Math 21 (Improper Integrals, Sequences, and Series) — Fall 2018
George J. Schaeffer — Department of Mathematics, Stanford University
Course Information and Policy Document (v. 9/03/18)

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* Circumstances under which you would need to directly message a member of the course staff are rare. Please read the Online Interactions section below.

Course Website
The course website is math21.stanford.edu. All course materials will be available on the course website or linked from it. We will not be using Canvas this quarter.
Enrollment
If you are not officially enrolled in the course, you should read the information here and fill out the linked webform so that we can give you access to the course’s Piazza and Gradescope sites as soon as possible.

Online Interactions
If you have questions about the course, the course staff is here to help! However, please follow these guidelines to streamline issues that may arise outside of class and office hours:

- Administrative concerns (OAE letters, exam conflicts, extended absences, Honor Code concerns) are handled by both Dr. Howe and Dr. Schaeffer. Please email the instructor for the lecture in which you are enrolled and he will forward the message to the other co-instructor if necessary.
- Questions about course material (e.g., on homework or examples from lecture/discussion) should be posted to the Math 21 Piazza page. There are several reasons this is preferable to asking and answering questions via email:
  - Because questions and answers are visible to everyone in the course, questions only need to be asked and answered once.
  - In addition to the course staff, other students can answer your questions or add follow-up questions.
  - Questions posted outside of regular work hours (8 AM–5 PM, Mon–Fri) will naturally receive replies at a slower pace. Please remember that we also have personal lives and responsibilities outside of this class!
- Questions about grades.
  - Your scores on homework assignments and exams will be recorded using Gradescope (more on this below). If a score has not been posted to Gradescope, it is probably because that assignment has not yet been graded.
  - You are perfectly capable of calculating your own (actual or potential) numerical grade based on the information in this document (see Determination of Numerical Grades) and your scores on as recorded on Gradescope. Please refrain from asking the course staff to calculate your current or potential grade for you.

Textbook
The textbook for this course is Calculus (Single Variable) by Hughes-Hallett et al. While the bookstore will only stock the 7th edition of the textbook, both the 6th and 7th editions can be used in this course—any references to the textbook will cite both editions.

Please note that some copies of the 6th edition are missing a page from the integration tables at the back of the book. This page will be made available on the course website.

If you are an undergraduate who needs assistance with the cost of course textbooks, supplies, materials and/or fees, please contact Joseph Brown, the Associate Director of the Diversity and First-Gen Office (jlbrown@stanford.edu; Old Union Room 207). Dr. Brown is available to connect you with resources and support while ensuring your privacy.
Calculators
With very few exceptions (and only on homework assignments), you will not be required to have or use a calculator during this course. The use of any electronic devices (including cellphones and calculators) during an exam is strictly prohibited and will be considered an actionable violation of the Stanford Honor Code.

Syllabus
Math 21 covers the final topics covered in a standard two-semester/three-quarter college-level single-variable calculus course, with some additional emphasis on growth and dominance relations (limit comparison). The course will be broken up into three sections:

- **Section 1** (Weeks 1–4): Review of limits, growth and dominance relations, improper integrals, sequences, infinite series, geometric series, p-series*, integral test*
- **Section 2** (Weeks 5–8): Convergence tests for infinite series, Power series, Taylor series
- **Section 3** (Weeks 9–10): Applications of Taylor series

Midterm 1 will cover Section 1, Midterm 2 will cover Section 2, and the Final will cover all three sections. (*These topics overlap with Section 2 and may not be tested until Midterm 2, subject to time constraints.)

Prerequisites
You are expected to be familiar with the material that precedes Math 21 in a standard precalculus/calculus sequence. More specifically, you should be conversant in the following:

- **Precalculus** (algebra, functions, graphing, trigonometry, logarithms, etc.)
- **Limits and continuity** (limits, continuous functions, intermediate value theorem)
- **Differential calculus** (differentiable functions, first and second derivative tests, finding minima and maxima, mean value theorem, L’Hôpital’s Rule)
- **Basic integral calculus** (the fundamental theorem of calculus, antiderivatives, definite integrals as areas, integration by substitution, integration using an integral table)

You will not be tested directly on the above material, but much of Math 21 will depend on it. **Mastery of limits is particularly important in Math 21.** We will **not** assume integration by parts, though there may be guided exercises on the homework that involve its use.

Course Organization and Materials
In a typical week you will

- Attend three lectures (led by Dr. Howe or Dr. Schaeffer), on Mon., Wed., and Fri.;
- Attend one discussion (led by one of the teaching assistants) on Tuesday; and
- Turn in one homework assignment on Fri. morning, or take one exam on Wed. evening.

The course staff will also hold regular office hours during the week. Note that there are no classes or office hours during the Thanksgiving Break. For logistical reasons, office hours are not typically held on examination days or during finals week.

