SYLLABUS
MATH 161-01
SPAL 2019 2019

BLAKE FARMAN

Lafayette College

Contact Information

E-mail: farmanb@lafayette.edu
Office: Pardee Hall room 225A
Phone: (610) 330-5906
Office Hours: Monday - Friday, 11:00 am - 12:00 pm.

Course Information

Lectures. Monday-Friday, 9:00 am - 11:00 am in Pardee Hall, room 217.

Pre-Requisites. High school trigonometry.

Course Objectives. Math 161 (Calculus I) provides an introduction to calculus for students of mathematics, engineering, and the sciences. Topics include limits, derivatives, techniques of differentiation, definite integrals, the fundamental theorem of calculus, and applications of derivatives and integrals.

Learning Outcomes. The calculus sequence will help students

- perform fundamental computational techniques of calculus,
- understand the basic concepts and vocabulary of calculus,
- learn to use symbolic, graphical, and numerical methods in an integrated way to investigate and solve problems in various contexts,
- learn to formulate problems in mathematical terms, and
- develop their ability to learn mathematics.

Date: July 1, 2019.

Text. The required text for this course is

Calculus, 8th Edition, James Stewart, 2016. ISBN 978-1-285-74062-1.

It is **expected** that you will read the text outside of lecture. In particular, it is highly suggested that you take some time to read the section to be covered ahead of lecture.

Course Website. The URL for the course website is

`http://sites.lafayette.edu/farmanb/teaching/math-161-j19/`

Here you can find a digital copy of the syllabus and other important information.

Grading

This course will use **Standards-Based Grading**. This grading style emphasizes demonstration of subject mastery by students over accumulation of points. The course content is broken into 15 *standards* listed below.

Standards. The following is a list of standards that you are expected to master by the end of this semester.

1. Functions
   - Limits
   - Continuity of a function
   - Intermediate Value Theorem
2. Derivatives
   - Limit Definition
   - Tangent line to a function at a point
   - Instantaneous and average rates of change
3. Derivative Rules
   - Power rule
   - Sum/Difference rule
   - Constant multiple rule
4. Product and Quotient Rules
5. Chain Rule
6. Implicit Differentiation and Related Rates
7. How derivatives affect the shape of a graph
   - Critical numbers
   - First derivative test
   - Increasing/Decreasing test
   - Second derivative test
   - Concavity and Inflection points
8. Asymptotes
   - Horizontal
   - Vertical
   - Slant/Oblique
9. Curve sketching
10. Closed interval method and Optimization
11. Integrals
    - Areas and distances
    - Riemann Sums
    - Definite integrals
12. Fundamental Theorem of Calculus
    - Anti-derivatives
    - Indefinite integrals
13. Substitution
14. Inverse Functions
    - Exponentials and their properties
    - Logarithms and their properties
15. Calculus of Inverse Functions
    - Derivatives and integrals involving exponentials
    - Derivatives and integrals involving logarithms

Problem Scoring. Each problem that you encounter during this semester will be scored on the following scale:

Mastery (4 Points)	The given solution is correct with no content related errors. Appropriate justification is provided in a clear, easy to follow manner.
Proficiency (3 Points)	The given solution is mostly correct, with only minor content errors. Appropriate justification is provided.
Improving (2 Points)	The given solution is only partially correct or lacks justification.
Rookie (1 Point)	The given solution is incorrect, but correct techniques were identified.
Not assessable (0 points)	The given solution was blank, illegible, or used inappropriate techniques.

Mastery. You can achieve mastery of a standard by receiving a score of **M** on in-class assessments and the final exam. Once you have achieved mastery, problems explicitly from that standard will no longer appear on your assessments. However, calculus builds upon itself, so the concepts in any given standard will certainly reappear in later standards.

It is important to note that, unlike a traditional grading scheme, you will be afforded multiple opportunities to display mastery and your past performance does not affect mastery.

Scale. Letter grades will be assigned based on the following table.

	# Standards mastered	# Homework sets mastered
A	14-15	90%-100%
B+	13	86%-89%
B	12	80%-85%
C+	11	76%-79%
C	10	70%-75%
D+	9	66%-69%
D	8	60% - 65%
F	≤ 7	$< 60\%$

In order to attain the letter grade in a given row, you must satisfy both criteria. If you have mastered the number of standards in a row, but you have not mastered the appropriate number of homework sets, then you will be bumped down one row.

