**MATH 166-01 (Calculus I)** **Summer 2017**

**Meetings:** MTuWThF 9:00-12:00
**Classroom:** 318 North Hall
**Office Hours:** 8:30 A.M. daily
Also by appointment

**Instructor:** Keith Nabb
**Office:** 206F North Hall
**E-mail:** keith.nabb@uwrf.edu
**Phone:** 715-425-3909

**Materials:** *Calculus*, 8th Ed., James Stewart
Graphing Calculator (e.g., TI 83/84 series)

**Description:** This course provides a thorough treatment of differential calculus, including functions, limits, continuity, the derivative, rules of differentiation, and implicit differentiation, as well as applications to graphing, optimization, and related rates. The course concludes with an introduction to integral calculus, including anti-derivatives, the definite integral, the Fundamental Theorem of Calculus, and its application to finding areas and volumes. Prerequisite: MATH 147, or 149, or four years of above-average work in college-prep mathematics, including one semester of trigonometry and a suitable mathematics placement test score.

**How the class will run:** Prior to most class meetings, you will be provided a short set of notes to read. This will serve as your "foundation" for class that day. Please read it carefully and arrive to class with any questions. You will then engage in solving a problem in your group/pair. Once the problem is solved, a group or two will present their results to the class. We might use whiteboards/easels/document cameras as a means to present problems to the class. Depending on the nature and difficulty of the problems, we'll have opportunities to solve/discuss many problems in a classroom period.

**Classroom Record:** Because of the format of this class, "taking notes" is not as important as understanding and making meaning of the content you see in class. At the end of each class, you will have a detailed record of what happened in class; I will post (1) the pre-class reading, (2) the problems posed in class, (3) the solution(s) presented by your classmates, and (oftentimes) (4) a reflection on what was learned.

**Course Grade:**

(a) Grades will be assigned according to the following scale:

| Average | Grade |
|---|---|
| 90 or above | A |
| 80-89 | B |
| 70-79 | C |
| 60-69 | D |
| 59 or below | F |

I may assign a "plus" grade (e.g., B+) for grades close to the border. I may also raise your grade by a letter if it is determined that your final grade is a poor indicator of what you learned.

(b) Attendance and active participation are very important. Each time your group presents to the class, a group grade will be assigned. The amalgam of these grades will count for 25% of your grade. Note: As for strict attendance, you are allowed to miss one class without penalty. After this, you will lose a percentage point for each class missed (e.g., final average of 82% + 5 missed classes = 82 – 4 = 78%). Note: *Individual* absences in no way impact grades given to a *group*.

(c) Fridays: We will have a short review followed by a test each Friday. We will then have a short break and cover one section of content. Three tests will count for 25% of your grade. No make-ups are granted.

(d) There will be one assigned project during the course of the semester. We will discuss the nature of this project in class. The project is worth 15% of the term grade. The pair with the "best" project will be awarded a ridiculously cool math T-shirt.

(e) At the end of most classroom meetings, a group will be assigned to "reflect" on the day's events. Questions to think about include, *What was the objective of this lesson? What was difficult or straightforward? Why might today's material be important moving forward?* I'll submit Reflection #1 to provide a reference for future reflections. Reflections are worth 10% of the term grade.

(f) There will be a comprehensive Final Exam worth 25% of the term grade. The Final Exam will take place on the final Friday meeting, June 16.

**Math Center:** The math help center is located in 145 North Hall. Drop in during their regular hours for extra help.

**Academic Integrity:** For any instances of academic misconduct (plagiarism, copying, using notes/formulas when not allowed, etc.) the office of Student Conduct and Community Standards will be called upon for assistance.

**Wisconsin Content and Teacher Standards:** Refer to the webpage https://www.uwrf.edu/MATH/WisconsinContentTeacherStandardsMathematicsCourses.cfm for the standards addressed in this course.