If for some reason you cannot make it to class it is your responsibility to find out from a classmate (or the course website) what material you missed.
Because of time constraints it is unlikely that we will be able to cover every nuance of the material in the Greatest Possible Detail during lectures, which is why we may occasionally assign *required readings* in the textbook (as part of the homework) or that we have written up ourselves. Your completion of such readings is fundamental both to your understanding and our effectiveness as instructors. You are responsible for all material covered in lecture and discussion, all assigned readings and handouts, and any supplemental material presented in homework assignments, unless otherwise stated.

**Lecture Notes**
Notes may be posted to the course website to record material covered in lecture. While you may find them helpful, these notes will not constitute formal course materials. Some caveats:
- These notes are *not* a replacement for your regular attendance of lectures.
- There is no expectation or guarantee that notes will be posted for every lecture.
- Since these notes are written principally to aid the lecturer, there may be skipped steps and the examples in the notes may differ from those covered in lecture.

**Discussion Sections**
The purpose of discussion sections is for you to check your knowledge of the course material and ask your TA questions that may not have been answered in lecture. These discussions will be based around examples similar to problems you will see on homework and exams.

**Homework Assignments**
Homework will be assigned and due weekly on Friday mornings by 10 AM, with the exception of midterm weeks (Weeks 4 and 8).
- You will submit your homework online using Gradescope. More details are posted [here](#).
- Homework in this course will be graded not only on completion and correctness, but also on how well you communicate what you are doing. Show your work when possible and use words to describe your process and your reasoning. Good work in mathematics is not just a series of equations, but a *coherent and logical progression of ideas* leading from the problem to a solution.
- It is a good idea to start the homework early, or at least look over the problems (especially the more complicated problems) as soon as they are assigned.
- Collaboration is encouraged as long as it is beneficial to your understanding of the material. Copying someone else’s homework is a violation of the Stanford Honor Code, your solutions must be your own.
- Photographing, photocopying, reproducing, or disseminating another student’s work constitutes a clear and actionable violation of the Honor Code.
- If you have questions about a homework problem, post it to Piazza! You can also *answer* questions other students have posted.
- Homework is due at 10 AM on Fridays and complete solutions will be posted shortly after the deadline. Late assignments can be submitted to Gradescope up to 24 hours after the deadline. Late assignments will be penalized at instructor discretion. No aid will be provided by the course staff on an assignment after its Friday deadline.
- Exceptions to the above are given only to students with planned religious observances.
- Your lowest homework score will be dropped. This policy is in place not so that you can "skip" an assignment, but rather to provide relief in case of emergency or illness.

Examinations
There will be two midterm exams and a final exam. The first midterm exam will cover material from Section 1 of the course (see above); the second midterm exam will cover material from Section 2. The final exam will be cumulative, and will cover all three sections.
The dates of the midterms and exams are:
- MIDTERM 1: WEDNESDAY, OCTOBER 17TH, 7:00–8:30 PM
- MIDTERM 2: WEDNESDAY, NOVEMBER 14TH, 7:00–8:30 PM
- FINAL: MONDAY, DECEMBER 10TH, 7:00–10:00 PM
Makeup midterms will be given rarely (with exceptions for students who have planned religious observances). However, if you have an unplanned appropriate, documented, and verifiable excuse that compels your absence from an examination (such as a family or medical emergency), contact Dr. Howe as soon as possible to discuss your options.

It is department policy that exams in lower-division courses such as Math 21 must be taken at the scheduled time. Students with OAE accommodations or who are away from campus for University-sponsored events may have different arrangements (made in advance by email with Dr. Schaeffer), but must take the exam on the same day as everyone else.

It is department policy that student-athletes who are away from campus during an examination must have the examination administered individually by athletic staff on the examination date. Please get me in contact with the appropriate staff member as soon as exam dates are announced so that these arrangements can be made.

Students with accommodations from OAE must make arrangements with Dr. Schaeffer by email for each examination (with notification at least a week from the exam), and Dr. Schaeffer must have received your OAE letter before the examination is administered. If you have an extended-time accommodation with the OAE, your exam will end (rather than begin) at the same time as the main exam.

Late and Make-up Work Policies
The general rule is that homework turned in more than one day after the due date is not accepted and make-up exams are not given. The only guaranteed exceptions are reserved for students with planned religious observances who inform course staff in advance. Please notify your instructor by email as soon as possible if there is any situation that will interfere with your work in this class.

Grading and Feedback
Homework assignments and exams in this course will be graded using an online service called Gradescope.
- Your homework is graded by anonymous graders. Their anonymity is essential to their impartiality in evaluating your work, and we treat it seriously.
- Exams are graded by the course staff.
Redress of Grades
If you believe an error was made in the grading of a homework assignment or exam, you may submit a regrade request through Gradescope within three days after the grades have been published. For the Final Exam, you will be notified one day before the deadline for regrade requests.

