The University of Texas at San Antonio™

Calculus II

MAT 1224.009 (Spring 2023)

Syllabus

Instructor:

Dr. Josué Tonelli-Cueto
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0 Basic Information

The course syllabus is a general plan for the course; the instructor may made changes to the syllabus. All changes will be communicated to the students in class and by e-mail.

Course Title:	Calculus II
Course Code:	MAT 1224
Credits:	4
Prerequisites:	MAT 1193 or MAT 1214
Instructor:	Dr. Josué Tonelli-Cueto
Office:	FLN 1.04.04
E-mail:	josue.tonelli-cueto@utsa.edu
Office Hours:	Monday, 10.00 am – 12.05 pm Also by appointment and by Zoom
Ombudsperson:	Contact ilse.rosalesmartinez@utsa.edu regarding concerns about this class

Days:	Monday & Wednesday
Time:	8:00 am – 9:40 am
Place:	McKinney Humanities Building Room 3.03.16
Date Range:	Jan 17, 2023 - May 10, 2023
Type:	Traditional in-person
Exceptions:	February 6 & 8, 2023 April 17 & 19, 2023

The classes on February 6 and 8 and on April 17 and 19 will be by another instructor or on-line.

Important Dates		Exams		Special Classes	
Jan 18	First Class	**Feb 13**	1st Midterm Exam	**February 6**	
Mar 13-17	Spring Break	**Mar 8**	2nd Midterm Exam	**February 8**	
May 1	Last Class	**Apr 17**	3rd Midterm Exam	**Apr 17**	
May 3	Student Study Day	**May 10**	Final Exam Exam	**April 19**	

An additional on-line bi-weekly one hour sessions will be offered at a date chosen the first class

1 Description

Calculus, originally called *infinitesimal calculus*, is the mathematical study of continuous change. It has two major branches: differential calculus and integral calculus. In Calculus I, the focus was on differential calculus which studies the instantaneous rate of change. In other words, we were trying to answer the question:

How Much Does a Function Vary at an Instant?

In Calculus II, the focus will be on integral calculus that studies the accumulation of change. In this sense, we will be focusing in the opposite question to the one above,

How Much do Changes Accumulate over Time?

While the central concept of Calculus I was the *derivative*, the central concept of Calculus II will be the *integral* and the *series*.

In the first part of the course, the objective will be to understand and use the interplay between derivatives and integral. We will showcase how integration can be applied not only to geometry and physics, but also to engineering, economics and biology. In the second part of this course, the objective will be to understand the convergence of series and several criterions to determine it. After this, we will focus on *power series* as a tool to understand how functions can be locally be approximated by polynomials, and use this for computing the value of some series explicitly.

Catalogue Description Prerequisite: MAT 1193 or MAT 1214. Methods of integration, applications of the integral, sequences, series, and Taylor expansions. (Formerly MAT 1223. Credit cannot be earned for both MAT 1224 and MAT 1223.) Generally offered: Fall, Spring, Summer.

2 Course Objectives

Upon successful completion of this course, students will be able to:

- Use the concepts of definite integrals to solve problems involving area, volume, work, and other physical applications.
- Use substitution, integration by parts, trigonometric substitution, and partial fractions to evaluate definite and indefinite integrals.
- Apply the concepts of limits, convergence, and divergence to evaluate different types of improper integrals.
- Determine convergence or divergence of infinite sequences and series.
- Use Taylor and MacLaurin series to represent functions and to integrate functions not integrable by conventional methods.

Additionally, the successful student will learn to:

- Communicate abstract and complex ideas in writing.
- Develop a general understanding of the role that calculus—and more generally mathematics—plays in STEM and the humanities.

3 Course Schedule

The course topics will be covered according to the following plan:

Lesson	Section	Date	Topics
0	1.3	Jan 18	The Fundamental Theorem of Calculus
1	1.5	Jan 23	Integration by Substitution
2	2.1	Jan 25	Area between Curves
3	2.2	Jan 30	Determining Volumes by Slicing
4	2.3	Feb 1	Volumes of Revolution, Cylindrical Shells
5	2.4	Feb 6	Arc Length of a Curve and Surface Area
6	2.5	Feb 8	Physical Applications
7	2.6	Feb 13	Moments and Center of Mass
8	3.1	Feb 15	Integration by Parts
9	3.2	Feb 20	Trigonometric Integrals
10	3.3	Feb 22	Trigonometric Substitution
11	3.4	Feb 27	Partial Fractions
12	3.7	Mar 1	Improper Integrals
13	Review	Mar 6	Review of Integration
14	4.3	Mar 8	Separation of Variables
		Mar 13 Mar 15	Spring Break
15	4.5	Mar 20	First-Order Linear Differential Equations
16	5.1	Mar 22	Sequences
17	5.2	Mar 27	Infinite Series
18	5.3	Mar 29	The Divergence and Integral Tests
19	5.4	Apr 3	Comparison Tests
20	5.5	Apr 5	Alternating Series
21	5.6	Apr 10	Ratio and Root Tests
22	Review	Apr 12	Review of Series
23	6.1	Apr 17	Power Series and Functions
24	6.2	Apr 19	Properties of Power Series
25	6.3	Apr 24	Taylor and Maclaurin Series
26	Review	Apr 26	Review for Power Series
27	Review	May 1	Review for Final Exam
		May 3	Student Study Day

The grading calendar is the following one:

Date	Time	Event
Feb 1		Last day to drop or withdraw without a grade
Feb 13	8:00 – 8:50 am	1st Midterm Exam
Mar 8	8:00 – 8:50 am	2nd Midterm Exam
Apr 17	8:00 – 8:50 am	3nd Midterm Exam
May 10	9:00 – 10:50 am	Final Exam

4 Bibliography and Supplementary Materials

The course will be based mainly in the following textbook:

[1] E. Herman, G. Strang, W. Radulovich, et al. *Calculus (Volume 2)*. OpenStax, 2016. URL: https://openstax.org/details/books/calculus-volume-2.

The following supplementary material covers sometimes topics beyond the scope of our course, but the parts that correspond to our course can be useful to supplement the textbook, lectures and exercises of the course.

[2] V. Amelkin. *Differential Equations In Applications*. Trans. by E. Yankovsky. Science for Everyone. Mir, 1990. URL: https://archive.org/embed/AmelkinDifferentialEquationsInApplicationsScienceForEveryoneMir1990.

[3] B. Demidovich, ed. *Problems in Mathematical Analysis*. Trans. by G. Yankovsky. Mir, 1970. URL: https://archive.org/embed/DemidovichEtAlProblemsInMathematicalAnalysisMir1970.

[4] R. Ghrist. *Calculus: Single Variable by Professor Robert Ghrist*. URL: https://www.youtube.com/playlist?list=PLKc2XOQp0dMwj9zAXD5LlWpriIXIrGaNb.

[5] R. A. Silverman. *Essential calculus with applications*. Dover Publications, 1989.

5 Instructional Methods

The instruction will combine lectures with homework. With the exception of February 6 and 8 and April 17 and 19, all classes will be held at the time and place stated on ASAP or above. On February 6 and 8 and April 17 and 19, classes will either take place online using either Zoom or Blackboard Collaborate Ultra or they will be given by another instructor. None of the lectures will be recorded in principle.

5.1 Additional review classes Additional biweekly one-hour online review classes on a date and time to be chosen by the class. These classes will take place only if at least one student attend and they will be recorded. In these classes, the instructor will present solutions to extra exercises and will answer student questions.

5.2 Homework All homework for the course will be assigned and completed through the online homework system WeBWorK: webwork.math.utsa.edu/webwork2. Students can log in to WeBWorK using their UTSA credientials at the site. Students are responsible for keeping up with the due dates for all assignments. There will be no make up assignments.

5.3 Photographing policy Students have explicit permission from the instructor to photograph and share photographs of any written blackboard during the lectures. These photographs can be freely shared among students as long as no student is identifiable in the photograph.

5.4 Recording policy The instructor will record on-line meetings of this course. Any recordings will be available to all students registered for this class as they are intended to supplement the classroom experience. Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless Student Disability Services has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced or shared with those not in the class, or uploaded to other online environments except to implement an approved Student Disability Service accommodation. If the instructor or a UTSA office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.

5.5 Expectations Students are expected to attend lectures and participate in discussions. A student absent from class bears the full responsibility for all subject matter and procedural information discussed in class.

6 Grading Policy

The final grade will depend on the performance on homework, three midterm exams and a comprehensive final exam. A student must take the final exam to pass. Each grade will contribute to the final grade as follows:

Homework	1st Midterm Exam	2nd Midterm Exam	3rd Midterm Exam	Final Exam
20%	20%	20%	20%	20%
The grade of the final exam will substitute the lowest grade in a midterm exam if higher than this grade. If the final exam is not taken, the student fails the course.				

