Syllabus: MAC 2312 Analytic Geometry and Calculus II

Fall semester 2024

Welcome to MAC 2312 – Calculus II

This course is part of the STEM Core, a set of critical and foundational courses consisting of mathematics, chemistry, physics, programming, and STEM applications. These courses build the skills and conceptual understanding you need to succeed in all degree programs. Data show that completing these courses in your freshman (first) year is the best path towards a high-powered STEM degree and an on-time graduation. Courses in the STEM Core share similar formats and expectations. The faculty across the STEM Core work together to help you succeed. Make these courses a priority!

Academic Integrity

Students are expected to adhere to the highest standards of academic integrity. Violations of academic integrity, particularly cheating and plagiarism, undermine the central mission of the university and negatively impact the value of Florida Poly degrees. Suspected violations will be fully investigated, possibly resulting in an academic integrity hearing and sanctions against the accused student. More information about Florida Poly's academic integrity policies and procedures can be found here: https://floridapoly.edu/wp-content/uploads/2017/07/FPU-5.005-Academic-Integrity-7.29.14.pdf#search=academic%20integrity

Official Email Address

Florida Polytechnic University email is the official method of communication for the University. Students are required to check their email frequently (at least once per day). We cannot reply to any email received from an address other those that end in floridapoly.edu.

Midterm Exams

Midterm exam dates will be finalized early in the semester and those dates/times will be posted to our Canvas course site once available. Exam dates are subject to change and you should refer to the Academic Calendar website for the most up-to-date exam schedules. Exam dates will also be announced in class at least one week prior to the scheduled event.

Course Structure and Required Texts

All course content will be organized and communicated via the course's Canvas page (https://floridapolytechnic.instructure.com/). Each week's course module will include links to the relevant sections of the online textbook and any other required resources. These resources will vary from week to week, therefore it is essential for you to regularly visit the Canvas page to see where to look for additional help for each topic.

Our main text throughout most of the course will be *OpenStax Calculus Volume 2*, though we will be using *OpenStax Calculus Volume 3* as a supplementary text for some material. These are both free textbooks available online, and will act as our primary resources for content, readings, and problems.

Textbook: OpenStax Calculus Volume 2, https://openstax.org/details/books/calculus-volume-2

Textbook: OpenStax Calculus Volume 3, https://openstax.org/details/books/calculus-volume-3

Instructor Information

Instructor: XXX

Office: XXX

Email: XXX

Office Hours: XXX

Course Information

Course Number and Title: MAC 2312 Analytic Geometry and Calculus II, Section XX

Meeting time: XXX

Credit Hours: 4

Current Academic Term: Fall 2024

Course Delivery and Course Description

Delivery Mode: Face-to-face

Course Website: https://floridapolytechnic.instructure.com/

Official Catalog Course Description: An introduction to the theory and applications of integration. Topics include techniques for finding anti-derivatives, numerical integration, an introduction to differential equations, applications of integrals to real-world problems, parametric equations, Taylor polynomials, and a basic introduction to infinite series and power series.

Gordon Rule (6A-10.030): No

Prerequisites: A grade of C or better in MAC 2311 - Analytic Geometry and Calculus 1

Equipment and Material:

Laptops will often be required in class (see Canvas for additional details on what laptops are suitable). During some classes, some cell phones may be appropriate substitutes when a laptop is not available. For example, we will often need technology that can adequately run Desmos or Excel. Graphing calculators are not allowed. **The required calculator for this class is the TI-30XIIS.** No other calculators are allowed.

Course Objectives:

To help the students build up a solid foundation in mathematical reasoning by acquiring important building blocks and skills. Also, giving the students the tools to apply the learned knowledge to solve routine and non-routine problems with emphasis placed on solving applications by mathematical modeling.