Determination of Numerical Grades
Your Numerical grade is apportioned as follows:
- Engagement: 2%
- Homework: 18%
- Exams Section 1: 35%
- Exams Section 2: 35%
- Exams Section 3: 10%

*Engagement.* This measures roughly your active participation in learning and keeping up with the course material as perceived by the course staff. If you come to lecture and discussion fairly regularly you should have no problem receiving the full 2%.

*Homework.* There will be seven graded homework assignments over the course of the quarter; your lowest of these seven homework grades is dropped. The remaining six homework assignments count for 3% of your Numerical Grade each.

*Exams.* Your exams grade is broken up into three sections, corresponding roughly to material covered in weeks 1–4 (Section 1), weeks 5–8 (Section 2), and weeks 9–10 (Section 3).
- Your grade for Section 1 depends on your grades for Midterm 1 and Part 1 of the Final.
- Your grade for Section 2 depends on your grades for Midterm 2 and Part 2 of the Final.
- Your grade for Section 3 depends only on your grade for Part 3 of the Final.

For $X = 1$ or $X = 2$, your score for Section X is determined to be the maximum of

\[
[25\% \text{ your Midterm X score}] + [75\% \text{ your Final, Part X score}] \text{ and } \\
[50\% \text{ your Midterm X score}] + [50\% \text{ your Final, Part X score}]
\]

This grading scheme will always work in your favor: If you flub one of the midterms, you can make it up on the final to some extent; conversely, if you do really well on a midterm, it can mitigate a lower score on the corresponding section of the final.

Determination of Letter Grades
Once your numerical grade is computed, it is rounded to the nearest hundredth (two decimal places) and your letter grade is assigned according to the following standard grading scale:
- A (93.00–100.00%), A– (90.00–92.99%)
- B+ (87.00–89.99%), B (83.00–86.99%), B– (80.00–82.99%)
- C+ (77.00–79.99%), C (73.00–76.99%), C– (70.00–72.99%)
- D+ (67.00–69.99%), D (63.00–66.99%), D– (60.00–62.99%)
- NP (below 60.00%)

We are generally against “curving” grades because we believe your grade should reflect your individual performance in the course. That being said, the above grade boundaries may be modified if the average class grade lies outside of what we consider to be a reasonable range. The grade of A+ is given extremely rarely in introductory math courses.
Policies Concerning Other Grades
For those taking the course for CR/NC (credit / no credit) rather than for a letter grade, the University defines "credit" (CR) as a grade of C− ("satisfactory") or above and "no credit" (NC) as a grade of D+ or below.

The grade of I ("incomplete") will only be granted, upon request, to students who have completed a majority of the work in the course (typically all assignments except the final exam) and who would receive a C− ("satisfactory" grade) or above based on the work they have completed thusfar. For more information, please see the University's definition of grades.

Academic Integrity and the Honor Code
The course staff takes academic integrity seriously. Any reasonable Honor Code concern will be pursued by the course staff to the fullest extent possible.

In addition to following the Honor Code generally, please refrain specifically from the following (as these have led to charges and sanctions in previous quarters):

- Copying or photographing another student's homework assignment(s).
- Submitting another student's work to Gradescope as your own.
- Accessing an internet-capable device during an examination, for any reason. (If you need to make an emergency call, please notify a proctor, who will let you do so.)

If you have an Honor Code concern, please contact Dr. Schaeffer ASAP.

Policies Relevant to Student-Athletes
Students who are active members of a in a Stanford University Athletics team should identify themselves to the course staff using the webform here.

- If you will be traveling for competition in athletic event on a day when homework is due, the expectation is that you can still submit it by the 10 AM deadline via Gradescope. Please make sure that you submit your homework Thursday night or that you bring your homework with you if you need to submit it while traveling.
- It is department policy that student-athletes who are away from campus during an examination must have the examination administered by athletic staff on the examination date. Please get Dr. Schaeffer in contact with the appropriate team staff member as soon as possible (at least one week before the exam) so arrangements can be made.

Policies Relevant to Students with OAE Accommodations
If you have an accommodation with the OAE (Office of Accessible Education) please notify Dr. Schaeffer by email as soon as possible. We must be notified of your accommodations at least one week before an exam so that the necessary arrangements can be made (room reservations at this university are not instantaneous). Additionally, Dr. Schaeffer will require a copy of your OAE letter (sent by email is fine) by the date of the exam.

If you have an extended time accommodation from OAE, your exam will end at the same time as the main exam.
Extra Help
If you need extra help beyond the scope of class and our office hours:
- Free tutoring is available through the office of the Vice Provost for Teaching and Learning (VPTL). There are individual appointments (see sututor.stanford.edu) and drop-in appointments (see tutoring.stanford.edu) available for Math 21.
- Stanford athletes may have access to additional academic support. Ask your team’s staff for details.