

# Lamar University



## Department of Mathematics

**MATH 2414 Calculus & Analytic Geometry II** (4 hour course)

Spring 2018 Syllabus

Monday/Wednesday/Friday 10:20 – 11:15, Tuesday/Thursday 9:35 – 10:30

- Instructor:** Dr. Robert W. Vallin  
**Office:** 204 Lucas Engineering Building  
**Phone:** 409-880-7979  
**E-Mail:** [robert.vallin@lamar.edu](mailto:robert.vallin@lamar.edu) (all e-communication will be responded to within two business days of receipt)  
**Office Hours:** 11:30 – 12:20 Monday, Wednesday; 10:40 – 11:30 Tuesday, Thursday  
I am also available at other times by appointment  
**Text:** *“Calculus Early Transcendental Functions”* (Larson, Edwards), 6<sup>th</sup> edition  
Blackboard is used sparingly if at all in this course.  
**Prerequisites:** Grade of C or better in Calculus I (MATH 2413) or its equivalent.

### Catalog Description

Methods of integration, polar coordinates, parametric equations, sequences and series, and vectors.

### MATH 2414 Learning Outcomes

Upon completion of the course, students will:

1. Use the concepts of definite integrals to solve problems involving area, volume, work, and other physical applications.
2. Use substitution, integration by parts, trigonometric substitution, partial fractions, and tables of anti-derivatives to evaluate definite and indefinite integrals.
3. Define an improper integral.
4. Apply the concepts of limits, convergence, and divergence to evaluate some classes of improper integrals.
5. Determine convergence or divergence of sequences and series.
6. Use Taylor and MacLaurin series to represent functions.
7. Use Taylor or MacLaurin series to integrate functions not integrable by conventional methods.
8. Use the concept of polar coordinates to find areas, lengths of curves, and representations of conic sections.
9. Approximate definite integrals using the Midpoint, Trapezoid and Simpson’s Rule;
10. Find the arc length of a function;
11. Find surface area of a solid of revolution;
12. Sketch the graph of a parametric curve;
13. Explore area, arc length, surface area, and tangent lines for parametric functions;
14. Express a series as a limit of partial sums;

15. Determine convergence/divergence and value of geometric series;
16. Determine if a series converges or diverges using any of the following tests: Divergence Test, Integral Test, Comparison Test, Limit Comparison Test, Alternating Series Test, Ratio Test, and Root Test;
17. Determine if a series converges absolutely;
18. Compute the radius and interval of convergence for a power series;
19. Graph basic equations in 3-D coordinate system;
20. Compute using basic vector arithmetic;
21. Compute the dot product of two vectors;
22. Compute the angle between two vectors;
23. Find the projection of one vector onto another;
24. Compute the cross product of two vectors;
25. Determine if two vectors are parallel or orthogonal;
26. Find the equation of lines and planes in 3-D space.

### **Core Curriculum Outcomes**

While our course has specific outcomes, it also fulfills some of the outcomes of the Core Curriculum. Upon completion of this course, the student will demonstrate his or her abilities to think critically, communicate quantitative information, and apply mathematical concepts:

1. Critical Thinking: Develop a logical, consistent plan to solve a problem, recognize consequences of the solution, and articulate a reason for choosing solution method.
2. Communication Skills: Use and present quantitative information in connection with an argument or problem solution and explicate it in an effective format.
3. Empirical and Quantitative: Construct and present a detailed problem statement with evidence of relevant contextual factors and possible approaches for solving the problem, then implement a solution and review the results.

### **Lectures/Discussions**

There will be a healthy amount of lecture in this course, but listening to my lectures about mathematical concepts and procedures will not make you understand them. Therefore, I employ active learning methods so that students have the best chance of succeeding in this course. On Tuesdays<sup>1</sup> we will have group work or worksheets or some other method to reinforce concepts over rote memorization. These forms of active learning comprise a participation portion of the grade.

### **Student Responsibilities**

In order to be successful in this class, you must do much more than passively sit in a classroom. This class is organized under several assumptions:

1. You are doing much more than just copying what is on the board. Notes should also contain important information, tips, and techniques that are heard during lecture.
2. You understand that not every important fact is covered during lecture and that the appropriate sections in the book should be read (preferably *before coming to class*).
3. You know that doing the homework in a timely manner is necessary to succeed in this course. You cannot hope to do well in our course without practicing a lot of problems. This includes book homework and classroom handouts.

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<sup>1</sup> And maybe even other days, as I see fit.

4. You will seek out appropriate help (the professor or tutors) as soon as possible to get questions answered. This course covers a lot of material in a short amount of time. Falling too far behind will make catching up nearly impossible.