In the event that the student's grade on the final exam is higher than the lowest grade in a midterm exam, the final exam grade will substitute this lowest midterm exam grade. The grade scale and weighting is given below.

A+	97.5-100	A	90.0-97.4	A–	87.5-89.9
B+	85.0-87.4	B	80.0-84.9	B–	77.5-79.9
C+	75.0-77.4	C	70.0-74.9	C–	67.5-69.9
D+	65.0-67.4	D	60-64.9	D–	57.5-59.9
		F	0-57.4		

7 Exams

There will be three midterm exams and a final exam. The final exam is compulsory to pass the course. In the event that the student's grade on the final exam is higher than the lowest grade in a midterm exam, the final exam grade will substitute this lowest midterm exam grade. More detailed information about the exams will be provided by your instructor throughout the semester.

7.1 Midterm exams There will be three midterm exams administered in class on the dates listed on the course syllabus.

7.1.1 Format of the Midterm Exams Each exam will consist of written problems similar to the homework problems and examples discussed in class. The exams will have a time limit of 50 minutes.

7.1.2 Use of Calculator The use of a scientific (non-graphing) calculator without internet capabilities is allowed. Under no circumstances are students permitted to utilize an online resource, website, or tutor to find solutions to exam problems.

7.1.3 Practice Problems and Extra Credit One week before each midterm exam, a set of practice problems will be made available in WeBWorK. These assignments are designed to help students prepare for the upcoming exam. Students can complete these practice problems to earn up to 10 bonus points on each exam, which will 10% of a student's score on the practice problems will be added to the corresponding exam score.

7.2 Final Exam There will be a compulsory comprehensive final exam. The date and time of the final exam will be on May 10, at 9:00-10:50 am—in accordance with the for your section can be found at 2022 Spring Final Exam Schedule.

7.2.1 Format of the Final Exam The final exam will consist of written problems similar to the homework problems and problems from the midterm exams.

7.2.2 Use of Calculator The use of a scientific (non-graphing) calculator is allowed. Under no circumstances are students permitted to utilize an online resource, website, or tutor to find solutions to exam problems.

7.2.3 Practice Problems and Extra Credit One week before the final exam, a set of Practice Problems will be made available in WeBWorK. These assignments are designed to help students prepare for the upcoming exam. Students can complete these Practice Problems to earn up to 10 bonus points on the final exam, i.e., 10% of a student's score on the Practice Problems will be added to the final exam score.

7.2.4 Back Up Grade In the event that a students' grade on the final exam is higher than the lowest of their three midterm exam grades, the final exam grade will replace this lowest midterm exam grade in the overall course grade calculation.

8 Common Syllabus Information

The following information is common for every syllabus at the University of Texas at San Antonio. For an up-to-date version, please, visit provost.utsa.edu/syllabus.html

8.1 Counseling Services Counseling Services provides confidential, professional services by staff psychologists, social workers, counselors and psychiatrists to help meet the personal and developmental needs of currently enrolled students. Services include individual brief therapy for personal and educational concerns, couples/relationship counseling, and group therapy on topics such as college adaptation, relationship concerns, sexual orientation, depression and anxiety. Counseling Services also screens for possible learning disabilities and has limited psychiatric services. Visit Counseling Services at utsa.edu/counsel or call (210) 458-4140 (Main Campus) or (210) 458-2930 (Downtown Campus).

8.2 Student Code of Conduct and Scholastic Dishonesty The Student Code of Conduct is Section B of the Appendices in the Student Information Bulletin. Scholastic Dishonesty is listed in the Student Code of Conduct (Sec. B of the Appendices) under Sec. 203[1].

8.3 Students with Disabilities The University of Texas at San Antonio in compliance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act provides "reasonable accommodations" to students with disabilities. Only those students who have officially registered with Student Disability Services and requested accommodations for this course will be eligible for disability accommodations. Instructors at UTSA must be provided an official notification of accommodation through Student Disability Services. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.utsa.edu/disability or by calling Student Disability Services at (210) 458-4157. Accommodations are not retroactive.

8.4 Transitory/Minor Medical Issues In situations where a student experiences a transitory/minor medical condition (e.g. broken limb, acute illness, minor surgery) that impacts their ability to attend classes, access classes or perform tasks within the classroom over a limited period of time, the student should refer to the class attendance policy in their syllabus.