Assessments

Homework. Regular homework will be assigned, collected, and scored. The problems are chosen to highlight the core concepts from the standards. Mastery of these homework sets serves as a good indicator for quiz and exam 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 the text, a computer, a calculator, or any other tools not available during an exam.

Quizzes. Quizzes will be given during class time, at least once per week. You should expect to see a quiz shortly after completion of a homework set. Each quiz will contain problems from only one standard, and will generally be your first opportunity to demonstrate mastery. If you receive a score of **M** on each problem on a quiz, then you will have mastered that standard.

Exams. There will be three in-class exams and a final exam on Friday, August 9, 2019. Each exam will be comprised of questions corresponding to the standards that you have not yet mastered and labeled accordingly. Mastery of a standard depends **only** on attaining a score of **M** on the questions corresponding to that standard.

The in-class exams are tentatively scheduled as follows:

Exam 1: Monday, July 8, 2019,
Exam 2: Wednesday, July 24, 2019, and
Exam 3: Friday, August 2, 2019.

Re-Assessment. You will have the opportunity to have a single homework set that you have not mastered re-assessed each day during office hours. I will provide you with at least one problem from the relevant standard which you will work out on the board. Your goal in this re-assessment is to convince me that you have mastered the homework set. If you are successful, then the score for that assignment will be changed to **M**.

Disability statement. In compliance with Lafayette College policy and equal access laws, I am available to discuss appropriate academic accommodations that you may require as a student with a disability. Requests for academic accommodations need to be made during the first two weeks of the semester, except for unusual circumstances, so arrangements can be made. Students must register with the Office of the Dean of Advising and Co-Curricular Programs for disability verification and for determination of reasonable academic accommodations.

Expectations

Academic Integrity. To maintain the scholarly standards of the College and, equally important, the personal ethical standards of our students, it is essential that written assignments be a student's own work, just as is expected in examinations and class participation. A student who commits academic dishonesty is subject to a range of penalties, including suspension or expulsion. Finally, the underlying principle is one of intellectual honesty. If a person is to have self-respect and the respect of others, all work must be his/her own.

Any student found responsible of academic dishonesty **will receive a grade of F in the course** and disciplinary action according to the procedure outlined in Student Handbook.

Attendance. Lecture is the longest stretch of time each week in which you have access to an interactive learning resource (i.e. me). As such, lecture is arguably the most valuable aspect of the course and you are expected to not only attend class, but to also actively engage with the material (e.g. ask questions, contribute answers, etc.). Cell phones and other distractions should either be left at home or be silenced and remain stored your bag. If you find yourself unable to attend the lecture, please contact me in advance, if possible, to see what you will miss.

Federal Credit Hour Requirement

The student work in this course is in full compliance with the federal definition of a four credit hour course. Please see the Registrar's Office web site

`http://registrar.lafayette.edu/additional-resources/cep-course-proposal`

for the full policy and practice statement.

Schedule

Below is a tentative schedule for the course.

Class Number	Date	Section(s)	Material
1	7/1	1.4/1.5	Tangents, velocities, and the need for limits.
		1.6	Limit laws
2	7/2	1.8	Continuity
		2.1	Definition of the derivative
3	7/3	2.2	The derivative as a function
4	7/4	2.3	Product and quotient rules
		2.4	Derivatives of trigonometric functions
5	7/5	2.5	The chain rule
6	7/8		Exam 1
7	7/9	2.6	Implicit Differentiation
8	7/10	2.8	Related Rates
9	7/11	2.9	Linear approximations and differentials
10	7/12	3.2	The Mean Value Theorem
11	7/15	3.3	Derivatives and the shape of a graph
12	7/16	3.4	Horizontal asymptotes
13	7/17	3.5	Curve sketching
14	7/18	3.5	
15	7/19	3.1	Extrema on closed intervals
16	7/22	3.7	Optimization
17	7/23	3.7	
18	7/24		Exam 2
19	7/25	4.1	Area and distance

20	7/26	4.2	The definite integral
21	7/29	3.9/4.3	Antiderivatives and The Fundamental Theorem of Calculus
22	7/30	4.3	
23	7/31	4.4	Indefinite Integrals and Net Change
24	8/1	4.5	The Substitution Rule
25	8/2		Exam 3
26	8/5	6.1	Inverse Functions
27	8/6	6.2	Exponential functions and their derivatives
28	8/7	6.3	Logarithmic Functions
29	8/8	6.4	Calculus and Logarithms
30	8/9		Final Exam