~moham189/Summer_2016.shtml)

Lecture Meets: Mondays, Wednesdays and Fridays: 11:15 am - 12:05 pm, Akerman Hall 227;
Tuesdays and Thursdays: 11:15 am - 1:10 pm, Folwell Hall 30

Office Hours: Mondays, Wednesdays and Fridays: 12:20 pm - 1:20 pm;
Tuesdays and Thursdays: 3:15 pm - 4:15 pm;
or by appointment (office hours are tentative and are subject to change)

Course Information

About the course:

This is the first part of the two-semester pair of four-credit courses on Advanced Calculus: MATH 4603-4604. The goal of the first part is to introduce the basic elements of single variable real analysis (the real numbers, sequences, continuous and differentiable functions and Riemann integrals) to the student at a level that is adequate enough for the student to handle its second semester sequel. The main goal of the sequel is to study the multivariable counterpart.

The course will be rigorous, emphasizing on formal mathematical proofs, although I will try to provide a variety of examples aiming on building intuition. I will use Edward D. Gaughan’s *Introduction to Analysis*, Fifth Edition as the textbook for the class. We will plan on covering a majority of the sections in chapters 1 through 5 along with section 0.5 of the textbook, however we may omit a few topics or sections. I will also review the preliminary sections 0.1 through 0.4 at a slightly faster pace during the first week of class.

The tentative lecture schedule is as follows:
- Week 1: Preliminaries, The Real Numbers, Introduction to Sequences
- Weeks 2 and 3: Sequences of Real Numbers and Limits of Functions
- Week 4, 5 and 6: Continuity and Differentiation
- Week 7: The Riemann Integral
Prerequisites:

The prerequisites for this course are to have completed several semesters of calculus that include the two-semester sequence MATH 1271-1272 or its equivalent (Basic Single Variable Calculus), along with MATH 2243 or its equivalent (Basic Linear Algebra and Differential Equations) and MATH 2263 or its equivalent (Basic Multivariable Calculus) so that you could handle the abstraction, rigour and the pace of this class with the help of the intuition you have acquired based on the familiarity with concepts, examples and counterexamples you have seen in those courses.

Apart from those basic calculus courses, an introductory course on mathematical reasoning and proof-writing is not required but is very helpful. A certain level of mathematical maturity is expected from the student and such an introductory course on proofs helps a lot in gaining this maturity. Additionally, such a course also familiarizes the student with the language and certain standard notations.

Students who have taken other upper division proof-oriented mathematics courses on abstract algebra, topology, advanced linear algebra, Fourier analysis or differential equations could have acquired some familiarity with the language and some mathematical maturity. However, none of these classes is essential as a prerequisite.

Textbook:

Other books for reference:
Charles Chapman Pugh, *Real Mathematical Analysis*
Terrence Tao, *Analysis, Volume I*, Third Edition
Walter Rudin, *Principles of Mathematical Analysis*

Tutoring Information

SMART Learning Commons will offer drop-in tutoring this summer M-Th 10 am - 2 pm.
Please see: https://www.lib.umn.edu/smart/tutor-schedules
Grading Information

Grading Components and Weights

Your course grade will be based on the *Total Course Points* which is a weighted sum of the points you obtained in the homeworks, quizzes, midterm exams and the final exam, as described below.

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
<th>Weightage</th>
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</thead>
<tbody>
<tr>
<td>Homework (best 12 out of 14 assignments)</td>
<td>15 points each (rescaled to 150 points in total)</td>
<td>15%</td>
</tr>
<tr>
<td>Quizzes (best 12 out of 14)</td>
<td>10 points each (rescaled to 100 points in total)</td>
<td>10%</td>
</tr>
<tr>
<td>Midterm Exams (2)</td>
<td>100 points each (200 points in total; rescaled to 400 points in total)</td>
<td>20% each (40% in total)</td>
</tr>
<tr>
<td>Final Exam</td>
<td>150 points (rescaled to 350 points)</td>
<td>35%</td>
</tr>
<tr>
<td><strong>Total Course Points</strong></td>
<td>1000 points</td>
<td>100%</td>
</tr>
</tbody>
</table>

Final Exam

The final exam will take place on **Friday, August 5th** at the same time and venue of the regular class meeting on Fridays. The duration of the final exam is two hours. You will **NOT** be allowed to take the final exam at any other time.

