

Syllabus

Title	Advanced Calculus
Number	MATH 4335-161
Time	MW 5:30–6:45
Place	BH 206
Instructor	David Milovich
Email	david.milovich@tamui.edu
Phone	(956) 326-2570
Office	BVC 321
Hours	MTR 3:00-5:00
Department	Engineering, Mathematics, and Physics
College	Arts and Sciences
Institution	Texas A&M International University
Term	Fall 2012

Course description. A course in real analysis. It will include topology, continuity, differentiation, integration, sequences, series and power series. Prerequisite: MATH 2415.

Student learning outcomes. Upon successful completion of this course, the student will be able to:

- describe the usual topology, including completeness, of the set of real numbers, including compact sets using the Heine-Borel Theorem;
- use the Bolzano-Weierstrass Theorem to determine the convergence of a sequence;
- determine the convergence or divergence of a numerical sequence or series, and determine if a series converges absolutely or conditionally;
- determine the convergence (and uniform convergence) of a sequence or series of functions, including a Taylor series, the interval of convergence of a power series and the possible outcome of integrating or differentiating a series of functions term by term;
- determine the continuity of a function at a point, the continuity of a function in an interval and if a continuous function is uniformly continuous in an interval;
- use Theorems such as Rolle's Theorem, the Mean Value Theorem, the Intermediate Value Theorem, and the Inverse Function Theorem for functions of one variable to solve problems in Analysis;
- use the definition of the Riemann Integral to determine if a bounded function defined in a closed and bounded interval is integrable, and use the Fundamental Theorem of Calculus for integrable functions to compute derivatives or to compute a definite integral;
- use definitions and theorems to provide proofs related to topics in this course.

Textbook. Required: *Principles of Mathematical Analysis*, 3rd edition (1976). Walter Rudin. McGraw-Hill. ISBN: 978-0070542358.

Quizzes. Almost every class will start with a quiz to check that you have done the reading assigned in the schedule below. The quiz should be easy if you have done the reading. There will be 23 quizzes; I will drop your lowest 3 quiz scores. Quizzes make up 15% of your grade.

Homework. I will suggest exercises (mostly from the book) at least once a week and I will post solutions to suggested exercises on ANGEL the next week. However, I will not collect homework. It is up to you to

do as many exercises as you need to do to master the material. Remember, I am available in my office and over email to help you with these exercises. Also, there will some time in class for discussion of exercises.

Writing project The writing project is worth 20% of your grade. I will soon offer you several writing assignments to choose from. Each assignment consists of writing a series of proofs in L^AT_EX. To help you how to use learn L^AT_EX, the solutions I post to suggested exercises will be prepared in L^AT_EX, and I will include my source code. See the schedule below for due dates.

Tests. Test I and Test II are each worth 20% of your grade. The final exam is comprehensive and worth 25% of your grade. All tests are closed-book and open-note, but **all notes must be in your own handwriting**. You must turn in your notes with your test.

Grading.

letter	score of x%
A	$90 \leq x$
B	$80 \leq x < 90$
C	$70 \leq x < 80$
D	$60 \leq x < 70$
F	$0 \leq x < 60$

Make-ups. There are no make-ups for missed work, except by situations covered by university rules.

Tentative Schedule

Date	Pages	Topic
27-Aug		introduction
29-Aug	1–8	ordered fields
3-Sep	8–12	\mathbb{R} & $[-\infty, +\infty]$
5-Sep	12–17	\mathbb{C} & Euclidean spaces
10-Sep	24–30	finite, countable, & uncountable sets; writing assignments announced
12-Sep	30–36	metric spaces
17-Sep	36–43	compact, perfect, & connected sets
19-Sep	47–52	convergent sequences, subsequences; writing assignment selection due
24-Sep	52–58	Cauchy & special sequences; upper & lower limits
26-Sep		review
1-Oct		Test I on topics 29-Aug. through 24-Sep.
3-Oct	58–63	series; nonnegative series
8-Oct	63–70	e ; root & ratio tests; power series
10-Oct	70–78	series
15-Oct	83–89	functions, their limits, & continuity
17-Oct	89–92	continuity, compactness, & connectedness; first draft due
22-Oct	94–98	discontinuities; monotonic functions; limits with ∞
24-Oct	103–108	differentiation; mean-value theorems
29-Oct		review
31-Oct		Test II on topics 3-Oct. through 24-Oct.
5-Nov	108–113	L'Hospital's Rule, Taylor's Theorem, etc
7-Nov	120–127	Riemann-Stieltjes integral
12-Nov	128–133	Riemann-Stieltjes integral
14-Nov	133–137	fundamental theorem of calculus; rectifiable curves
19-Nov	143–148	problematic sequences of functions; final draft due
26-Nov	148–154	uniform convergence
28-Nov	173–178	more about power series
3-Dec	179–185	special functions and the fundamental theorem of algebra

