

# MATH 2530: Calculus III

## Instructor

**Dr. Ariel Ramirez**

aramirez8@unm.edu

Office: LRC 172

## Class Details

Monday/Wednesday

Class Time: 1:30-3:20pm

Room: Zoom Online

**ZOOM ID: 991 1470 8744**

MyMathLab Course ID:

**ramirez97795**

## Tutoring Hours

M/T/W/Th 10:00am-11:30am

Or by Appointment

**ZOOM ID: 926 9130 0553**

**Code: f2020**



"Laboratory Still Life 02" - Don Shank

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## Course Description

This course covers vector operations, vector representation of planes and curves, functions of several variables, partial derivatives, gradient, tangent planes, optimization, multiple integrals in Cartesian, cylindrical and spherical coordinates, vector fields, line integrals and Green's theorem. (4 Credit Hours).

**Prerequisites:** Math 1522. Check with your adviser to make sure you meet the requirements.



## Course Outcomes

In this course, we will investigate vectors, functions of several variables, partial derivatives, and multiples integrals. A complete list of the Student Learning Objectives for this course is given at the end of this syllabus.

## Course Materials

### Textbook:

Thomas' Calculus, 14th edition, by Hass, J., Heil, C., & Weir, M., Pearson Publishing.

**Required:** Appropriate MyMathLab (MML) access code (do not purchase a generic code, in this case the code is book specific). You may purchase the 18-week access code for a lower price, but you *cannot* upgrade to the lifetime code once you purchase the restricted one.

**Optional:** You may "upgrade" your access by purchasing a hardcopy of the book directly from Pearson for an additional cost (between \$50 and \$60 before tax). There will be copies of the book on reserve for use in the library (you will not be able to take the book from the library home).

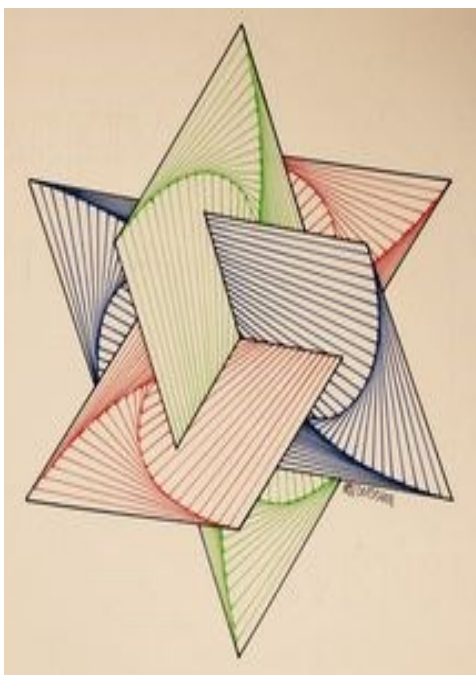
### Technical Skills:

To participate and succeed in this class, you will need to be able to perform the following basic technical tasks:

- Use email – including attaching files, opening files, downloading attachments
- Copy and paste within applications including Microsoft Office
- Open a hyperlink (click on a hyperlink to access a website or online resource)
- Use Microsoft Office applications

**Technical Skills (continued):**

- Create, download, update, save and upload MS Word documents
- Download, annotate, save and upload PDF files
- Access MS Teams
- Use the in-course web conferencing tool (Collaborate Web Conferencing software in UNM Learn) or use Zoom or other web conferencing tool
- Download and install an application or plugin – required for participating in web conferencing sessions
- Use UNM Learn (help documentation located in the "How to Use Learn" link on the left course menu, and also at [Online Student Documentation](#) ). Also, UNM-Valencia provides a Blackboard Learn Jumpstart self-learning module to give you practice with the most commonly used tools in UNM Learn. Ask your instructor if you do not see the UNM-Valencia Blackboard Learn Jumpstart in your list of classes in UNM Learn.

**Technical Requirements:***Computer*

A high-speed Internet connection is highly recommended.

Supported browsers include Chrome, Edge, Firefox, Safari, and Internet Explorer.