Homework and Quizzes

There will be a homework assignment that is due on **almost every Tuesday and every Thursday**. (There will be no homework due on the Tuesdays of the first week and the fourth week of classes). Homework problems will be assigned about two to three days in advance of the due date. Sometimes you will not be required to turn in all of the assigned problems. There will be clear instructions on this. Please check the course website regularly for updates on homework assignments. Homework will be collected (for grading) at the **BEGINNING** of class on the day it is due. **NO LATE HOMEWORK** will be accepted and you will get a zero score on a homework assignment which you failed to turn it in on time on the due date.

Doing your homework diligently everyday is the key to understanding the material and succeeding in getting good grades in this class. Hence, please take it very seriously. Getting together with other students (that is, in study groups) is a very efficient way to do homework. However, note that you must write up your own work individually. There will be **NO** makeup for homework. However the **lowest two** of your homework scores will be **dropped** while calculating your Total Course Points.

There will be a **quiz** on **every Tuesday and every Thursday** whenever there is a homework due on that day, and the quiz will be based on the material covered from the date of the previous quiz until that covered in the previous day. I will give more instructions on quizzes during the lecture hours. Each quiz has a time limit of 15 minutes and it will be conducted at the **BEGINNING** of class. There will be **NO** makeup quizzes. The **lowest two** of your quiz scores will be **dropped** while calculating your Total Course Points.
Midterm Exams

Two midterm exams will be given. The material for these exams will be informed to you in class a few days before each midterm exam. The dates for the midterms are: **Friday, July 1st**, and **Friday, July 22nd**. There will be **NO** makeup for midterm exams. Under **exceptional** circumstances, and at the discretion of the instructor, a missed midterm exam may be excused. You must talk to the instructor in person **well in advance** if you plan to miss a midterm exam for a **legitimate reason** (in my opinion). In this case, a weighted average of the scores in the other midterm exam and the final exam will count as the score for the missed midterm exam. And note that elective travel is **NOT** an acceptable excuse to miss a midterm exam.

Calculators and other aids during exams

**NO** calculators, cell phones, headphones, laptops or other electronic devices are allowed during quizzes and exams. All quizzes, midterm exams and the final exam are **closed book, closed notes** and **NO cheat sheets** are allowed (unless I provide any).

Incomplete Grade

Incomplete grades will be given only in extraordinary circumstances, and are at my latitude. More precisely, I will consider giving you an incomplete if you have successfully completed all but a small portion of the work of the course and some severe, unexpected event prevents you from completing the course. This means that you must have taken at least two midterm exams and must be doing work at the C level or better. You will have to sign a contract detailing what you have to do to complete the course. I will not give you an incomplete simply because you are behind in your work; in the latter case you should try to drop the course.

Scholastic Dishonesty

The College of Science and Engineering assumes that all students who enroll in its programs are serious about their education and expects them to be responsible individuals who demand of themselves high standards of honesty and good personal conduct. Any act of scholastic dishonesty is regarded as a serious offense that will result in a sanction being imposed, and may result in expulsion. Scholastic dishonesty is defined as:

- Submitting false records of academic achievement
- Cheating on assignments or examinations; plagiarizing
- Altering, forging, or misusing a University academic record
- Taking, acquiring, or using test materials without faculty permission
- Acting alone or in cooperation with another to falsify records or to obtain dishonest grades, honors, awards, or professional endorsement

Aiding and abetting a student in an act of scholastic dishonesty is also considered a serious offense. For more information on the official policy of the College of Science and Engineering concerning scholastic conduct please visit [http://cse.umn.edu/services/advising/CSE_CONTENT_188716.php](http://cse.umn.edu/services/advising/CSE_CONTENT_188716.php)