Course Learning Outcomes:

The following topics will be used to measure the student learning outcome “Demonstrate fluency in mathematics concepts”, which corresponds to the Mathematics Reasoning Competency:

1. Interpret a differential equation model to determine the behavior of the system it describes, either by solving the differential equation (exactly or numerically) or by qualitatively describing its solution's behavior (by applying a slope field, a phase line, or equilibrium analysis).
2. Apply an understanding of how a given real-world system changes to define a reasonable differential equation to model it. Interpret a given differential equation model to reach conclusions about how the corresponding real-world system changes.
3. Create and evaluate a Riemann sum or definite integral to approximate or exactly compute the value of a given geometric or physical measurement (e.g. area, volume, arc length, mass, force).
4. Select and apply an appropriate numerical integration technique (e.g. left endpoint rule, right endpoint rule, midpoint rule, trapezoidal rule) to approximate the value of a definite integral, and analyze the error in this approximation.
5. Select and apply an appropriate strategy to evaluate a given indefinite integral using an appropriate combination of basic antidifferentiation rules, substitution, integration by parts, and partial fraction decomposition. Evaluate a given definite integral using the Fundamental Theorem of Calculus, properties of integrals, or basic geometry.
6. Determine the convergence properties of an infinite series, either by directly applying the definition of convergence or by applying an appropriate convergence test (e.g. divergence test, ratio test, alternating series test). Compute or approximate the sums of selected types of infinite series (e.g. geometric series, alternating series).
7. Find the power series representation or polynomial approximation for a given function, either from the definition of a Taylor series or by manipulating a closely-related power series.
8. Apply a power series to approximate a given function, and apply Taylor's Theorem and convergence analysis to determine the error bound and convergence properties of the approximation.

Grading Scale

Grade	A	B+	B	B-	C+	C	D	F
Percentage	90%	87%	83%	80%	77%	70%	60%	< 60%
GPA	4.0	3.33	3.0	2.67	2.33	2.0	1.0	0.0

Assignment/Evaluation Methods

Homework	14%
Projects	10%
Quizzes	5%
Attendance	3%
Exam 1	17%
Exam 2	17%
Exam 3	17%
Final Exam	17%
Total	100%

Homework: Homework will be assigned on Canvas on a regular basis and will cover important topics to help you to better learn the course material and to prepare for the exams. Dates and topics for these assignments will be announced via Canvas.

Homework assignments will generally consist of two parts: an *online part* and a *hand-written part*. The online part will be completed entirely online through a homework system called Edfinity (details for enrolling in Edfinity can be found on the Canvas page). The hand-written part will be handwritten and submitted digitally as a single through Canvas. You can do so by scanning your work and submitting a PDF.

Hand-written submissions will be graded on the basis of presentation (presenting professional, readable work), completeness (attempting a full solution for all assigned problems), and correctness (a subset of problems in each assignment will be fully graded for correctness). In order to receive full credit for a solution you must clearly communicate and annotate all steps thoroughly enough for a reader to easily see what you are doing and why.

It is vitally important that you make a solid effort to consistently complete all parts of the homework assignments. *Students that consistently skip homework or consistently perform poorly on homework assignments do not do well in this class*. Keep in mind that homework is not an exam, and that you are encouraged to discuss assignments with other students (as long as you submit your own work) and to ask your instructor for help as often as you like.

Homework submitted up to 24 hours after the posted due date will be accepted with a 20% penalty. No submissions will be accepted more than 24 hours late. Unexcused late work will not be accepted for any reason, including due to technical issues with Canvas, so be sure to submit early to avoid unexpected delays. If you are having issues submitting your assignment, be sure to email your work to your instructor *before* the cutoff to demonstrate that you've made a good-faith effort to meet the deadline. It is your responsibility to ensure that you submit the correct file. No corrections will be accepted after the cutoff for any reason. At the end of the semester your lowest two homework scores will be dropped.