Any computer capable of running a recently updated web browser should be sufficient to access your online course. However, bear in mind that processor speed, amount of RAM, and Internet connection speed can *greatly* affect performance. ***Be aware, some programs that use mathematics will not work well on mobile devices such as smartphones or tablets.***

Microsoft Office products are available free for all UNM students (more information on the UNM IT Software Distribution and Downloads page) Please update your contact information in LoboWeb: **MyUNM**. When you log into MyUNM, Enter LoboWeb. Click on the Personal Information link to make sure your contact information is up to date.

Laptops may be available for checkout for the Fall semester from the **UNM-Valencia Library**. Contact the librarians for more information.

*Web Conferencing*

Web conferencing via ZOOM will be used in this course:

For the online sessions, you will need:

- ◆ A USB headset with a microphone. Headsets are widely available at stores that sell electronics, at the UNM Bookstore or online.
- ◆ A high-speed internet connection is highly recommended for these sessions. A wireless Internet connection may be used if successfully tested for audio quality before web conferencing.
- ◆ You should also dress as you would when attending an in-person class, even if you do not turn on your video camera.

*Technical Support*

- ◆ For UNM Learn Technical Support: (505) 277-0857 (24/7) or use the "Create a Tech Support Ticket" link in your course.
- ◆ For UNM-Valencia IT Support: (505)925-8911
- ◆ For UNM Web Conference Technical Help: (505) 277-0857

**Other Requirements:**

- Administrative rights to download free software or plug-ins or add-ons on the computer you plan to use for this course.
- Access to Microsoft Teams will use your UNM NetID to log into UNM Learn. This is available as part of your Office 365 package.
- Standard or Scientific calculator. This cannot be an app on your cell phone.
- Adobe Reader (a free download), preferably version 11.0 or better.

## Classroom Policies

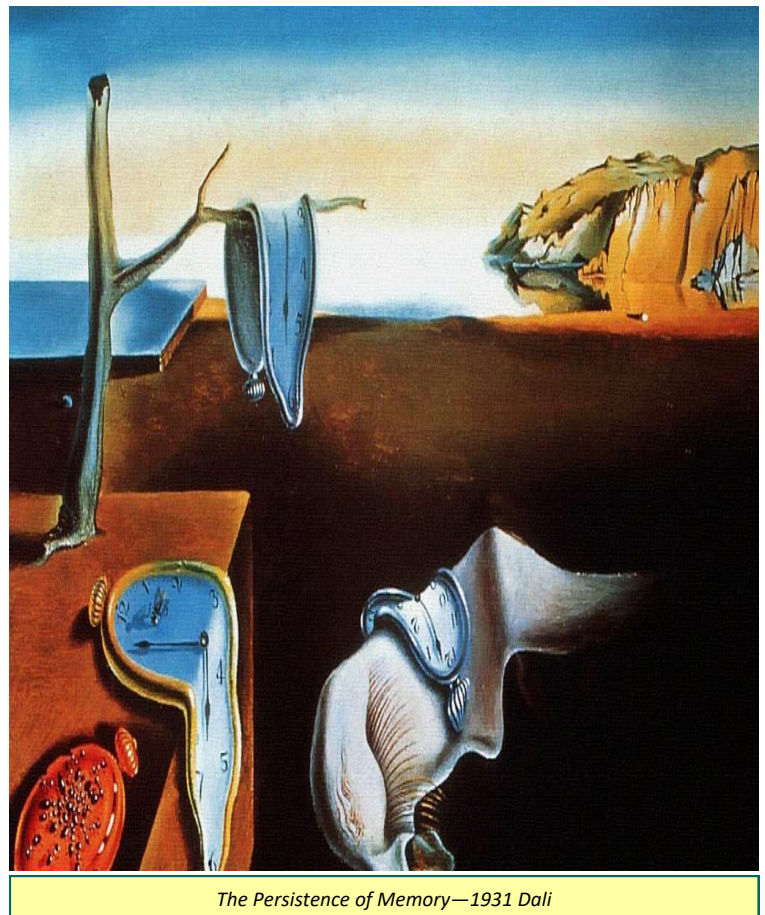
### Attendance / Participation (100 points)

You are expected to be on time to each class and stay the entire class, have the necessary course materials on hand, and participate in the lecture and/or group activities to receive full credit for attendance each day.

