

# MA161 – Calculus 11

*Dr. Stefan Ehrlich*

*Graduate Computer Science / Mathematics Department  
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**Contact Info:**

Phone: 603-888-1311x8531  
Office: Sylvia Trottier - 313  
Email: [sehrlich@rivier.edu](mailto:sehrlich@rivier.edu)

**Text:**

Calculus  
Hughes-Hallett, 2005  
John Wiley and Sons, Fourth Edition

**Office Hours:**

Monday 2:00- 3:30  
Tuesday 1:30-2:30, 4:00-6:00  
Thursday: 1:30-2:30, 4:00 – 5:30

**Brief Course Description:**

Calculus 11 introduces the student to a new class of problems within the realm of integral calculus.

The first involves a study of techniques of integration that are applicable in many instances when the antiderivative is not relatively obvious. This directly leads into finding more efficient ways to analytically and numerically find the area between functions. This includes cases where the interval of integration is infinite or points where the value of the function is infinity.

The second involves determining infinite series for transcendental functions by which they are evaluated. Examples used include:  $e^x$ ,  $\ln(x)$ , and  $\sin x$ . A study of sequences is a precursor to this material.

Finally, an introduction to differential equations is presented with appropriate applications.

**Course Objectives:**

This course has been designed with one overriding goal in mind:

the extension of topics covered in a standard Calculus 1 course to a full treatment of integral calculus concepts

A solid understanding of these topics is essential for further study in the field of mathematical analysis

**Classroom Policies:**

Students are expected to attend and participate in all classes. Attendance is taken at the beginning of each period. Please notify the instructor in advance of any anticipated absence whenever possible. It is your responsibility to make up any material missed whenever you are absent. Assignments are related to material covered in class. The homework problems are always covered in a timely fashion and questions about the problems should be raised at the next class meeting. The study of mathematics/computer science requires regular work and plenty of practice. Postponed homework usually results in poor comprehension and performance.

### **Teaching Strategies:**

Lecture format, with numerous examples chosen to illustrate theoretical concepts. Lots of drill with emphasis on practice, practice, and more practice. Questions are encouraged and discussion of material stressed.

### **Course Requirements and Grading Policies:**

Students will be evaluated based on two midterms, a set of homework assignments, and a final exam as follows:

Midterms - 40%      Homework Assignments – 20%      Final - 40%

All tests are closed book and the final is comprehensive. The results will be converted to a letter grade in keeping with grading policies of the college.

### **Material Covered:**

1. Techniques of Integration
  - Analytic Integration by
    - Substitution
    - Parts
    - Partial Fractions
    - Trigometric Substitution
  - Numerical Integration by
    - Rectangular Rule
    - Trapezoid Rule
    - Simpson's Rule
  - Improper Integrals
    - Type 1
    - Type 2
2. Computing Areas and Parameters of a Curve
  - Vertical Rectangles
  - Horizontal Rectangles
  - Arc Length
  - Curvature
3. Sequences Series and Approximating Functions
  - Sequences
  - Geometric Series
  - Convergence of Series
  - Power Series
  - Taylor Series

#### 4. Differential Equations

What is a Differential Equation

Analytic Solution- Separation of Variables

Numerical Solution- Euler's Method

Applications