Calculus III: Math 2032 - 44879

1 Contact Information

Professor:	Dr. Blake Farman
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Email Address:	farman@ulm.edu
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Office:	Walker 3-34
Office Hours:	Monday: 8:00 AM - 10:00 AM 12:15 PM - 12:30 PM 1:45 PM - 4:00 PM Wednesday: 8:00 AM - 11:00 AM 12:15 PM - 12:30 PM 1:45 PM - 4:00 PM.

1.1 Preferred Method of Communication

The best way to communicate with me during the semester is through email. I monitor my email during regular business hours and try to respond within one business day.

1.1.1 Official University Email Addresses

The University provides each student with an email address, username@warhawks.ulm.edu, and all official course correspondence will **only** be conducted using official university email addresses.

2 Course Description

This course covers vectors, lines, and planes, vector valued functions, partial derivatives, multiple integrals, calculus of vector fields.

3 Course Objectives and Outcomes

The goal of this course is to develop both the critical thinking and problem-solving skills needed to work theoretical and applied problems involving multiple integrals, partial derivatives, and vectors.

4 Course Topics

- Vectors
- Planes and surfaces
- Partial Derivatives
- Optimization problems in several real variables.
- Multiples Integration
- Vector Calculus

5 Course Prerequisites

A grade of C or better in MATH 1032.

6 Instructional Methods

This course is offered as a face-to-face course.

- Learning will be facilitated through traditional lecture along with occasional demonstrations, online homework, in-class or online quizzes, three in-class tests, and an in-class final exam.
- The online homework will be administered through MyMathLab.
- It is the student's responsibility to learn how to use MyMathLab. For technical support, go to www.pearsonmylabandmastering.com or www.mymathlab.com
- Keep track of assignment deadlines (posted in MyMathLab). **Work should be completed well in advance of the due dates.**
- If you have technical issues, you may need to contact MyMathLab Technical Support. **Homework deadlines will not be extended for technical issues.**

6.1 Temporary Remote Instruction (TRI)

During the semester, class and/or campus operations might be disrupted by an occurrence such as a tornado, fire, or illness outbreak that temporarily prevents in-person instruction. Until in-person instruction is possible, the class may enter a phase of temporary remote instruction (TRI). During this phase, instruction will take place via virtual means, either synchronously or asynchronously. Your instructor will alert you when this happens via e-mail and will include a description of how the course will proceed.

6.2 Technical Requirements During TRI

During a period of temporary remote instruction, the need for the course to continue in a virtual manner means that you will be required to have appropriate equipment, software, and telecommunication access to allow you to participate. This course will require that you have the following, should we have to go into TRI:

- A stable internet connection that is capable of joining Zoom meetings and taking assessments.
- A web camera (internal or external) and a microphone that can be used for Zoom meetings.
- A device such as a scanner or a smartphone equipped with a scanning app such as Adobe Scan to upload assessments on Moodle.

7 Evaluation

This course will use **Mastery Based Grading**. The content is broken into *standards* that you are expected to master by the end of the course.

This grading system is *iterative* in the sense that you will have multiple opportunities to display mastery of each standard, and *forgetful* in the sense that your previous unsuccessful attempts are discarded once you demonstrate mastery of a standard. Below, you can see a list of each standard.

7.1 Standards

7.1.1 Vectors and the Geometry of Space

VG 1	I can express vectors with appropriate notation. I can perform the following basic operations on vectors: add, subtract, scale, find the magnitude, and find the direction. I can use vectors to solve application problems. (§13.1, 13.2)
VG 2	I can compute the dot product of two vectors and use this to compute the angle between two vectors. In particular, I can determine whether two vectors are orthogonal, compute the orthogonal projection of one vector onto another, and use these to solve application problems. (§13.3)
VG 3	I can compute the cross product of two given vectors to find a third vector orthogonal to each of the given vectors. I can use the cross product to solve application problems. (§13.4)
VG 4	I can find the equation of a line in space given either a point and a vector in space, or two points in space. I can express the line as a vector equation and using parametric equations. I can solve application problems involving lines in space. (§13.5)
VG 5	I can find the equation of a plane given either a point and a normal vector in space, or three points in space. I can express this as a vector equation and as a linear equation in three variables. (§13.5)
VG 6	I can match standard quadric surfaces and their standard equations. Given an equation for a quadratic surface, I can place the equation into standard form. (§13.6)