**Absences:** If you know ahead of time you will miss a class, send me an email indicating the date of the absence.

Arrange before the next class meeting to get notes from a classmate. The student bears full responsibility for the material and information covered in class.

Each student starts with 100 attendance points. Attendance is taken at the **beginning** of class. Eight attendance points is deducted for each unexcused absence; Four attendance point for tardiness.



The Persistence of Memory—1931 Dalí

### Homework (260 points)

Homework is assigned nearly every week based on the course outline. Weekly assignments in MyMath-Lab must be completed not later than the indicated date in MML. **Each homework assignment is worth 24 points.** *The lowest homework grade will be dropped.* A 10% penalty may be incurred if your homework is late. You will not be able to go back to improve your grade after the due date.

### Quiz (180 points)

We will have 9 quizzes in class for 20 points each. *The lowest grade on a quiz will be dropped.* Each quiz will have a few problems from the online homework. The quizzes will resemble the exam and final exam, so you should use them to study.

## Classroom Policies



### Gottfried Wilhelm Leibniz,

(June 21, 1646—November 14, 1716), German philosopher, mathematician, and political adviser, important both as a metaphysician and as a logician and distinguished also for his independent invention of the differential and integral calculus.

### In-Class Group Assignments (60 points)

- During the semester, we will have several in-class assignments. You will work in groups.
- Groups will be between two and three students.
- These assignments will further develop your conceptual understanding of the topics presented in the course.
- **You must be present to participate and receive any credit.**
- Each in-class assignment is worth 10 points. Each group member receives the same grade.

### Exams (200 points)

There will be two exams during the semester based on the quizzes and homework in the course. Each is worth 100 points. If you are ill or an unexpected event happens, and you cannot make it to the exam, you have one week to make it up.

### Final Exam (200 points)

The final exam will cover all the topics in the course. It will be based on the exams, quizzes, and homework.

**Time for This Course:** Plan to spend a *minimum* of 9 to 12 hours per week for this class. There is no guarantee you will pass if you dedicate this amount of time, you still need to learn the material and use your time wisely, but those who pass generally are the ones who spend the time needed to learn the material.

### Netiquette

One of the overriding principles in online conversations is to “craft your responses effectively.” It is sometimes difficult to remember that real people are reading posted messages. This is especially true of online communication where others do not have the opportunity to see body language or hear the tone of voice; therefore, misunderstandings are more likely.

Please, follow these guidelines in **all** of your online responses and discussion postings.

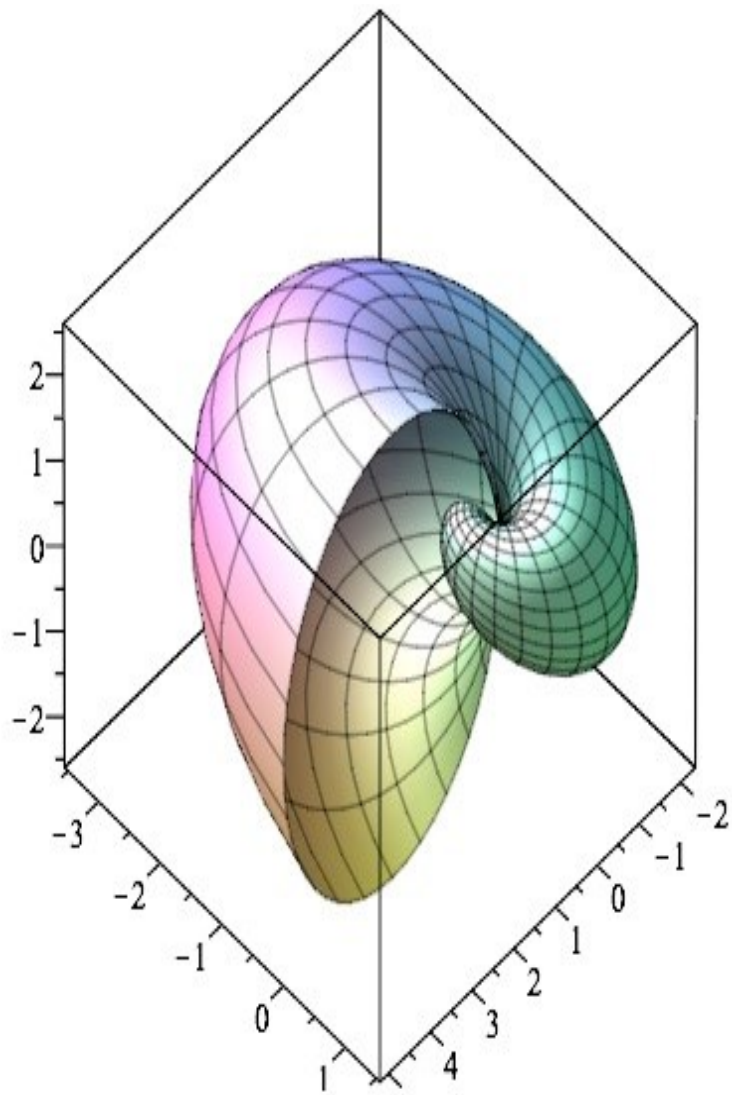
- ◇ Honor everyone’s right to an opinion.
- ◇ Respect the right of each person to disagree with others.
- ◇ Respond honestly but thoughtfully and respectfully; use language that others will not consider foul or abusive. You may also use emoticons to convey a lighter tone.
- ◇ Respect your privacy and the privacy of others by not revealing information which you deem private and which you feel might embarrass you or others
- ◇ Be prepared to clarify statements that might be misunderstood or misinterpreted by others