**Learning Environment:** The UWRF promotes safe, inclusive and effective learning environments that protect the rights and support the interests of both students and faculty. For additional information regarding our inclusivity expectations, academic accommodations, academic conduct expectations and processes, and other syllabi information, please consult http://go.uwrf.edu/Syllabi.

1. The University of Wisconsin-River Falls strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment. If you have concerns about such behavior, contact your instructor, the Office of Student Conduct and Community Standards at 715-425-0720, or the Office of Equity, Diversity, and Inclusion at 715-425-3833. For a list of prohibited behaviors and protected classes or to report something that is inappropriate

using an online process, please use this form: http://www.uwrf.edu/EquityDiversityInclusion/incident.cfm.

2. The University of Wisconsin-River Falls welcomes students with disabilities into its educational programs, activities, residential halls, and everything else it offers. Those who will need academic adjustments or accommodations for a disability should contact the Ability Services Office. Decisions to allow adjustments and accommodations are made by the Ability Services Office on the basis of clinical documentation that students provide to sufficiently indicate the nature of their situation.

**Course Outline:**

**I. Limits and Continuity**

A. Numerical and graphical meaning of a limit
B. Infinite limits and vertical asymptotes
C. Continuity and its applications
D. Limits at infinity and horizontal asymptotes

**II. Derivatives**

A. Derivative concept numerically, graphically and in context
B. Limit definition of the derivative
C. Derivative as a function concept graphically
D. Differentiation Rules
E. Derivatives of trigonometric functions
F. Implicit Differentiation

**III. Applications of Derivatives**

A. The derivative as the slope of a tangent line
B. The derivative as instantaneous rate of change, including problems of motion
C. Related rates problems
D. Linear approximations and differentials
E. How derivatives affect the shape of a graph
F. Extreme Value Theorem
G. Optimization in the natural sciences, business and engineering

**IV. The Integral**

A. Anti-derivatives and the indefinite integral
B. Integral concept numerically, graphically and in context
C. The approximation of integrals with Riemann Sums
D. The limit definition of the definite integral
E. The Fundamental Theorem of Calculus
F. Properties of definite integrals
G. Integration by substitution

**V. Applications of Integrals**

A. Area between curves
B. Volume by revolution

**Course Calendar:** The schedule that follows is tentative and may be adjusted during the semester to accommodate the needs of the course.

| **Week No.** | **Topics Covered** |
|---|---|
| 1/May 22 | Syllabus, Group Assignments, Problem Solving/Prerequisites, 1.4 (Tangent and Velocity Problems), 1.5 (Limit of A Function), 1.6 (Using Limit Laws), 1.8 (Continuity), 2.1 (Rate of Change), 2.2 (Derivative as Function), 2.3 (Differentiation Rules), **Test 1**, 2.4 (Trigonometry)<br>**Brainstorm Semester Project** |
| 2/May 30 | **No Class on Monday May 29**, 2.5 (Chain Rule), 2.6 (Implicit Differentiation), 2.7 (Applications), 2.8 (Related Rates), 2.9 (Linear Approximation & Differentials), 3.1 (Minimum and Maximum Values), **Test 2**, 3.2 (Mean Value Theorem)<br>**Have Semester Project Topic Selected** |
| 3/June 5 | 3.3 (How Derivatives Affect the Shape of a Graph), 3.4 (Limits at Infinity, Horizontal Asymptotes), 3.5 (Summary of Curve Sketching), 3.7 (Optimization), 3.8 (Newton's Method), 3.9 (Antiderivatives), 4.1 (Area & Distance), 4.2 (The Definite Integral), **Test 3**, More on 4.2 (The Definite Integral) |
| 4/June 12 | 4.3 (Fundamental Theorem of Calculus), 4.4 (Indefinite Integrals, Net Change), 4.5 (Substitution), 5.1 (Area Between Curves), 5.2 (Volume), 5.3 (Volume by Shells), review, **Final Examination**<br>**Semester Project Due (Any day this week)** |