### **Grading Policies**

There will be three tests and a final exam. Test dates will be announced in class at least one week in advance. If you are to miss a test, you must let me know as soon as possible. Make up/Replacement of a missed exam is at my discretion. In order to make this an Honors class, we will have a series of small synopsis essays dealing with calculus and proofs without words

First exam	20%
Second exam	22.5%
Third exam	22.5%
Final exam	20%
Essays	5%
Classroom participation	10%

90-100	A
80-89	B
70-79	C
60-69	D
59 and below	F

There will be no curve. Class attendance and participation will determine any grade I believe is on the borderline.

A grade of Incomplete may be requested in the case of a medical emergency documented prior to the final exam and if the student is passing at the time. Such a request must be in writing and include a plan for completion of the course. A student may not register for the course while an Incomplete in the course is on record. No Incomplete will be authorized after the final exam. If an Incomplete is awarded, the missing work must be made up before the end of the subsequent Fall/Spring semester.

### **Behavior Policy**

Mathematics is a highly complex and detailed subject that requires both deep understanding and rote memorization. I have carefully designed this course to give you ample practice with both of these elements and give you the best chance to succeed in this course. As a class, each of you has a heavy responsibility for our success, as well. In order to create a classroom environment that will help you succeed, in order to minimize

disruptions to other students' learning, and to help you stay focused and attentive, I must insist that a few rules be followed. In general, students must refrain from behavior in the classroom that intentionally or unintentionally disrupts the learning process. What does this mean to me?

1. Restroom trips, pencil sharpening, and all other preparations for class need to be performed *before class*.
2. Cellular telephones must be turned off before class begins. Since they are to be turned off, they should not be visible in class. Students will be asked to leave if their phone should ring during class. The first instance of texting or improper use of the computers in class shall result in a warning. After that, at my discretion, points will be taken from the final class grade of the entire class.
3. Some other things that disrupt our learning community include: using tobacco products in class, making offensive remarks, eating, reading outside materials, sleeping, talking when we are working silently or when others are talking, wearing inappropriate clothing, or engaging in any other form of distraction.
4. If a student disrupts class in one of these ways or in any other way that I think is harmful to our learning, I may ask that student to leave class in order to defend the rights of the rest of the class. If this happens to you, you will not be allowed to return to class until you have spoken with me and I have decided to let you back in. If a student is especially disruptive, he or she may be reported.
5. You are expected to be in class on time and to stay for the entire class period. If you are repeatedly late for class, you will not be able to succeed in this course.
6. The homework assignments, which are contained in this syllabus, are essential for success in this course. The fact is if you do not do the homework, you will almost definitely not do well in the course.
7. If you need to miss an exam, you must let me know beforehand (either by phone, voicemail, email, or in-person). There are no make-up exams, but at my discretion, a missed exam score may be replaced with the final exam score.

### **Final Exam**

Monday, May 7<sup>th</sup> from 11:00 a.m. – 1:30 p.m. It is cumulative. You must pass the final exam in order to pass the course.

While I have made a sincere effort to ensure that this syllabus is correct, changes may be required. I will announce any substantive changes during a regularly scheduled class (and possibly in a Blackboard announcement). If you find an error or omission, please advise me at once so that the other members of the class may be advised.

Lamar University  
Department of Mathematics  
Important Information for Students

Lamar University expressly prohibits intimidation and harassment of students, faculty, staff, or applicants. <http://students.lamar.edu/academic-support/code-of-conduct.html>

**Drop Policy:** Please make note of the three dates indicated in this drop policy. Any drop will be your responsibility; I will not drop a student from the course.

**January 31, 2018:** (Census Date-Six Drop Rule does not apply) A student may drop or withdraw without consulting with the instructor. The Six Drop Rule does not apply to a drop before 5:00 PM.

**February 19, 2018:** (Six Drop Rule applies) A student may drop or withdraw from the course without academic penalty and receive a Q, however, the Six Drop Rule applies. The student will consult with the instructor and the Records Office to initiate a drop.

**April 4, 2018:** (Six Drop Rule applies) Last day to drop or withdraw with academic penalty; the student must be passing the course at the time of the requested drop in order to receive a Q. The drop form, including all required signatures, must arrive in the Records Office by no later than 4:00 PM. No drop is allowed after this date except in extreme extenuating circumstances. Any “late drop” must be approved by the instructor, department chair, college dean, and provost.