Projects: Small group projects will be assigned periodically throughout the semester to supplement our coverage of selected topics. The purpose of these projects is to give you some hands-on experience working with concepts, to discover some results on your own through experimentation, and to discuss ideas with your classmates. Project topics, dates, and submission requirements will be discussed in class, and project submissions will be graded on the basis of completeness, correctness, and presentation.

In addition, a major cumulative final project will be assigned near the end of the semester (see the below schedule for tentative final project dates). This will consist of a multi-day group project that incorporates material from all units, and is meant to act as both a cumulative review and a cumulative evaluation before the final exam. Details for the final project will be announced in class.

Quizzes: Quizzes will be given in class. Tentative quiz dates are included in the schedule below. Quizzes are meant to act as quick checks of the important concepts and skills to be featured on the next exam in order to help you to identify topics that you will need to work on more in preparation. Like exams, quizzes are a form of assessment, and you are expected to prepare for them ahead of time. At the end of the semester your lowest quiz score will be dropped.

Attendance: To succeed in this class it is essential that you attend class regularly. Attendance will be taken daily to determine your attendance grade. Coming to class to be counted and then leaving is not permitted. Falsifying attendance for yourself or for another student is an act of academic dishonesty and is considered a violation of the university's academic integrity policy.

Exams: There will be three common unit exams during the semester, held in the evening outside of class. Tentative exam dates are included in the schedule below. Exact dates, times, and room numbers will be released by the Registrar after the semester begins.

Final Exam: There will be a common, comprehensive exam at the end of the semester. The final exam schedule will be released by the Registrar during the semester. Your lowest exam score may be replaced by your final exam score if that would improve it, up to a maximum of 80%.

Schedule of Topics by Week

Note: Most book sections below refer to OpenStax Calculus Volume 2. Those that reference Volume 3 instead indicate so.

Be aware that quiz and exam dates, their coverage, and the topic schedule are subject to change. The STEM Core common exams will be deconflicted to avoid holding too many during the same week, which may result in some of the below exam dates and unit cutoffs moving up or down.

Week	Topics	Notes and Important Dates
Week 1 Aug 19 – Aug 24	**Beginning of Unit 1: Differential Equations** Course Introduction 4.1 Basics of Differential Equations	Tue Aug 20: First Day of Class
Week 2 Aug 26 – Aug 30	4.2 Direction Fields and Numerical Methods 4.4 The Logistic Equation	
Week 3 Sep 2 – Sep 6	1.1 Approximating Areas 1.2 The Definite Integral 1.3 The Fundamental Theorem of Calculus 1.4 Integration Formulas and the Net Change Theorem	Mon Sep 1: Labor Day (No Classes) **Wed Sep 4: Quiz 1 (4.1-4.2, 4.4)**
Week 4 Sep 9 – Sep 13	Vol 3: 3.1 Vector-Valued Functions and Space Curves Vol 3: 3.2 Calculus of Vector-Valued Functions 1.5 Substitution	
Week 5 Sep 16 – Sep 20	Unit 1 Review **End of Unit 1** **Beginning of Unit 2: Applications and Techniques of Integration** 3.6 Numerical Integration	**Mon Sep 16: Quiz 2 (1.1-1.5, Vol 3: 3.1-3.2)** **Date TBD: Exam 1**
Week 6 Sep 30 – Oct 4	3.6 Numerical Integration 2.1 Areas Between Curves 2.2 Determining Volumes by Slicing	
Week 7 Oct 7 – Oct 11	Vol 3: 3.3 Arc Length and Curvature (arc length only) 2.5 Physical Applications (linear mass and hydrostatic force only) 3.1 Integration by Parts	**Fri Oct 11: Quiz 3 (2.1-2.2, 2.5, Vol 3: 3.3)**
Week 8 Oct 14 – Oct 18	3.1 Integration by Parts 3.4 Partial Fractions (non-repeated linear factors only) Unit 2 Review **End of Unit 2**	**Fri Oct 18: Quiz 4 (1.5, 3.1, 3.4)**
Week 9 Oct 21 – Oct 25	**Beginning of Unit 3: Taylor Series** 6.3 Taylor and Maclaurin Series (introduction only)	**Date TBD: Exam 2**
Week 10 Oct 28 – Nov 1	5.1 Sequences 5.2 Infinite Series	
Week 11 Nov 4 – Nov 8	5.3 The Divergence and Integral Tests (divergence test only) 5.5 Alternating Series 5.6 Ratio and Root Tests (ratio test only)	**Fri Nov 8: Quiz 4 (5.1-5.3, 5.5-5.6)**
Week 12 Nov 11 – Nov 15	6.1 Power Series and Functions 6.2 Properties of Power Series	Mon Nov 11: Veteran's Day (No Classes)