8.5 Supplemental Instruction Supplemental Instruction offers student-led study groups using collaborative learning for historically difficult classes. Supported courses and schedules can be found on the TRC website (utsa.edu/trcss/si/). You can call the SI office if you have questions or for more information at (210) 458-7251.

[1] See catalog.utsa.edu/policies/administrativepoliciesandprocedures/studentcodeofconduct/

8.6 Tutoring Services Tomás Rivera Center (TRC) may assist in building study skills and tutoring in course content. The TRC has several locations at the Main Campus and is also located at the Downtown Campus. For more information, visit the Tutoring Services web page (www.utsa.edu/trcss/tutoring/) or call (210) 458-4694 on the Main Campus and (210) 458-2838 on the Downtown Campus.

8.7 Academic Success Coaching The Tomas Rivera Center (TRC) Academic Success Coaching Program offers one-on-one study skills assistance through Academic Coaching. Students meet by appointment with a professional to develop more effective study strategies and techniques that can be used across courses. Group workshops are also offered each semester to help students defeat common academic challenges. Find out more information on the TRC Academic Success Coaching website (www.utsa.edu/trcss/asc/) or call (210) 458-4694.

8.8 Sexual Harassment and Sexual Misconduct UTSA is committed to providing an environment free from all forms of discrimination and sexual harassment, including sexual misconduct, sexual assault, domestic violence, dating violence, and stalking. If a student has experienced or experiences any of these incidents, know that UTSA has resources to help.

UTSA faculty have the responsibility to create a learning environment that is safe and free from hostility. State and federal law as well as UTSA's Handbook of Operating Procedures (HOP 9.24) require that instructors must report incidents of sexual harassment and sexual misconduct they learn about to the Title IX Coordinator or a Deputy Title IX Coordinator. This means that if a student tells their instructor about a situation (including classroom discussions, written work and/or one-on-one meetings) involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, the instructor must report it to the EOS/Title IX Office. Although the faculty member must report the situation, the student will still have options about how their case will be handled, including whether or not they wish to pursue a formal complaint. The university's goal is to make sure students are aware of the range of options available to them and have access to the resources they need.

If a student wishes to speak to someone confidentially, they can contact any of the following on-campus resources, who are not required to report the incident to the EOS/Title IX Office: (1) Counseling Services at 210-458-4140; (2) Student Health Services at 210-458-4142; or (3) PEACE Center at 210-458-4077.

8.9 Campus Safety & Emergency Preparedness UTSA is committed to providing a safe campus environment for students, faculty, staff, and visitors. As members of the community, we encourage you to take the following actions to be better prepared in case of an emergency:

8.9.1 Alerts: Ensure you are signed up for UTSA Alerts through your ASAP.utsa.edu account.

8.9.2 Emergency Procedures: Read the emergency response guide on the UTSA Alerts website.

8.9.3 Safety App: Download the LiveSafe App on your phone through the Apple store or Google Play; visit the UTSA Alerts website for details.

8.9.4 Important Numbers: UTSA Police — Emergency: (210) 458-4911;
Non-Emergency: (210) 458-4242.

Each one of us play a critical role in making sure ALL ROADRUNNERS are safe, know what to do, and how to stay informed during a campus crisis. Don't be scared, be prepared! #UTSAprepared

9 Inclusivity Statement

The University of Texas at San Antonio, a Hispanic Serving Institution situated in a global city that has been a crossroads of peoples and cultures for centuries, values diversity and inclusion in all aspects of university life. As an institution expressly founded to advance the education of Mexican Americans and other underserved

communities, our university is committed to ending generations of discrimination and inequity. UTSA, a premier public research university, fosters academic excellence through a community of dialogue, discovery and innovation that embraces the uniqueness of each voice. Learn more at www.utsa.edu/inclusiveexcellence.

10 The Roadrunner Creed

The University of Texas at San Antonio is a community of scholars, where integrity, excellence, inclusiveness, respect, collaboration, and innovation are fostered.

As a Roadrunner, I will:

Uphold the highest standards of academic and personal integrity by practicing and expecting fair and ethical conduct;
Respect and accept individual differences, recognizing the inherent dignity of each person;
Contribute to campus life and the larger community through my active engagement; and
Support the fearless exploration of dreams and ideas in the advancement of ingenuity, creativity, and discovery.

Guided by these principles now and forever, I am a Roadrunner!