



## § I: MATH 6610 Fundamentals of Calculus Syllabus

### Catalog Description

Prerequisite: MATH 1115 (Pre-Calculus mathematics) or equivalent. Review of algebra and trigonometric functions. Topics from calculus include differentiation and integration methods applied to problems in science, business, and the social sciences. A review of series. 3 credits.

### Required Textbook

*Calculus for Scientists and Engineers*, Briggs, Cochran, Gillett. Pearson, 2e, ISBN 9780321826718 (2013).

### Course Objectives

The course MATH 6610 provides an introduction to the foundations of differential and integral Calculus emphasizing the role of derivatives and integrals in many applications. Aside from providing many differentiation and integration methods, the student is introduced to many geometric and physical applications. The course aims to provide an overview of both differential and integral Calculus which will include equally weighted amounts of foundational theory, applications of the tools that we develop, and an understanding of each problem or concept within general mathematics. In addition, differential equations, sequences, power series, and Taylor series will be introduced.

### Student Learning Outcomes

Upon successful completion of the course the student will

1. Have a working knowledge of how limits are used to create both derivatives and integrals as mathematical tools;
2. Be Proficient in the calculation of derivatives using a variety of tools;
3. Have knowledge of the many applications of derivatives across several fields of physical science;
4. Be able to Examine the components of a moving object using the definite integral.
5. Calculate areas between curves using definite integrals;
6. Compute volumes of solids generated from curves using definite integrals;
7. Solve physical problems using integration techniques;
8. Solve elementary differential equations;
9. Create the Taylor Series of basic functions;
10. Assess the convergence and divergence of power series.

### Required Curriculum Content

This course introduces important mathematical concepts that are useful in engineering sciences. Topics covered include: Rules of differentiation, related rates, applications of the derivative and optimization problems, methods of integration, applications of the integral, improper integrals, differential equations, and an introduction to infinite series.

All sections of MATH 6610 Fundamentals of Calculus will cover, as a minimum, the material from *Calculus for Scientists and Engineers*, Briggs, Cochran, Gillett. Pearson, 2e, ISBN 9780321826718 (2013), as listed:

Chapter	Textbook Topic
1.1	Functions Review of functions

Chapter	Textbook Topic
1.2	Representing functions
1.3	Trigonometric functions and their inverses
2	<b>Limits</b>
2.1	The idea of limits
2.2	Definitions of limits
2.3	Techniques for computing limits
2.4	Infinite limits
2.5	Limits at infinity
2.6	Continuity
3	<b>Derivatives</b>
3.1	Introducing the derivative
3.2	Rules of differentiation
3.3	The product and quotient rules
3.5	Derivatives as rates of change
3.6	The Chain Rule
3.7	Implicit differentiation
3.8	Derivatives of logarithmic and exponential functions
4	<b>Applications of the Derivative</b>
4.1	Maxima and minima
4.4	Optimization problems
4.5	Linear approximation and differentials
4.6	Mean Value Theorem
4.9	Antiderivatives
5	<b>Integration</b>
5.2	Definite integrals
5.3	Fundamental Theorem of Calculus
5.4	Working with integrals
5.5	Substitution rule
6	<b>Applications of Integration</b>
6.1	Velocity and net change
6.2	Regions between curves
6.3	Volume by slicing
6.4	Volume by shells
7	<b>Logarithmic and Exponential Functions</b>
7.2	The natural logarithm and exponential functions
7.4	Exponential models
8	<b>Integration Techniques</b>
8.1	Basic approaches
8.2	Integration by parts
8.4	Trigonometric substitutions
8.7	Numerical integration
8.8	Improper integrals
9	<b>Differential Equations</b>
9.1	Basic ideas
9.3	Separable differential equations
9.4	Special first-order differential equations
9.5	Modeling with differential equations

Chapter	Textbook Topic
10	<b>Sequences and Infinite Series</b>
10.2	Sequences
10.3	Infinite series
10.6	Alternating series
11	<b>Power Series</b>
11.2	Properties of power series
11.3	Taylor series
11.4	Working with Taylor series
12	<b>Parametric and Polar Curves</b>
12.1	Parametric equations
12.2	Polar coordinates

### Common Department Requirements for MATH 6610

While students in each section of MATH 6610 are assessed by the course instructor, there are general guidelines that apply to all sections of MATH 6610. These include:

- Calculators and other electronic devices are not allowed on any exams.

## Department, College and University Expectations and Policies

It is important that students familiarize themselves with a range of policies and guidelines that have been established by the Department of Mathematics and Physics, the College of Arts and Sciences, and the University of New Haven. These are an integral part of the syllabus for this course.

### Adding/Dropping a Class

The final day to drop a course without it appearing on your transcript is Tuesday, December 4, as discussed at <http://www.newhaven.edu/academics/calendar>. During the second week of classes, further adjustment requires the approval of the chair of the department offering the course, as described at <http://catalog.newhaven.edu/content.php?catoid=7&navoid=730#Changes>.