7.1.2 Vector-Valued Functions

VF 1	I can sketch graph of a vector-valued function of a single variable. I can compute limits involving vector-valued functions and determine whether a vector-valued function is continuous at a point. (§14.1)
VF 2	I know the derivative rules for vector-valued functions and I can use them to find the vector tangent to a point on a space curve. I can compute the unit tangent vector at a point on a space curve. I can compute definite and indefinite integrals involving vector-valued functions. (§14.2)
VF 3	I can represent the path of an object moving in space using a vector-valued function and compute its velocity, speed, and acceleration. I can find the vector-valued function representing the path of an object moving in space given either the acceleration or velocity vector and initial conditions. I can recognize straight-line and circular motion, and solve application problems. (§14.3)
VF 4	I can compute the length of a space curve on a closed interval. I can parameterize a curve by arc length under appropriate conditions. (§14.4)
VF 5	I can compute the curvature, principal unit normal vector for a smooth space curve, and use these to decompose the acceleration. I can compute the binormal vector, interpret the **TNB** frame, and compute the torsion for a smooth space curve. (§14.5)

7.1.3 Functions of Several Variables

SV 1	I can find the domain and range of a function of two real variables. I can sketch level curves and surfaces for functions of two real variables. (§15.1)
SV 2	I can use the limit laws for functions of two real variables to compute limits and determine whether a function is continuous at a point in the domain. I know the definition of interior point, boundary point, open set, and closed set. (§15.2)
SV 3	I can compute the partial derivatives for functions of two or more variables. I can determine whether a function of two variables is differentiable. (§15.3)
SV 4	I can use the chain rule on functions with one or more independent variables. I can use implicit differentiation on a function of two variables. I can solve application problems involving these techniques. (§15.4)
SV 5	I can compute the gradient and directional derivatives of a function of two or more variables. I can use these techniques to solve application problems. (§15.5)
SV 6	I can compute the plane tangent to a surface at a point from either the implicit or explicit form. I can approximate a surface near a point using the tangent plane. I can work with differentials and solve application problems with these techniques. (§15.6)
SV 7	I can identify critical points of functions of two variables. I can use the second derivative test to classify critical points and find maximum/minimum values on closed bounded sets. (§15.7)
SV 8	I can use Lagrange Multipliers to find absolute extrema on closed and bounded constraint curves. (§15.8)

7.1.4 Multiple Integration

MI 1	I can use iterated integrals to compute double integrals over a region in $\mathbb{R}^2$ and I can identify when to use polar coordinates to simplify these iterated integrals. (§16.1, 16.2, 16.3)
MI 2	I can use iterated integrals to compute triple integrals over a region in $\mathbb{R}^3$ and I can identify when to use cylindrical and spherical coordinates to simplify these iterated integrals. (§16.4, 16.5)
MI 3	I can compute the center of mass of an object (§16.6).
MI 4	I can use a change of variables in two and three dimensions to simplify an interal (§16.7).

7.1.5 Vector Calculus

VC 1	I can match vector fields with their graphs. I can parameterize curves, evaluate line integrals, and interpret these as mass, work, flux, and circulation. (§17.1, 17.2)
VC 2	I can determine whether a vector field is conservative and, if so, find the potential function. I can use the Fundamental Theorem for Line Integrals to evaluate line integrals of conservative vector fields. (§17.3)
VC 3	I can use Green's Theorem to evaluate line integrals of vector fields. (§17.4)
VC 4	I can compute the divergence and curl of a vector field. (§17.5)
VC 5	I can parameterize a given surface and compute surface integrals. (§17.6)
VC 6	I can use Stoke's Theorem to evaluate integrals (§17.7).
VC 7	I can use the Divergence Theorem to evaluate integrals. (§17.8).

7.2 Grading Scale

Letter grades will be assigned based on the following table:

		MyMathLab Average				
		$< 60\%$	60% - 69%	70% - 79%	80% - 89%	90% - 100%
# Standards Mastered	27-30	B	B	B	B	A
	24-26	C	C	C	B	B
	21-23	D	D	C	C	C
	18-20	F	D	D	D	D
	< 18	F	F	F	F	F

7.3 Assessments

Each assessment will contain problems corresponding to standards that have not yet been assessed. The standards are graded *independently* and, unlike quizzes or tests that you may have had in the past, there is no partial credit. You must master *each* of the problems that go with the standard.

