Indiana University Southeast

Department of Mathematics

M311 – Calculus 3

Course Syllabus

Fall 2025

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Office hours:
Monday and Wednesday: 1 – 2 at LF 116 or Zoom
Tuesday and Thursday: 3 – 4 at LF 116 or Zoom

Course Structure: Welcome to the first course in our three-course calculus sequence (MATH-M 215, 216, and 311), designed specifically for math, math ed, and science majors. Throughout this course, we will delve into the fundamental concepts of limits and continuity, explore the intricacies of derivatives and their real-world applications, and introduce integrals and their practical uses. For a comprehensive understanding of the course objectives, please refer to the detailed learning outcomes presented in the syllabus below.

Prerequisites: MATH-M 216 (Calculus 2)
Total credit hours: 3

Modality: Online

Required materials:

Required: OpenStax Calculus Volume 3. This is available as a free download in pdf format (see openstax.org/subjects/math), but it is available in an inexpensive hard-bound printed edition (ISBN 978-1938168079).

There are several options to obtain this book:

- View online (Links to an external site.)
- Download a PDF

The sections corresponding to each week's module will be linked *to that module*. You can see how this looks in Modules.

Graphing calculators and calculators that perform numerical integration and differentiation (e.g., TI-36X Pro) are not allowed on any examination in this course. ***A scientific calculator is required***. The TI-30X IIS is particularly inexpensive and functional. Please ask during the first week if you are unsure whether your calculator is acceptable.

Course learning outcomes:

These outcomes indicate what a student should be able to do at the end of the course.

Surfaces

- Find traces on a surface.
- Classify quadric surfaces as paraboloids, ellipsoids, or hyperboloids of one or two sheets.

Vector-valued functions

- Sketch the graphs of vector-valued functions as curves.
- Find the derivative of a vector-valued function.
- Find the tangent vector or unit tangent vector to a curve.
- Find the angle at which two curves cross.
- Find the integral of a vector-valued function.
- Find the arclength of a curve; find the curvature of a curve.

Functions of several variables

- Find the domain of a function of two variables.
- Draw contour maps of a function of two variables.
- Sketch the graph of a function of two variables.
- Find level surfaces for a function of three variables.
- Find the limit of a function of two variables; determine the continuity of a function of two variables.

Partial derivatives

- Give the definition of partial derivative; find partial derivatives using the definition.
- Find partial derivatives.
- Find the linear approximation to a function at a specified point.
- Find the differential of a real-valued function of several variables; use the differential to
- estimate changes in a function given changes in its independent variables.
- Write the chain rule for a given case using a tree diagram; find partial derivatives of composite.
- functions using the chain rule.
- Use partial derivatives to compute implicit derivatives.
- Find directional derivatives and the gradient of a function of two or three variables.
- Find the tangent plane to a surface.
- Find critical points for a function; determine whether these are local maxima or minima.
- Find the extreme values of a function on a set.
- Solve optimization problems using Laplace multipliers.

Double and triple integrals

- Set up and evaluate double integrals over general regions.
- Set up and evaluate double integrals using polar coordinates.
- Set up and evaluate triple integrals over solids.
- Set up and evaluate triple integrals in cylindrical or spherical coordinates.

Vector fields and line integrals

- Sketch vector fields and gradient fields.
- Compute line integrals with respect to arclength; compute line integrals of a vector field.
- Verify that a vector field is conservative; find its potential field if it is conservative.
- Use the Fundamental Theorem for Line Integrals to find line integrals.

Grading:

1. Homework Assignments 20%
2. Discussion 10%
3. Three exams (each 15%) 45%
4. Comprehensive Final Exam 25%

Grading Scale

[97%, 100%]: A+	[94%, 97%): A	[90%, 94%): A-
[87%, 90%): B+	[84%, 87%): B	[80%, 84%): B-
[77%, 80%): C+	[74%, 77%): C	[70%, 74%): C-
[67%, 70%): D+	[64%, 67%): D	[60%, 64%): D-

Less than 60% of points will be F.

All assignment grades are available through the Canvas Gradebook.

Course Expectations:

It is your responsibility to:

- read all of the assigned material,
- complete all of the homework by the due date,
- participate in discussions, problem-solving, preparation, and submission,
- ask questions to clarify confusion,
- work quickly with the instructor to resolve any difficulties,

I strongly urge you to practice good time-management skills, working throughout the time available for the assignments. **Do Not Wait** until the end of the week to get all of the work done. Your goals should be to understand the concepts, to logically apply them to solve problems, and to professionally communicate your solution.

Canvas and Modules:

Canvas is Indiana University's online course management system. We will be using Canvas extensively to communicate announcements, emails, discussion questions, grades, etc. You should become familiar with the system and log in at least three times each week to ensure that you are up to date with course events and to check your Canvas Messages (and your IU email). Please send all correspondence to me through Canvas or my IU email.

The Modules Tab in Canvas will be used to organize the course assignments. The Getting Started Module contains information about getting prepared for the semester such as the Syllabus and Course Schedule. In the remaining Modules, you will have descriptions of each week's assignments, such as Homework, Quizzes, and Exams with their due dates.

