

Fort Valley State University
College of Arts and Sciences
Department of Mathematics & Computer Science
Fall 2018

Course: MATH 2174 – Calculus III
Section: 1
Schedule: MTWR => 1:00 pm – 1:50 pm
Location: CTM 202
Instructor: Dr. Patcharin Tragoonsirisak Marion **E-mail:** tragoonsirisakp@fvsu.edu
Office: CTM 216 **Phone #:** 478-825-6199
Office Hours: Monday => 10:00 am – 12:00 pm; 2:00 pm – 3:00 pm
Tuesday => 10:00 am – 12:00 pm
Wednesday => 10:00 am – 12:00 pm; 2:00 pm – 3:00 pm
Thursday => 10:00 am – 12:00 pm
or by appointment

Course Description:

The concepts of limit, derivative, and integral are applied to vector-valued functions and functions of several variables. Students apply vector calculus to solve problems in physics.

Prerequisite: MATH 2164 – Calculus II

Textbook: Calculus Volume III (OpenStax Textbook), Gilbert Strang & Edwin "Jed" Herman, OpenStax, Rice University 2016.

Additional information:

"<https://fvsu.view.usg.edu>" for doing quizzes and downloading documents (including the syllabus and solution keys).

Departmental Major Area Learning Outcomes:

This course addresses the following major area learning outcomes:

I. Students will apply the concept of function together with the traditional computational techniques to solve real world problems (Course Learning Outcomes II - Objective 8, III - Objective 19, and IV- Objectives 1, 2, 4, and 5)

V. Students will use graphing calculators and computers to perform numerical and symbolic computations, visualize data and mathematical objects, and solve mathematics problems. (Technology Assignment - Course Learning Outcome III - Objectives 19 and 20)

Sophomore-Junior Diagnostic Exam:

Mathematics majors enrolled in this course will take part I of the diagnostic exam. This exam includes items on topics covered in MATH 1113 (Precalculus), MATH 1154 (Calculus I), and MATH 2164 (Calculus II).

Course Learning Outcomes:

I. Students will investigate analytical properties of curves given by parametric equations. They will explore polar coordinates and properties of polar graphs.

Objectives:

1. Sketch the graph of a curve given by a set of parametric equations
2. Find a set of parametric equations to represent a curve
3. Find the slope of a curve represented by a set of parametric equations
4. Find the arc length of a curve given by a set of parametric equations
5. Find the area of a surface of revolution given in parametric form
6. Convert between rectangular and polar forms
7. Sketch the graph of an equation given in polar form
8. Find the area of a region bounded by a polar graph
9. Find the arc length of a polar graph

10. Find the area of a surface of revolution given in polar form

II. Students will perform operations with vectors and investigate the geometry of space.

Objectives:

1. Write vectors in component form and as linear combinations of standard unit vectors
2. Perform vector operations, and interpret the results geometrically
3. Compute dot product of vectors in 2-space and 3-space
4. Apply the properties of dot product
5. Find the direction cosines of a vector in space
6. Find the projection of a vector onto another vector
7. Find the cross product of two vectors in 3-space
8. Apply the properties of cross product
9. Find and apply the triple scalar product of three vectors in space
10. Write parametric equations and symmetric equations of lines
11. Write equation of a plane in standard and in general form
12. Find the measure of the angle between two planes
13. Find the distance between a point and a plane
14. Find the distance between a point and a line in space
15. Recognize and write equations for cylindrical surfaces, quadric surfaces, and surfaces of revolution
16. Convert between rectangular, cylindrical, and spherical coordinates
17. Write equations of surfaces in space using cylindrical and spherical coordinates

III. Students will differentiate and integrate vector-valued functions. They will apply vector valued functions to real world problems.

Objectives:

1. Sketch space curves given by vector-valued functions
2. Find limits of vector valued functions
3. Determine whether a given vector-valued function is continuous at a give point or on a given set
4. Find the derivative of a given vector-valued function
5. Apply the properties of the derivative of vector-valued functions
6. Find the definite integral and indefinite integral of a vector-valued function
7. Find the velocity, acceleration, and speed of a vector-valued function
8. Use a vector-valued function to analyze projectile motion
9. Find the unit tangent vector and the unit normal vector at a point on a space curve
10. Find the tangential and normal components of acceleration
11. Find the arc length of a space curve, and use the arc length parameter to describe a curve at a point on the curve
12. Find the curvature of a curve at a point on the curve

IV. Students will apply differential calculus to functions of several variables. They will solve optimization problems involving functions of several variables.

Objectives:

1. Find and sketch the domain of a function of two (or three) variables
2. Sketch the graph of a function of two variables
3. Sketch level curves of a function of two variables, and sketch level surfaces of a function of three variables
4. Find limit of a function of two (or three) variables
5. Determine whether a function of two (or three) variables is continuous at a point or on a set
6. Find partial derivatives of a function of two or three variables
7. Find higher order partial derivatives of a function of two or three variables
8. Find the total differential of a given function of two or three variables
9. Determine whether a function of two (or three) variables is differentiable at a point or on a set
10. Apply differentials of functions of two or three variables
11. Apply the Chain Rule
12. Find partial derivatives implicitly
13. Find the directional derivatives of a function of two (or three) variables
14. Find the gradient of a function of two (or three) variables
15. Find the direction of maximum decrease and the direction of maximum increase of a function of two (or three) variables, and find the maximum and minimum values of the directional derivative
16. Find equations of tangent planes and normal lines to a surface
17. Find the absolute and relative extrema of a function of two variables

18. Apply the Second Partial Test
19. Solve optimization problems involving functions of several variables
20. Use Lagrange multipliers to solve constrained optimization problems

V. Students will evaluate iterated integrals. They will use multiple integrals to find areas of plane regions, volumes of solid regions, and areas of surfaces.