7.3.1 Problem Scoring

Written assessments in this course will be scored on the following scale.

Mastery:	The given solution is correct with no content related errors. Appropriate justification is provided in a clear, easy to follow manner.
Progressing:	The given solution demonstrates an understanding of the material, but contains content related errors or lacks justification.
Needs Improvement:	The given solution was blank, illegible, or used inappropriate techniques.

7.4 Reassessment

Reassessment provide an opportunity to improve your score on all of the standards that you have not yet mastered. You will be given an assessment that contains problems for every standard that you have not yet mastered. You may attempt as many of the standards as time allows.

7.4.1 Reassessment Days

There are tentatively 5 scheduled Reassessments for this course:

Reassessment 1:	Friday, September 9, 2022,
Reassessment 2:	Friday, September 30, 2022,
Reassessment 3:	Friday, October 28, 2022,
Reassessment 4:	Tuesday, November 22, 2022,
Final Reassessment:	Monday, December 5, 2022 8:00 AM - 9:50 AM.

7.5 Homework

Homework sets are arguably the most important component for learning the material in this course, so it is imperative that you complete these sets on time. The problems are chosen to highlight the core concepts from each section. Mastery of these homework sets serves as a good indicator for assessment performance. As such, you should ensure that you fully understand the material on these homework sets; that is, upon completion of the homework set, you should be capable of completing similar problems without the aid of any tools that are not available during an exam.

Unless otherwise specified, final submission for a homework set is 9:00 am on the day of the next Reassessment. Late work **will not be accepted**, and you are solely responsible for ensuring that these assignments are completed on time. **Do not leave these assignments until the last minute.**

8 Class Policies and Procedures

At a minimum, all policies stated in the current ULM student policy manual & organizational handbook should be followed (see http://www.ulm.edu/studentpolicy/). Additional class policies include:

8.1 Textbook

The required text for this course is *Calculus: Early Transcendentals with Integrated Review*, Third Edition by Briggs, Cochran, Gillett, and Schulz, ISBN 9780134763644.

8.2 Materials

- MyMathLab Access Code: This may be bundled with your book if you get a new book.
  - You may purchase a MyMathLab Access Code from the ULM Bookstore or directly from the MyMathLab website.
  - **Students MUST register for a MyMathLab account by the second week of classes.**
- Calculator: A scientific calculator such as a TI-30X II S or TI-30X II B (2-line display) will be the only calculator allowed to be used during quizzes and exams.
  - **Graphing calculators may NOT be used during quizzes and exams.**
  - **Calculator sharing and cell phone calculators will NOT be permitted during quizzes and exams.**

8.3 Statement on COVID-19 Protocols (all classes)

Since the beginning of the COVID-19 pandemic, ULM has followed the guidance of the CDC and the ULS System regarding what measures to put in place at various stages of the outbreak. This situation is unchanged in the coming semester, as the CDC guidance on the need for social distancing, mask wearing, and vaccinations will be followed as the outbreak continues to evolve. Therefore, please continue to monitor university e-mails and websites (https://www.ulm.edu/coronavirus/) for any new updates on the pandemic.

8.4 Attendance Policy

Students are expected to adhere to the Class Attendance Policy outlined in the ULM Student Policy Manual.

- Class attendance is regarded as an obligation and a privilege, and all students are expected to attend all required classes in which they are enrolled regularly and punctually. Failure to do so may jeopardize a student's scholastic standing and may lead to suspension from the University. **Students are responsible for the effect absences have on all forms of evaluating course performance.**
- In accordance with University policy, the instructor will take roll regularly. It is the student's responsibility to ensure that his/her attendance is recorded. To be marked present for a given class period, students must stay until the class is completed.
- Each student is responsible for all class material and assignments whether or not the student is present. If a student misses class, then he/she is expected to check Moodle and ULM email for announcements and to work on the assignments listed on Moodle.
- A student accumulating absences of 25% of the class meetings regardless of the reasons (excused or unexcused) will be reported to the Dean of Arts, Education, & Sciences which could result in academic withdrawal from the course or a course grade of F. This may be avoided if the course is dropped; however, it is the responsibility of the student to drop the course. Class removal carries with it the penalties of being assigned a grade of W or F, whichever is appropriate, and no credit for the course. Academic withdrawal may negatively impact a student's full-time status.