Other Canvas tabs that you will find useful are Syllabus (a calendar of due dates at the bottom of the page) and the Gradebook.

Computer Software and Hardware:

MS Office package is **free** for IU students: Go to One.iu.edu -> Software Download.

Login to Campus Computer Systems:

Two-Step Login (Duo) is required for all students. Be sure to have your primary device (like a cell phone or tablet) accessible so you can log in to secure IU systems. Also, make sure you have a backup device like a hardware token or Google Voice.

You can get help with technology by phone 24 by 7. See the University Information Technologies Services Help Desk. You can also find lots of very specific help at the Indiana University Knowledge Base.

Get 24/7 tech support **Call** (812) 941-2447 **, Email** helpdesk@ius.edu

Walk-up help is available to all students, faculty, and staff between 8 a.m. and 5 p.m., Monday through Friday. You may also schedule an appointment by calling (812) 941-2447 and choosing option #2, or by emailing helpdesk@ius.edu anytime.

Equipment:

You will need to be able to create digital images of your work and upload it into Canvas as a PDF. Some people use phone cameras, tablet cameras, computers, or scanners. I strongly suggest using a smartphone as be familiar with your choice of electronic device and how it works.

Homework:

Read the textbook for each section:

It is important that you read the textbook. In many of your future careers, you will be expected to read and absorb technical material on your own. Believe it or not, this *is a skill in itself*. Getting practice in this controlled environment (where you have the backup of your lectures) is an educational component many students skip over. Some of the mathematical content may be difficult to absorb in one read, but I suggest you try to get what you can from it on your own. (My lectures should help you pick up the rest and solidify the pieces you did understand from the book.) Usually, I would suggest going over the textbook *before* coming to lectures.

Reading a mathematics, statistics, or science text is not like reading a history text: you should read with a pencil in hand, fill in any algebraic calculations that the author leaves out, and note in the margin any questions that you have about the material so that you can get clarification.

Practice the Concepts/Skills/Tools:

When you do the assignment, have a notebook to write down your solutions to the homework problems, applicable concepts, and thoughts. The notebook will then be a tool as you study for exams.

You should do the homework. The schedule indicates the due date and shows up as an upcoming deadline in Canvas. I post solutions to the homework the day after it is due, so ***late assignments cannot be accepted***. It is important that I post these solutions so that students can use them to study, especially on the week of an exam.

HW Submission.

I recommend submitting your HW through Canvas as a PDF file before the due date and time.

There are many ways you can organize a pdf.

If you want to use PDF, there are a few ways to do it.

1. a) Use mobile apps such as iOS Notes, Microsoft Lens, or Android Google Drive. Use them to scan the work that you have written on paper using your mobile phone camera and save it as a PDF. Ensure all pages are in the right view (not angle or upside down) and correct the order of pages and problems.

2. b) Take pictures of your papers from your mobile camera and transfer them to a PC/laptop. Open a Word file, copy and paste all pictures of your papers, and save it as a PDF (not print). To do this, save the Word file, then "save a copy," and select PDF. Ensure all pages are in the right view (not angle or upside down) and correct the order of pages and problems.
3. c) You can use any tech that can be used with a stylus pen and write on it and save it as a PDF, or type your solutions on a Word file and save it as a PDF.
4. You can upload your PDF to "HW Assignment XX" under the assignments, or it also appears under the corresponding module for the week. You can directly access the assignment via the module without navigating to the Assignment section.

Online Discussion:

You should discuss all questions related to examples, exercises, difficulties in any topic in the lecture notes, textbook, your assignments such as homework, exams, and other technical issues in Canvas Discussions. Discussion is a main component of online learning. Participation in the discussion forum is mandatory and is a significant part of your overall course grade. A grade will be assigned weekly for your participation in weekly discussions in the discussion forum.

You may contribute in two ways: either by asking an informed question, or by answering (either fully or partially) someone else's question. Your participation is considered to be more significant if you do not limit yourself in only asking questions but also equally ask questions and answer other's questions. Your post cannot be generic or something that can be copied from somewhere, so use this sparingly.

You need to deliver a minimum of TWO substantial posts each week in the discussion forum on different days of the week. At least one post should be in the first three days of the week. Posts made within twelve hours of the deadline will carry less weight. If all posts are made Sunday afternoon, a maximum of three points can be earned for the week.

A response to someone's posting is considered substantial if it delivers mathematical insight, and provides ideas to help answer the question. The responses like 'I agree with you', 'I did exactly the same', 'my answer is same as yours', 'thank you', 'I appreciate your help' or something of similar platitudes are not considered as substantial posts. However, you can make such responses if needed, but no grades will be assigned for them.

Work that is shared in discussions will be considered representative work based on your skill level. If quizzes and exams are inconsistent with the level of work shared in discussions, an oral exam will be conducted by your instructor via Zoom to verify your level of understanding.

See below for examples of acceptable posts and those that are not.