**Academic Integrity:** Students are expected to maintain complete honesty and integrity in their academic experiences both in and out of the classroom. Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action. Students are specifically warned against all forms of cheating and plagiarism. The *Lamar University Student Handbook* clearly reads: “Any student found guilty of academic dishonesty in any phase of academic work will be subjected to disciplinary action. Punishable offenses include, but are not limited to, cheating on an examination or academic work which is to be submitted, plagiarism, collusion, and the abuse of source materials.” One aspect of the *Handbook*’s definition of cheating includes “purchasing or otherwise acquiring and submitting as one’s own work any research paper or other writing assignment prepared by an individual or firm.” Plagiarism is defined as “the appropriation and the unacknowledged incorporation of another’s work or ideas into one’s own and submitted for credit.” Faculty members in the College of arts and Sciences investigate all cases of suspected plagiarism. Any student who is found cheating in this course will receive a course grade of F. <http://students.lamar.edu/student-handbook.html>

**Accommodations through the Disability Resource Center:** Lamar University is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is located in the Communications building room 105. Office staff collaborate with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact the DRC at [409-880-8347](tel:409-880-8347) or [drc@lamar.edu](mailto:drc@lamar.edu) to arrange a confidential appointment with the Director of the DRC to explore possible options regarding equitable access and reasonable accommodations. If you are registered with DRC and have a current letter requesting reasonable accommodations, we encourage you to contact your instructor early in the semester to review how the accommodations will be applied in the course. <http://www.lamar.edu/disability-resource-center/>

**Campus Closure:** In the event of an announced campus closure in excess of four days due to a

hurricane or other disaster, students are expected to login to Lamar University's website's homepage for instructions about continuing courses remotely. <http://lamar.edu>

**Emergency Procedures:** Many types of emergencies can occur on campus; instructions for severe weather or violence/active shooter, fire, or chemical release can be found at:

<http://www.lamar.edu/about-lu/administration/risk-management/index.html>

Following are procedures for the first two:

**Severe Weather:**

- Follow the directions of the instructor or emergency personnel.
- Seek shelter in an interior room or hallway on the lowest floor, putting as many walls as possible between you and the outside.
- If you are in a multi-story building, and you cannot get to the lowest floor, pick a hallway in the center of the building.
- Stay in the center of the room, away from exterior walls, windows, and doors.

**Violence/Active Shooter:**

- **CALL** - 8-3-1-1 from a campus phone (880-8311 from a cell phone). Note: Calling 9-1-1 from either a campus phone or cell phone will contact Beaumont City Police Dispatch rather than University Police.
- **AVOID**- If possible, self-evacuate to a safe area outside the building. Follow directions of police officers.
- **DENY**- Barricade the door with desks, chairs, bookcases or any other items. Move to a place inside the room where you are not visible. Turn off the lights and remain quiet. Remain there until told by police it is safe.
- **DEFEND**- Use chairs, desks, cell phones or whatever is immediately available to distract and/or defend yourself and others from attack.

**Course Evaluations:** You will have an opportunity to evaluate all aspects of this course in a formal process to be completed online near the end of the term. You will receive an email reminder through your LU account.

Math 2414 - Calculus and Analytical Geometry II  
Calculus Early Transcendental Functions  
(Larson/Edwards) 6<sup>th</sup> Edition – List of Topics

- L'Hopital's Rule
- Integration Techniques
  - Integration by Parts
  - Integrals Involving Trig. Functions
  - Trig. Substitutions
  - Partial Fractions
  - Integrals Involving Roots
  - Integrals Involving Quadratics\*
  - Improper Integrals
- Applications of Integrals
  - Volumes (Disk and Shell)
  - Arc Length
  - Surface Area
  - Center of Mass\*\*
  - Hydrostatic Pressure and Force\*
  - Probability\*
- Parametric Equations and Polar Coordinates
  - Parametric Equations and Curves
  - Tangents with Parametric Curves
  - Area with Parametric Curves\*
  - Arc Length with Parametric Curves
  - Surface Area with Parametric Curves\*
  - Polar Coordinates
  - Tangents with Polar Coordinates
  - Area with Polar Coordinates
  - Arc Length with Polar Coordinates
  - Arc Length and Surface Area – Revisited \*
- Sequences and Series
  - Sequences
  - Series – The Basics
  - Series – Convergence/Divergence
  - Series – Special Series\*
  - Integral Test
  - Comparison/Limit Comparison
  - Alternating Series Test
  - Absolute Convergence
  - Ratio Test
  - Root Test

- Strategy for Series\*
- Estimating the Value of a Series\*\*
- Power Series
- Power Series and Functions
- Taylor Series
- Applications of Series\*
- Binomial Series
- Vectors
  - Vectors – The Basics
  - Vector Arithmetic
  - Dot Product
  - Cross Product
- Three Dimensional Space\*\*\*
  - The 3-D Coordinate System
  - Equations of Lines
  - Equations of Planes
  - Quadratics Surfaces
  - Functions of Several Variables
  - Vector Functions
  - Calculus with Vector Functions
  - Tangent, Normal, and Binormal Vectors
  - Arc Length
  - Curvature
  - Velocity and Acceleration
  - Cylindrical Coordinates
  - Spherical Coordinates

\* These sections are not on the syllabus and there is rarely time to cover them.

\*\* These sections are on the syllabus and are only covered if time permits.

\*\*\* These sections are taught in Calculus III.