Policies of the College of Arts and Sciences

(Required on all COAS Syllabi)

Classroom Behavior

The College of Arts and Sciences encourages classroom discussion and academic debate as an essential intellectual activity. It is essential that students learn to express and defend their beliefs, but it is also essential that they learn to listen and respond respectfully to others whose beliefs they may not share. The College will always tolerate diverse, unorthodox, and unpopular points of view, but it will not tolerate condescending or insulting remarks. When students verbally abuse or ridicule and intimidate others whose views they do not agree with, they subvert the free exchange of ideas that should characterize a university classroom. If their actions are deemed by the professor to be disruptive, they will be subject to appropriate disciplinary action, which may include being involuntarily withdrawn from the class.

Plagiarism and Cheating

Plagiarism is the presentation of someone else's work as your own. **1)** When you borrow someone else's facts, ideas, or opinions and put them entirely in your own words, you must acknowledge that these thoughts are not your own by immediately citing the source in your paper. Failure to do this is plagiarism. **2)** When you also borrow someone else's words (short phrases, clauses, or sentences), you must enclose the copied words in quotation marks as well as citing the source. Failure to do this is plagiarism. **3)** When you present someone else's paper or exam (stolen, borrowed, or bought) as your own, you have committed a clearly intentional form of intellectual theft and have put your academic future in jeopardy. This is the worst form of plagiarism.

Here is another explanation from the 2010, sixth edition of the *Manual of The American Psychological Association* (APA):

Plagiarism: Researchers do not claim the words and ideas of another as their own; they give credit where credit is due. Quotations marks should be used to indicate the exact words of another. *Each* time you paraphrase another author (i.e., summarize a passage or rearrange the order of a sentence and change some of the words), you need to credit the source in the text.

The key element of this principle is that authors do not present the work of another as if it were their own words. This can extend to ideas as well as written words. If authors model a study after one done by someone else, the originating author should be given credit. If the rationale for a study was suggested in the Discussion section of someone else's article, the person should be given credit. Given the free exchange of ideas, which is very important for the health of intellectual discourse, authors may not know where an idea for a study originated. If authors do know, however, they should acknowledge the source; this includes personal communications. (pp. 15-16)

Consult the Writing Center or a recommended guide to documentation and research such as the *Manual of the APA* or the *MLA Handbook for Writers of Research Papers* for guidance on proper documentation. If you still have doubts concerning proper documentation, seek advice from your instructor prior to submitting a final draft.

Use of Work in Two or More Courses: You may not submit work completed in one course for a grade in a second course unless you receive explicit permission to do so by the instructor of the second course.

Penalties for Plagiarism: Should a faculty member discover that a student has committed plagiarism, the student should receive a grade of 'F' in that course and the matter will be referred to the Honor Council for possible disciplinary action. The faculty member, however, may elect to give freshmen and sophomore students a "zero" for the assignment and to allow them to revise the assignment up to a grade of "F" (50%) if they believe that the student plagiarized out of ignorance or carelessness and not out of an attempt to deceive in order to earn an unmerited grade. This option should not be available to juniors, seniors, or graduate students, who cannot reasonably claim ignorance of documentation rules as an excuse.

Caution: Be very careful what you upload to Turnitin or send to your professor for evaluation. Whatever you upload for evaluation will be considered your final, approved draft. If it is plagiarized, you will be held responsible. The excuse that "it was only a draft" will not be accepted.

Caution: Also, do not share your electronic files with others. If you do, you are responsible for the possible consequences. If another student takes your file of a paper and changes the name to his or her name and submits it and you also submit the paper, we will hold both of you responsible for plagiarism. It is impossible for us to know with certainty who wrote the paper and who stole it. And, of course, we cannot know if there was collusion between you and the other student in the matter.