**A Special Note about Anger**

- ◇ Do not send messages that you have written when you are angry, even anonymous ones. In the online world, angry messages are known as “flaming” and are considered bad behavior. Venting and flaming are two different things. It is possible to vent without becoming “ugly.” Stick to the facts of what is causing you frustration.
- ◇ Do not send messages that are written all in upper case; this is the visual equivalent of SHOUTING. It is considered aggressive and is considered bad behavior. If you ever feel like shouting a message, take a deep breath, and wait until you have calmed down before responding. Then, respond calmly and factually.

**Student Resources:** If you are struggling in this course, do not be afraid to ask for help!

- Ask My Instructor: Please use the Ask My Instructor button in MyMathLab. This button is available in the computational assignments and the quizzes and sends a message to my email with a link to the question. Do not just send the link, be specific about the problem you are struggling with.
- Tutoring Hours: See my tutoring hours listed at the beginning of this syllabus.
- Form online study groups: You may work together with other members of our class.
- Free Tutoring:  
<http://valencia.unm.edu/campus-resources/the-learning-center/learning-center.html>



## University Policies

**Equal Access:** In accordance with University Policy 2310 and the Americans with Disabilities Act (ADA), academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor’s attention, as I am not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow. Contact Accessibility Resource Center at 277-3506 for additional information.

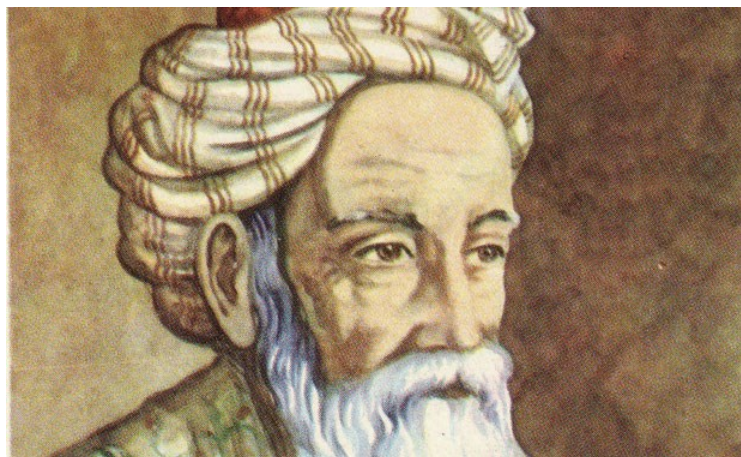
If you need an accommodation based on how course requirement interacts with the impact of a disability, you should contact me to arrange an appointment as soon as possible. At the appointment we can discuss the course format and requirements, anticipate the need for adjustments and explore potential accommodations. I rely on the Disability Services Office for assistance in developing strategies and verifying accommodation needs. If you have not previously contacted them, I encourage you to do so.