Discussion Posts:

Acceptable	**Unacceptable**
I don't understand how to compute slope. The problem says we should compute the slope of the line through the points (2,4) and (0,2). *The question is asked in a way that allows someone to answer it.*	I don't get slope. *This is not a question; it is more of a complaint.*

You compute the slope with the formula $m = (y_1 - y_2)/(x_1 - x_2)$ *Even though this is a partial answer, it helps the reader solve the problem. Someone else may then add where to find values for x_1, y_1, etc.*	I had no problems with slope. It's in the textbook. *Even though it's good you had no problem with slope, and we know it's in the textbook, this does not help the person who asked the question.*
I actually used this today at work. Here's what happened: A customer came in and had this problem . . . *If you show in detail how you were able to use a technique from class to solve a real-life problem you are contributing in a meaningful way.*	The book says we can use this when computing cost and revenue. I think this is neat. *No new information is brought into the discussion. We already know what's in the book.*

If you have a question on a problem you're working on, you may post the work you've done and request assistance. It is not acceptable to post a full and correct solution to a problem, whether solicited or not. If another student has asked a question, contribute one or two steps to assist and allow others to contribute further.

Mid-Term and Final Exam:

There are three midterm exams and a final exam. The final exam will be comprehensive. The exams must be completed without the use of any resources (notes, textbooks, people, videos, internet sites, etc.).

Justification of answers

ALL work on all parts of the exam will be required to be submitted. Failure to justify your answers may result in a zero on the exam.

General Grading Rubric:

My usual grading scheme is to score each test or homework problem on a 0 to 100 scale. A score of 70 to 100 indicates that errors may be present, but you appear to know how to solve the problem. A score of 40 to 60 indicates that you have partial understanding; there are important things you understand about the problem, but there are important things you do not understand about the problem. A score of 0 to 30 indicates minimal or no understanding.

If you do not understand how I scored a problem on homework or a test, please contact me. (If I've misread your work, I'm glad to make sure it's scored correctly, or else I will be glad to explain why I took points off or how to do the problem correctly. If I ever give a different number of points for a problem than someone else for the same work, please contact me—this is never deliberate.)

Attendance, makeups, and incompletes:

Attendance, makeups, and incompletes: If you are unable to take a test due to medical or similar reasons beyond your control, and you are unable to take a makeup test within several days of the scheduled test, the final exam percent will substitute for the missed test at my discretion. This is not automatic—contact me as soon as possible if you are unable to take a test.

If you are unable to take the final examination but you have a passing grade up to that time, you may be given a grade of I (Incomplete) at my discretion. Contact me within two weeks of the examination date to schedule a make-up examination. (An Incomplete can be given if you are unable to complete the course for reasons such as illness that are beyond your control, and if you have a passing grade at the time, you are unable to continue in the course. Contact me as soon as possible if you find yourself in this situation.)

University policies:

Important information for students in this course is available on a single website easily accessed through the Canvas course site. Simply look at the left navigation bar and click on Succeed at IU Southeast. You can find links to sites with a great deal of useful information, including:

- How to avoid plagiarism and cheating
- Disability Services
- Canvas Guides
- Financial Aid
- Counseling
- Writing Center

Accessibility & Privacy

This course uses Canvas as its course site. Please see the following links for more specific information regarding accessibility and privacy.

- Canvas Accessibility Statement (Links to an external site.)
- Canvas Privacy Statement (Links to an external site.)

Technology Assistance

Students encountering any technology problems (lost password, Canvas access, etc.) have several options:

- Call (812) 941-2447 (extension 2447 from campus phones)
- E-mail helpdesk@ius.edu

Communication, Expectations, & Etiquette

You may contact me directly via e-mail, if that is more convenient, but I urge you to use the Canvas messaging functionality. If you choose to use direct e-mail, I will not be able to discuss grades, etc., unless you use your official IU/IUS email account. My goal is to reply to all messages within 24 business hours. (During the weekend, I might not respond.)

Syllabus Revision

The instructor reserves the right to revise or adjust the course syllabus to best accommodate the pace and needs of the students.

Fair Use Policy

Copying or recording synchronous classes and asynchronous course materials without the express prior approval of the instructor is prohibited. All copies and recordings remain the property of Indiana University and the instructor. IU and the instructor reserve the right to retrieve, inspect, or destroy the copies and recordings after their intended use. These policies are not intended to affect the rights of students with disabilities under applicable law or IU policies.

Course Evaluations

Toward the end of the semester, you will be able to complete a course evaluation questionnaire. Your responses to this are completely anonymous. These evaluations are important in helping me make this course more efficient and effective. Therefore, I urge you to complete these. More information will be given when the questionnaires are made available.

University Statements

At IU Southeast, we have placed all university policies on a single website, easily accessed from every Canvas course site. Simply look at the left navigation bar and click on Succeed at IU Southeast. You can find links to sites with a great deal of useful information including

- How to avoid plagiarism and cheating
- Disability Services
- FLAGS
- Tutoring centers
- Canvas Guides
- Financial Aid
- Sexual Misconduct
- Counseling
- Writing Center
- Much more!

My expectation is that you review university policies carefully to ensure you understand the policy and possible consequences for violating the policy. Please contact me if you have any questions about any university policy.