- University Excuses: Any University-related activity requiring an absence from class will count as an absence when determining if a student has met the minimum attendance requirement.

8.5 Make-up Policy

In the event of a missed assessment or reassessment due to absence, students will be given the opportunity to attempt all missed standards on the next reassessment. The date and time of the final reassessment are determined by the registrar and cannot be made up.

8.6 Academic Integrity

Faculty and students must observe the ULM published policy on Academic Dishonesty (see the ULM Student Policy Manual – http://www.ulm.edu/studentpolicy/).
Any student caught turning in work that is not their own will be reported to the School of Sciences. If the student is found to be responsible for such a violation, then a formal report will be made to the Office of Student Services and the student will receive **a grade of F for the course**.

8.7 Course Evaluation Policy

At a minimum, students are expected to complete the online course evaluation.

9 Student Services

You can find information about the following available ULM student services at the websites listed below.

- Student Success Center (http://www.ulm.edu/cass/).
- Counseling Center (http://www.ulm.edu/counselingcenter/).
- Special Needs (http://www.ulm.edu/counselingcenter/special.htm).
- Library (http://www.ulm.edu/library/referencedesk.html)
- Computing Center Help Desk (http://www.ulm.edu/computingcenter/helpdesk)

Additional information can be found on The Student Services web site (http://www.ulm.edu/studentaffairs/).

9.1 Disability Accommodations

The University of Louisiana at Monroe strives to serve students with special needs through compliance with Sections 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act. These laws mandate that postsecondary institutions provide equal access to programs and services for students with disabilities without creating changes to the essential elements of the curriculum. While students with special needs are expected to meet our institution's academic standards, they are given the opportunity to fulfill learner outcomes in alternative ways. Examples of accommodations may include, but are not limited to, testing accommodations (oral testing, extended time for exams), interpreters, relocation of inaccessible classrooms, permission to audiotape lectures, note-taking assistance, and course substitutions.

Current policies on serving students with disabilities can be obtained from the ULM website: http://ulm.edu/counselingcenter/. If you need accommodation because of a known or suspected disability, you should contact the director for disabled student services at:

- Voice phone: (318) 342 - 5220
- Fax: (318) 342 - 5228
- Walk In: ULM Counseling Center, 1140 University Avenue (this building and room are handicapped accessible).

If you have special needs of which I need to be made aware, you should contact me within the first two days of class.

9.2 Mental Wellness

If you are having any emotional, behavioral, or social problems, and would like to talk with a caring, concerned professional please call one of the following numbers:

- The ULM Counseling Center (318) 342 - 5220
- The Marriage and Family Therapy Clinic (318) 342 - 9797
- The Community Counseling Center (318) 342 - 1263.

9.3 Title IX

Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds, including federal loans and grants. Furthermore, Title IX prohibits sex discrimination to include sexual misconduct, sexual violence, sexual harassment and retaliation. If you encounter unlawful sexual harassment or gender-based discrimination, please contact Student Services at (318) 342 - 5230 or to file a complaint, visit www.ulm.edu/titleix.

Remember that all services are offered free to students, and all are strictly confidential.

9.4 Emergency Procedures

The emergency number for the ULM Police Department is (318) 342 - 5350 and should be used for emergency calls. If the campus police are contacted about an emergency for a student, they will go to the student's class to inform the student.

9.5 Discipline / Course Specific Policies

Any policies given here may be altered by the professor if deemed necessary. If this occurs, ample notice will be given.

9.6 FERPA

Do not email or call your professor regarding your course grades. The Family Education Rights and Privacy Act (FERPA) prohibits your professor from discussing your grade in any manner except in person. Please do not have family members, friends, or anyone else contact your professor about your grade as FERPA prohibits your professor from sharing that information with them.

10 Tentative Course Schedule

10.1 Contact Information

Professor: Dr. Blake Farman
Phone Number: (318) 342 - 1851
Email Address: farman@ulm.edu
Website: https://ulm.edu/~farman
Office: Walker 3-34
Office Hours: Monday: 8:00 AM - 10:00 AM
12:15 PM - 12:30 PM
1:45 PM - 4:00 PM
Wednesday: 8:00 AM - 11:00 AM
12:15 PM - 12:30 PM
1:45 PM - 4:00 PM.