If you are a Valencia campus student, contact Equal Access Services at Valencia Campus at (505)925-8560 or [Valencia Student Services](#). If you are a main campus student you can receive documentation from the main campus Accessibility Resource Center. I will not guarantee accommodation without the appropriate documentation.

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*Omar Khayyam 1048-1131*

Khayyam was an astronomer, astrologer, physician, philosopher, and mathematician. In 1070, he published *Treatise on Demonstration of Problems of Algebra and Balancing*. In it he showed that a cubic equation can have more than one solution. He also showed how the intersections of conic sections such as parabolas and circles can be utilized to yield geometric solutions of cubic equations.

[www.famousscientists.org/omar-khayyam/](http://www.famousscientists.org/omar-khayyam/).

### Copyright Issues

All materials in this course fall under copyright laws and should not be downloaded, distributed, or used by students for any purpose outside this course.

[The UNM Copyright Guide](https://copyright.unm.edu) has additional helpful information on this topic. <https://copyright.unm.edu>

### Accessibility Statements

[Blackboard's Accessibility statement](https://www.blackboard.com/blackboard-accessibility-commitment) <https://www.blackboard.com/blackboard-accessibility-commitment>  
[Microsoft's Accessibility statement](https://www.microsoft.com/en-us/accessibility/) <https://www.microsoft.com/en-us/accessibility/>

### Academic Integrity

Having academic integrity is paramount to your success in any class. Plagiarism or cheating is not tolerated. Any instance of this will result in a grade of zero for that assignment. Here is the link to the UNM Academic Dishonesty Policy: <https://pathfinder.unm.edu/campus-policies/academic-dishonesty.html> and student code of conduct: <https://pathfinder.unm.edu/code-of-conduct.html>

*Any student judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course.*

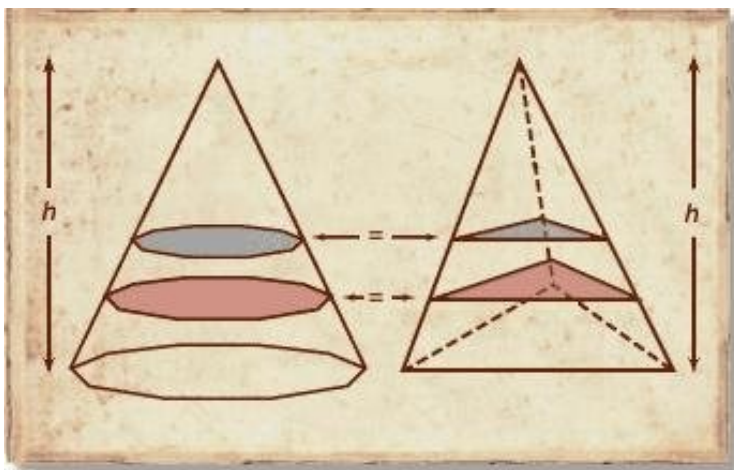
Academic Dishonesty is defined as:

*"Academic dishonesty" includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.*

## University Policies (continued)

**Title IX Statement:** In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered “responsible employees” by the Department of Education (see pg. 15 - <http://www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf>). This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity ([oeo.unm.edu](http://oeo.unm.edu)).

For more information on the campus policy regarding sexual misconduct, see: <https://policy.unm.edu/university-policies/2000/2740.html>



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## Grading

### COURSE AVERAGES:

Attendance/Class Participation	100 points
MyMathLab Online Homework	260 points
Quizzes	180 points
In-Class Group Assignments	60 points
Term Exam (two, 100 points each)	200 points
Final Exam	200 points
<b>Total</b>	<b>1000 points</b>

### Cavalieri's Principle

**Bonaventura Cavalieri**, (1598 — 1647) Italian mathematician who made developments in geometry that were precursors to integral calculus. Cavalieri observed that figures (solids) of equal height and in which all corresponding cross sections match in length (area) are of equal area (volume).