Objectives:

1. Evaluate an iterated integral, and use an iterated integral to find the area of a plane region
2. Evaluate and apply properties of double integrals; use double integrals to find the volume of a given solid region
3. Evaluate double integrals using polar coordinates
4. Use double integral to find the area of a surface
5. Evaluate triple integrals, and use them to find volumes of solid regions
6. Write and evaluate triple integrals in cylindrical and spherical coordinates

VI. Students will study the calculus of vector fields.

Objectives:

1. Find the curl and the divergence of a vector field
2. Determine whether a vector field is conservative
3. Write and evaluate line integrals of real valued functions and vector fields along piecewise smooth curves
4. Apply the Fundamental Theorem of Line Integrals
5. Apply Green's Theorem to evaluate a line integral
6. Evaluate surface integrals
7. Apply the Divergence Theorem
8. Apply Stokes's Theorem

Required Content:

<i>Chapter</i>	<i>Section</i>
1	1, 2, 3, 4, 5
2	1, 2, 3, 4, 5, 6, 7
3	1, 2, 3, 4
4	1, 2, 3, 4, 5, 6, 7
5	1, 2, 3, 4, 5
6	1, 2, 3, 4, 5, 6, 7, 8

Grading Standards and Criteria:

Final averages will be computed using the following scales:

- Common Final Exam 20%
- Midterm Exam 15%
- Test Average 45%
- Quiz (in D2L) Average 20%

Grades will be assigned using the point spread indicated below:

A: 100 – 90 B: 89 – 80 C: 79 – 70 D: 69 – 60 F: Below 60

Institutional and Course Policies for students:

- You are expected to bring the textbook and a calculator to class, and to be attentive and quiet. During class, I encourage you to ask me questions about the lecture, but not your classmate.
- Students are expected to attend punctually all classes. According to University policy, you are allowed 3 unexcused absences. **After the three absences, 1% of your final grade will be deducted for each class you miss.** Without a good reason, leaving a class before dismissal will be counted as a

late arrival. Every two late arrivals will be counted as one absence. If an absence is necessary, you are responsible for the material covered on that day.

- Any proof for an excuse (including any missing assignments) should be submitted as soon as possible. Definitely, there is no excuse or late assignments will be accepted after the final examination.
- During the test or exam, do not wear a cap/sunglass, and do not use any electronic device (except that being approved). Without any medical reason, you can leave the classroom only after having turned in the test or exam paper; otherwise, one point will be deducted for each minute being away.
- Cell phones, beepers, and anything that makes noise should be turned off during class.
- Anyone caught cheating will be given an F for the course, and will be dealt with to the full extent of Fort Valley State University regulations.

DISABILITY

FVSU is committed to the full inclusion of individuals with disabilities. To that end, the policies and procedures of FVSU ensure that a person with a documented disability is not, on the basis of that disability, denied full and equal access to academic programs, nor excluded from participation in co-curricular activities, or otherwise subjected to discrimination in such programs and activities. The policies for individuals with disabilities at FVSU are designed to ensure full compliance with all pertinent federal and state legislation, specifically to include Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990. If a student requires disability accommodations, he/she must register with the Office of Disability Services. To register online please visit : <http://www.fvsu.edu/disability-services/>. You may also call (478) 822-1072, or visit the Royal C. Peabody Bldg. Room 125.

INVOLUNTARY WITHDRAWAL POLICY

If after the mid-semester period, the instructor verifies that a student has accumulated the following number of unexcused absences from the class, the student is subject to involuntary withdrawal from the class and will receive a final course grade of “WF.”

- The student is absent 20 or more days for a class (including labs) that meet 4 days per week.
- The student is absent 15 or more days for a class that meets 3 days per week.
- The student is absent 10 or more days for a class meets 2 days per week.
- The student is absent 6 or more days for a class meets 1 day per week.

FVSU’s current policies and practices regarding plagiarism and academic dishonesty: Student Academic Dishonesty. Expulsion or suspension from the University or any lesser sanction may be imposed for the commission of offenses involving cheating or defraud on examinations. Examples of such offenses include giving assistance not authorized by the instructor in the preparation of an essay, laboratory report, examination or other assignment included in an academic course; taking or attempting to take, steal, or otherwise procure in an unauthorized manner, any material pertaining to the conduct of a class, including but not limited to examinations, laboratory experiments, and roll books; and plagiarizing.

Plagiarism. The appropriation of someone else’s ideas, passages arguments, interpretation of events or factual information, in either hard copy or electronically, demonstrates a lack of integrity and is unacceptable at Fort Valley State University. Other examples of plagiarism include submitting someone else’s work/assignment as one’s own, submitting purchased papers as one’s own, and submitting papers from the Internet as one’s own. Students who are guilty of plagiarism are subject to disciplinary action. Acts of plagiarism must be reported to the Department Head, Dean, Vice President for Academic Affairs, and the Vice President for Student Affairs for appropriate action. (2006 – 2008 Fort Valley State University Undergraduate Catalog, 71-72.)

References:

1. *Calculus*, 3rd Edition, by Robert Smith and Roland Minton, McGraw Hill, 2008
2. *Calculus, Early Transcendentals*, 5th edition, by James Stewart, Brooks/Cole, 2003
3. *Thomas’ Calculus*, 12th edition, by Finney, Weir, Giordano, Addison Wesley Longman, 2010

4. Calculus, 9th Edition, Larson & Edwards, Houghton Mifflin Publishing Company, Boston 2010.

The above schedule and procedures are subject to change in the event of extenuating circumstances.