Note: The instructor reserves the right to adjust the schedule as needed.

Week 1

Day	Date	Material Covered
Thu	8/18	13.1 - Vectors in the Plane
Fri	8/19	13.2 - Vectors in Three Dimensions

Week 2

Day	Date	Material Covered
Mon	8/22	13.3 - Dot Products
Tue	8/23	13.4 - Cross Products
Thu	8/25	13.5 - Lines and Planes in Space
Fri	8/26	13.6 - Cylinders and Quadric Surfaces

Week 3

Day	Date	Material Covered
Mon	8/29	14.1 - Vector-Valued Functions
Tue	8/30	14.2 - Calculus of Vector-Valued Functions
Thu	9/1	14.3 - Motion in Space
Fri	9/2	14.4 - Length of Curves

Week 4

Day	Date	Material Covered
Mon	9/5	*Labor Day*
Tue	9/6	14.5 - Curvature and Normal Vectors
Thu	9/8	Catch up / Review
Fri	9/9	Reassessment 1

Week 5

Day	Date	Material Covered
Mon	9/12	15.1 - Graphs and Level Curves
Tue	9/13	15.2 - Limits and Continuity
Thu	9/15	15.3 - Partial Derivatives
Fri	9/16	15.4 - The Chain Rule

Week 6

Day	Date	Material Covered
Mon	9/19	15.5 - Directional Derivatives and the Gradient
Tue	9/20	15.6 - Tangent Planes and Linear Approximation
Thu	9/22	15.7 - Maximum/Minimum Problems
Fri	9/23	15.7 - Maximum/Minimum Problems

Week 7

Day	Date	Material Covered
Mon	9/26	15.8 - Lagrange Multipliers
Tue	9/27	15.8 - Lagrange Multipliers
Thu	9/29	Catch up / Review
Fri	9/30	Reassessment 2

Week 8

Day	Date	Material Covered
Mon	10/3	16.1 - Double Integrals over Rectangular Regions
Tue	10/4	16.2 - Double Integrals over General Regions
Thu	10/6	16.2 - Double Integrals over General Regions
Fri	10/7	16.3 - Double Integrals in Polar Coordinates

Week 9

Day	Date	Material Covered
Mon	10/10	16.3 - Double Integrals in Polar Coordinates
Tue	10/11	16.4 - Triple Integrals
Thu	10/13	16.4 - Triple Integrals
Fri	10/14	16.5 - Triple Integrals in Cylindrical and Spherical Coordinates

Week 10

Day	Date	Material Covered
Mon	10/17	16.5 - Triple Integrals in Cylindrical and Spherical Coordinates
Tue	10/18	16.6 - Integrals for Mass Calculations
Thu	10/20	16.7 - Change of Variables in Multiple Integrals
Fri	10/21	16.7 - Change of Variables in Multiple Integrals

Week 11

Day	Date	Material Covered
Mon	10/24	*Fall Break*
Tues	10/25	*Fall Break*
Thu	10/27	Catch up / Review
Fri	10/28	Reassessment 3

Week 12

Day	Date	Material Covered
Mon	10/31	17.1 - Vector Fields
Tue	11/1	17.2 - Line Integrals
Thu	11/3	17.2 - Line Integrals
Fri	11/4	17.3 - Conservative Vector Fields

Week 13

Day	Date	Material Covered
Mon	11/7	17.3 - Conservative Vector Fields
Tues	11/8	17.4 - Green's Theorem
Thu	11/10	17.4 - Green's Theorem
Fri	11/11	17.5 - Divergence and Curl

Week 14

Day	Date	Material Covered
Mon	11/14	17.6 - Surface Integrals
Tue	11/15	17.7 - Stokes's Theorem
Thu	11/17	17.8 - Divergence Theorem
Fri	11/18	17.8 - Divergence Theorem

Week 15

Day	Date	Material Covered
Mon	11/21	Catch up / Review
Tue	11/22	Reassessment 4
Thu	11/24	*Thanksgiving Break*
Fri	11/25	*Thanksgiving Break*

Week 16

Day	Date	Material Covered
Mon	11/28	Catch up / Review
Tue	11/29	Catch up / Review

Finals Week

Day	Date	Material Covered
Mon	12/5	Final Reassessment, 8:00 AM - 9:50 AM