### GRADING SCALE:

<u>Letter Grade</u>	<u>Weighted Average</u>
A	[90, 100]
B	[80, 90)
C	[70, 80)
D	[60, 70)
F	[0, 60)

Week	Dates	Sections / Topics	Assignments
1	8/17 - 8/21	Sec. 12.1, 12.2	
2	8/24 - 8/28	Sec. 12.3, 12.4	MML homework 1 due Quiz #1
	8/28	<b>Last day to add a course (5 pm)</b>	
3	8/31 - 9/4	Sec. 12.5, 12.6	MML homework 2 due Quiz #2
	9/4 F 9/7 M	<b>Last day to drop a course without a grade (5 pm)</b> <b>Labor Day - no classes</b>	
4	9/7 - 9/11	Sec. 13.1, 13.2	MML homework 3 due
5	9/14 - 9/18	<b>Review Exam #1</b>	MML homework 4 due
6	9/21 - 9/25	Sec. 13.3, 13.4	
7	9/28 - 10/2	Sec. 14.1, 14.2, 14.3	MML homework 5 due Quiz #3
8	10/5 - 10/9	Sec. 14.4, 14.5	MML homework 6 due Quiz #4
	10/7 W	<b>Fall Break Day</b>	
9	10/12 - 10/16	Sec. 14.6, 14.7	MML homework 7 due Quiz #5
10	10/19 - 10/23	Sec. 14.8, 15.1	MML homework 8 due Quiz #6
11	10/26 - 10/30	<b>Review Exam #2</b>	MML homework 9 due
12	11/2 - 11/6	Sec. 15.2, 15.4	
	11/3 T 11/6 F	<b>Election Day - no classes</b> <b>Last day to drop without Dean's Permission (5 pm)</b>	
13	11/9 - 11/13	Sec. 15.5, 15.7	MML homework 10 due Quiz #7
14	11/16 - 11/20	Sec. 16.1, 16.2	MML homework 11 due Quiz #8
15	11/23 - 11/25	Sec. 16.3, 16.4	MML homework 12 due Quiz #9
	11/26 - 11/27	<b>Thanksgiving Break</b>	
16	11/30 - 12/4	<b>Review</b>	MML homework 13 due
	12/4 F	<b>Last day to drop with Dean's permission/change grade mode with form (5 pm)</b>	
17	12/7 - 12/12	<b>Final Exam Week</b>	



## Course Student Learning Outcomes

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

- A. **(Vector Operations)** Perform basic operations on vectors in 3D: addition, subtraction, scalar multiplication, dot product. Visualize addition, subtraction and scalar multiplication geometrically, state geometric meaning of dot product and cross-product, recognize and write down the equations defining lines and planes, and draw geometric information from the equations (such as a point on lines/planes, tangent and normal vectors, intersections)
- B. **(Vector-valued Functions of One Variable)** Visualize given functions as curves in space, find functional parametrization of given curves, find their derivatives, and interpret them as tangent vectors to curves; for functions describing the motion of a particle, interpret derivatives as velocity and acceleration; solve initial value problems.
- C. **(Scalar-valued Functions of Several Variables)** Visualize functions of two variables by graphs in space or level curves in the plane; visualize functions of three variables by level surfaces in space; recognize and graph equations for conic sections and surfaces of revolution; state what it means for a limit of a function of several variables to exist; compute partial derivatives, gradients, directional derivatives and understand their meanings, e.g. with respect to the direction of fastest growth and tangent planes; compute the gradient of a function and state its geometric significance; solve min/max problems with or without constraints (using substitution or Lagrange multipliers for the former) explain why the Lagrange multiplier method works.
- D. **(Double and Triple Integrals)** Compute by reducing to an iterated integral, by changing the order of integration, by changing from Cartesian coordinates to cylindrical or spherical coordinates and vice-versa; use double and triple integrals to compute areas, volumes, centers of mass.
- E. **(Vector Fields)** Visualize basic vector fields by flow lines and integral curves; state the definition of a gradient (or conservative) vector field and how to recognize one and compute a potential function; compute the divergence and curl of a vector field; rules for differentiation; recognize permissible and nonpermissible operations.
- F. **(Line Integrals)** Compute line integrals such as arclength, work, circulation using the parametrization of a curve; compute using the Fundamental Theorem of Line Integrals when applicable; state Green's theorem (2-D), apply it to examples.