

Course Syllabus



MA 226 - Multivariable Calculus II

[School of Engineering and Science/Department of Mathematical Sciences]

[Fall 2022]

Instructor: Mahmood Sohrabi

Course Schedule:

Section A: MWF 10:00-10:50 Howe 102

Section B: MWF 11:00-11:50 Kidde 360

Contact Info: msohrab1@stevens.edu

Office Hours: Monday and Wednesday: 2:45- 3:45 in North 308 or via Zoom:

<https://stevens.zoom.us/j/99978737921>  <https://stevens.zoom.us/j/99978737921>

Prerequisite(s): MA 126

COURSE DESCRIPTION

This is a course on integral calculus of multivariable functions and vector fields. Topics include double and triple integrals, polar, cylindrical, and spherical coordinates; Jacobian and change of

coordinates formulas; surface and line integrals; curl, divergence and integral theorems of Green, Gauss and Stokes. This is a seven (7) week course.

STUDENT LEARNING OUTCOMES

1. Define, set up and evaluate triple integrals over solids in various coordinate systems and interpret them as the total value over the solid of a quantity distributed possibly non-homogeneously over it, e.g. mass of a solid as accumulation of mass density or probability as accumulation of values of a joint probability density function.
2. Define vector fields, interpret them as force fields or velocity fields (of fluids), recognize fundamental examples such as gravitational fields and electric fields and visualize or draw basic examples.
3. Define, set up and evaluate line integrals of vector fields and interpret them as the work done by a force field on an object moving on a path, or circulation of a fluid around a closed path.
4. Define, set up and evaluate surface integrals of vector fields and interpret them as flux of fields or flow rates of fluids across surfaces.
5. State, verify and apply the fundamental theorems of vector calculus: Fundamental Theorem of Line Integrals, Green's and Stokes' Theorems, and the Divergence Theorem. Explain their (basic) interpretations in physics and fluid dynamics.

COURSE FORMAT AND STRUCTURE

This course is on-campus. Lectures are on MWF. Recitations are on Thursday

Course Logistics

- When assignments are due, they are due typically by 11:59 pm EST on the due date listed in the course schedule and periodically posted on Canvas.
- Deadlines are an unavoidable part of being a professional, and this course is no exception. Course requirements must be completed and posted or submitted on or before the specified due date and delivery time deadline. Due dates and delivery time deadlines are in Eastern Time (as used in Hoboken, NJ). Please note that students living in distant time zones or overseas must comply with this course time and due date deadline policy. Avoid any inclination to procrastinate. Due dates have been established for each assignment to encourage you to stay on schedule
- Assignments received 1-3 days late will have 10% of the total points deducted; assignments received more than three days late will receive 0 points.

TENTATIVE COURSE SCHEDULE


Please refer to [MA-226-22F2-CourseSchedule.pdf](#)

(<https://sit.instructure.com/courses/60137/files/10389992?wrap=1>)_ ↓

(https://sit.instructure.com/courses/60137/files/10389992/download?download_frd=1) . Please note that this is a tentative schedule. I will do my best to keep up with it.

COURSE MATERIALS

Textbook(s):

- **Required:** OpenStax Calculus (OSC) freely available [here](#) 
([https://math.libretexts.org/Bookshelves/Calculus/Book%3ACalculus_\(OpenStax\)](https://math.libretexts.org/Bookshelves/Calculus/Book%3ACalculus_(OpenStax)))
- Recommended: “Calculus: Concepts and Contexts, Multivariable” by James Stewart, Fourth Edition,

Other Readings: Notes posted on Canvas

Materials:

- **Required:** Webassign access. Students can buy the access directly from within the Webassign link posted here on Canvas. **They do not need to buy the access to the Ebook. You may buy the homework only access.**

COURSE REQUIREMENTS

The work requirements include online assignments, through Webassign, written homework, participation in lectures and ensuing discussions and written quizzes and exams. The goal is to help students acquire a deeper understanding of mathematics, achieve mastery of the most essential calculus skills, and acquire experience in the application of calculus techniques to problems in science and engineering.

Lecture attendance and participation: Lectures are where the main theoretical concepts and techniques are developed and discussed. During the lectures there will be polls and possible clicker questions. We'll be calling students at random to participate in discussions as well. If a student is called during a session and do not respond they will not receive their attendance grade. If clickers are used the participation grade will be based on the correct answers to the question.

Recitations (Problem Sessions): These are problem sessions where students can practice on the problems presented and get additional help with mastering the material from lecture and for asking questions related to the online and written assignments, if they wish. Problem sets will be posted on Canvas the day prior to the recitations, so students have time to work on these problems prior to the recitation. TA's will call students at random to present their solutions to the rest of the class with the assistance of the TA.

Web-Ex Assignments (Webassign): The main goal of these exercises is to develop the routine skills necessary to carry out computations in Calculus. Some of these assignments might include questions on forthcoming material that require independent reading, in which case students will be made aware via the assignment description on Canvas. Students must access Webassign via Canvas.

Written Assignments: There will be 3-4 written homework assignments. These may consist of more complex problems addressing the theoretical or applied aspects of the material. The scans of the assignments in pdf format need to be uploaded to Grade Scope whose link will be available via Canvas before the posted due date.