Penalties for Cheating: Should a faculty member discover a student cheating on an exam or quiz or other class project, the student should receive a "zero" for the assignment and not be allowed to make the assignment up. The incident should be reported to the chair of the department and to the Honor Council. If the cheating is extensive, however, or if the assignment constitutes a major grade for the course (e.g., a final exam), or if the student has cheated in the past, the student should receive an "F" in the course, and the matter should be referred to the Honor Council. Under no circumstances should a student who deserves an "F" in the course be allowed to withdraw from the course with a "W."

Student Right of Appeal: Faculty will notify students immediately via the student's TAMIU e-mail account that they have submitted plagiarized work. Students have the right to appeal a faculty member's charge of academic

dishonesty by notifying the TAMIU Honor Council of their intent to appeal as long as the notification of appeal comes within 5 business days of the faculty member's e-mail message to the student. The *Student Handbook* provides details

UConnect, TAMIU E-Mail, and Dusty Alert

Personal Announcements sent to students through TAMIU's UConnect Portal and TAMIU E-mail are the official means of communicating course and university business with students and faculty – not the U.S. Mail and not other e-mail addresses. Students and faculty must check UConnect and their TAMIU e-mail accounts regularly, if not daily. Not having seen an important TAMIU e-mail or UConnect message from a faculty member, chair, or dean is not accepted as an excuse for failure to take important action. Students, faculty, and staff are encouraged to sign-up for *Dusty Alert* (see www.tamtu.edu). *Dusty Alert* is an instant cell phone text-messaging system allowing the university to communicate immediately with you if there is an on-campus emergency, something of immediate danger to you, or a campus closing.

Copyright Restrictions

The Copyright Act of 1976 grants to copyright owners the exclusive right to reproduce their works and distribute copies of their work. Works that receive copyright protection include published works such as a textbook. Copying a textbook without permission from the owner of the copyright may constitute copyright infringement. Civil and criminal penalties may be assessed for copyright infringement. Civil penalties include damages up to \$100,000; criminal penalties include a fine up to \$250,000 and imprisonment.

Students with Disabilities

Texas A&M International University seeks to provide reasonable accommodations for all qualified persons with disabilities. This University will adhere to all applicable federal, state, and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal education opportunity. It is the student's responsibility to register with the Director of Student Counseling and to contact the faculty member in a timely fashion to arrange for suitable accommodations.

Incompletes

Students who are unable to complete a course should withdraw from the course before the final date for withdrawal and receive a "W." To qualify for an "incomplete" and thus have the opportunity to complete the course at a later date, a student must meet the following criteria:

1. The student must have completed 90% of the course work assigned before the final date for withdrawing from a course with a "W", and the student must be passing the course;
2. The student cannot complete the course because an accident, an illness, or a traumatic personal or family event occurred after the final date for withdrawal from a course;
3. The student must sign an "Incomplete Grade Contract" and secure signatures of approval from the professor and the college dean.
4. The student must agree to complete the missing course work before the end of the next long semester; failure to meet this deadline will cause the "I" to automatically be converted to a "F"; extensions to this deadline may be granted by the dean of the college.

This is the general policy regarding the circumstances under which an "incomplete" may be granted, but under exceptional circumstances, a student may receive an incomplete who does not meet all of the criteria above if the faculty member, department chair, and dean recommend it.

Student Responsibility for Dropping a Course

It is the responsibility of the STUDENT to drop the course before the final date for withdrawal from a course. Faculty members, in fact, may not drop a student from a course without getting the approval of their department chair and dean.

Independent Study Course

Independent Study (IS) courses are offered only under exceptional circumstances. Required courses intended to build academic skills may not be taken as IS (e.g., clinical supervision and internships). No student will take more than one IS course per semester. Moreover, IS courses are limited to seniors and graduate students. Summer IS course must continue through both summer sessions.

Grade Changes & Appeals

Faculty are authorized to change final grades only when they have committed a computational error or an error in recording a grade, and they must receive the approval of their department chairs and the dean to change the grade. As part of that approval, they must attach a detailed explanation of the reason for the mistake. Only in rare cases would another reason be entertained as legitimate for a grade change. A student who is unhappy with his or her grade on an assignment must discuss the situation with the faculty member teaching the course. If students believe that they have been graded unfairly, they have the right to appeal the grade using a grade appeal process in the *Student Handbook* and the *Faculty Handbook*.

Final Examination

Final Examination must be comprehensive and must contain a written component. The written component should comprise at least 20% of the final exam grade. Exceptions to this policy must receive the approval of the department chair and the dean at the beginning of the semester.