Week 13 Nov 18 – Nov 22	6.3 Taylor and Maclaurin Series 6.4 Working with Taylor Series (selected topics) Unit 3 Review **End of Unit 3**	**Wed Nov 20: Quiz 6 (6.1-6.3)**
Week 14 Nov 25 – Nov 29	**Exam 3 and Thanksgiving Break**	**Date TBD: Exam 3** Wed Nov 27 – Fri Nov 29: Thanksgiving Break (No Classes)
Week 15 Dec 2 – Dec 6	**Project Week**	**Final Project** Wed Dec 4: Last Day of Classes Thu Dec 5 – Fri Dec 6: Reading Days (No Classes)

Course Policies

Attendance

- Students in face-to-face courses are expected to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor. (University Policy, FPU-5.0010AP) (see also University Policy).
- Attending class regularly is crucial for success in this course. Attendance will be taken daily.
- Note: Falsifying attendance for yourself or for another student is an act of academic dishonesty and is considered a violation of the university's academic integrity policy.

Students Feeling Sick

Students should not come to class if they are feeling ill, particularly if experiencing symptoms of COVID-19, or if you have been directed by a health professional to quarantine. Students who are experiencing an emergency situation that aligns with an academic exercise of consequence (e.g./a Common Exam) should work with CARE Services at care@floridapoly.edu

Late Work/Make-up work

Make-up exams/quizzes will be given only in extreme circumstances with a documented excuse. If you will miss an exam because you are participating in a college-sponsored activity, inform your instructor before the exam and provide them with documentation. Late homework/project submissions will not be accepted.

Exam Calculator Policy

TI-30XIIs is the only calculator allowed on examinations, though there may be portions of exams which are designated to be completed without a calculator. Testing format pertaining to calculator accessibility will be disclosed prior to the examination.

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Peer Learning Strategists (PLS)**: Are specially trained student leaders who help their peers strategize approaches to course content and work through solution methods. PLS work in collaboration with the courses they support so the content and methods are aligned with your instructors' expectations.

Students can meet with a PLS in The Learning Center, which is located on the first floor of the Innovation, Science and Technology (IST) building in room 1019.

- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit https://floridapoly.edu/writingcenter.

Participation

Students are expected to participate in the classroom experience. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.

University Policies

Reasonable Accommodations

Florida Polytechnic University is committed to assisting students with disabilities and offering reasonable accommodations to those with documented eligibility. The Office of Disability Services (ODS) coordinates accommodations for students with disabilities in accordance with the ADA Amendments Act of 2008 (ADAAA), the Americans with Disabilities Act of 1990 (ADA), and Section 504 of the Rehabilitation Act of 1973. Reasonable accommodations are determined on an individual basis through an interactive process between you, ODS, and your instructor(s). If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course and communicate with your instructor about your approved accommodations at your earliest convenience. If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible.

The Office of Disability Services (ODS):
DisabilityServices@floridapoly.edu
(863) 874-8770
The Access Point
ODS website: www.floridapoly.edy/disability

Accommodations for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. You may speak to your professor, but your professors have an obligation to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discussion resources and options available.

Student Record of Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use.

Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action).

Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers ***is prohibited****.*