Quizzes and Exams: There will be two (2), 60-minute-long quizzes and one (1) 3-hour-long final exam during the course of the (half)-semester. Quizzes are held during recitation times on Thursday. The final exam location and date will be announced later. The tentative dates of these are:

- Quiz 1: Thursday, November 3
- Quiz 2: Thursday, November 17
- Final Exam: Final Exam Period

The final exam is cumulative.

TECHNOLOGY REQUIREMENTS

- Basic computer and web-browsing skills
- Navigating Canvas

Technology skills necessary for this specific course

- Live web conferencing using Zoom

Required Equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

Required Software

- Scanner app
- Pdf reader

GRADING PROCEDURES

Grades will be based on:

Class Attendance and Participation	10%
Written Homework	15%
WebEx Assignments	25%
Quiz 1	12.5%
Quiz 2	12.5%
Final Exam	25%

Final Letter Grades will be based on the following grade scale:

A [90,100]	C+ [72, 75)
A- [86, 90)	C [68, 72)
B+ [82, 86)	C- [65, 68)
B [78, 82)	D [60, 65)
B- [75, 78)	F [0, 60)

Late Policy

Assignments received 1-3 days late will have 10% of the total points deducted; assignments received more than 3 days late will receive 0 points.

Academic Integrity

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at

<http://web.stevens.edu/honor/> ➦ [\(http://web.stevens.edu/honor/\)](http://web.stevens.edu/honor/)

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

“I pledge my honor that I have abided by the Stevens Honor System.”

Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor ➦ <http://www.stevens.edu/honor>.

EXAM CONDITIONS

The following procedures apply to quizzes and exams for this course. As the instructor, I reserve the right to modify any conditions set forth below by printing revised Exam Conditions on the quiz or exam.

1. Students may use the following materials during quizzes and/or exams. Any materials that are not mentioned in the list below are not permitted.


Material	Permitted?	
	Yes	No

Handwritten Notes Conditions: One page, two-sided, letter size, hand-written notes	X	
Typed Notes Conditions: i.e. size of note sheet		X
Textbooks Conditions: i.e. specific books		X
Readings Conditions: i.e. specific documents		X
Other (specify)		X

2. Students are not allowed to work with or talk to other students during quizzes and/or exams.

LEARNING ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/office-disability-services>  (<https://www.stevens.edu/office-disability-services>). If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu (<mailto:pgehman@stevens.edu>) or by phone 201-216-3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to

college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments can be made by phone (201-216-5177).

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text "Home" to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu (<mailto:care@stevens.edu>). A member of the CARE Team will respond to your concern as soon as possible.

		MA 226 Text: OpenStax Calculus			2022F 10/5/2022	
No.	2020F Date	Topics	Text	Due Dates Assignments	Wk	
L1	17-Oct	Review of double integrals	15.1		1	
	18-Oct					
L2	19-Oct	Review of double integrals	15.2			
R1	20-Oct	<i>Practice:</i>				
L3	21-Oct	<i>Polar coordinates</i>	15.3			
L4	24-Oct	Applications of double integrals (mass and center of mass)	15.6		2	
	25-Oct					
L5	26-Oct	Triple integrals	15.4			
R2	27-Oct	<i>Practice:</i>		WebEx1: Review of double integrals		
L6	28-Oct	<i>Triple integrals in cylindrical coordinates</i>	15.5	Hw1		
L7	31-Oct	Triple integrals in spherical coordinates	15.5		3	
	1-Nov					
L8	2-Nov	<i>Review</i>				
Q1	3-Nov	Quiz 1		WebEx2: Applications and Triple Integrals		
	4-Nov	Change of variables in triple integrals	15.7			
L7	7-Nov	Parametric curves, Line integrals of scalar functions	13.2, 16.2		4	
	8-Nov					
L8	9-Nov	Line integrals of vector fields	16.1, 16.2			
R3	10-Nov	<i>Practice</i>		WebEx3: Multiple integrals and applications		
L9	11-Nov	Line integrals	16.2	Hw2		
L10	14-Nov	Fundamental Theorem of Line Integrals	16.3		5	
	15-Nov					
L11	16-Nov	Review				
Q2	17-Nov	Quiz 2		WebEx4: Line integrals		
L10	18-Nov	Green's Theorem	16.4			
L11	21-Nov	Green's Thm and conservativity	16.4		6	
	22-Nov					
NC	23-Nov	Thanksgiving Recess				
NC	24-Nov	Thanksgiving Recess				
NC	25-Nov	Thanksgiving Recess				
L12	28-Nov	Parametric surfaces	16.6		7	
	29-Nov					
L13	30-Nov	Surface integrals of scalar functions	16.6			
R7	1-Dec	<i>Practice</i>		WebEx5: GT and the FT of line inetrgal		
L14	2-Dec	Surface integrals of vector fields, flux	16.6	Hw3		
L15	5-Dec	Divergence Theorem	16.8, 16.5		8	
	6-Dec					
L16	7-Dec	Divergnece Theorem and Stokes Theorem	16.8, 16.7			
R8	8-Dec	<i>Practice</i>		WebEx6: Surface Integrals		
L17	9-Dec	Stokes Theorem	16.7			
L18	12-Dec	Review			9	
	13-Dec					
L19	14-Dec	Review				
Fin Ex	15-Dec	Final Exam period starts		WebEx7: Div and Stokes Thms		
	16-Dec					
		WebEx through Wbeassign, due at 11:59 PM				
		Hw: Homework thorough Grade Scope, due at 11:59 PM				