### Attendance Regulations

University attendance policy guidelines require that:

All students are expected to attend regularly and promptly all their classes, appointments, and exercises. While the university recognizes that some absences may occasionally be necessary, these should be held to a minimum. A maximum of two weeks of absences will be permitted for illness and emergencies. The instructor has the right to dismiss from class any student who has been absent more than the maximum allowed. After the last date to drop as published in the academic calendar, a student will receive a failure (F), if failing at that point, or a W, if passing at the time of dismissal.

Students are to adhere to the policy attendance policy guidelines outlined in the University Catalog under the heading, *Attendance Regulations*, at [http://catalog.newhaven.edu/content.php?catoid=12&navoid=881#Academic\\_Status\\_and\\_Progress](http://catalog.newhaven.edu/content.php?catoid=12&navoid=881#Academic_Status_and_Progress), or alternatively in the Student Handbook at <http://www.newhaven.edu/studenthandbook> on pp. 48-49, i.e., at <http://viewer.zmags.com/publication/bc83d17d#/bc83d17d/48>.

### Withdrawal Deadline

Students wishing to withdraw must submit a request for an official course withdrawal in writing using the Course Withdrawal Form available online from <http://forms.newhaven.edu/view.php?id=134169>. The final date to request a withdrawal is Tuesday, October 30 listed in <http://www.newhaven.edu/academics/schedules-registration/academic-calendar-2017-2018.php>. This request must be submitted to the Registrar's Office and signed by the International Office if you are an international student. The grade of W will be recorded, but the course will not affect the GPA.<sup>1</sup>

### Incomplete Grades

A grade of Incomplete (INC) is given only in special circumstances and indicates that the student has been given permission by the instructor to complete required course work (with the same instructor) after the end of the term. Students need to examine carefully the **changed guidelines** pertaining to INC grades, specifically:

To remove the INC grade, the student must complete all required course work in timely fashion as stipulated by the instructor but no later than the end of the following term. Fall and intersession course incompletes must be completed no later than the last day of the spring term. Spring and summer course incompletes must be completed no later than the last day of the fall term.

If the course work is not submitted within the allotted time, the INC grade will be changed to an F shortly after the deadline by the Office of the University Registrar. Students will be notified via campus email at least two weeks prior to the change of grade process.

The University policy on incomplete grades is available at [http://catalog.newhaven.edu/content.php?catoid=12&navoid=881#Academic\\_Status\\_and\\_Progress](http://catalog.newhaven.edu/content.php?catoid=12&navoid=881#Academic_Status_and_Progress) under the heading, *Incomplete (INC) Grade Policy*.

<sup>1</sup> Please note that this withdrawal deadline represents a **significant policy change**. It is the responsibility of the student to assure that the required paperwork and documentation is completed by the deadline.

## Academic Integrity Policy

This class fully adheres to the Academic Integrity Policy:

Academic integrity is a core university value that ensures respect for the academic reputation of the University, its students, faculty and staff, and the degrees it confers. The University expects that students will conduct themselves in an honest and ethical manner and respect the intellectual work of others. Please be familiar with the UNH policy on Academic Integrity. Please ask about my expectations regarding permissible or encouraged forms of student collaboration if they are unclear.

Students are required to adhere to the Academic Integrity Policies specified in the Student Handbook on pp. 66–73 of <http://www.newhaven.edu/studenthandbook>, i.e., at <http://viewer.zmags.com/publication/bc83d17d#bc83d17d/66>.

## Coursework Expectations

This course will require significant in-class and out-of-class commitment from each student. The University estimates that a student should expect to spend two hours outside of class for each hour they are in a class. For example, a three credit course would average six [6] hours of additional work outside of class.<sup>2</sup> Coursework expectations are detailed at [http://catalog.newhaven.edu/content.php?catoid=12&navoid=881#General\\_Policies](http://catalog.newhaven.edu/content.php?catoid=12&navoid=881#General_Policies) under the heading *Course Work Expectations*.

Please note, that MATH 6610 is a 3-credit course, and as such requires a total of 9 hours per week invested in study and homework for the average student.

## Commitment to Positive Learning Environment

The University of New Haven wants to foster and support a civil, respectful, and open-minded climate so that all of us can live and work in an environment free of harassment, bias-motivated behaviors, unfair treatment, and fear. To this end, the university expects all members of our community to refrain from actions or behaviors that intimidate, humiliate, or demean persons or groups or that undermine their security or self-esteem based on traits related to race, ethnicity, country of origin, religion, gender identity/expression, sexual orientation, age, or physical or mental ability, including learning and/or developmental disabilities and past/present history of mental disorder or other category protected by state or federal law. If you have witnessed or are the target of a bias-motivated incident, please contact the Office of the Dean of Students at 203-932-7432 or Campus Police at 203-932-7014 or fill out the form at <http://www.newhaven.edu/student-life/report-it>.

The University adheres to the philosophy that all community members should enjoy an environment free of any form of harassment, sexual misconduct, discrimination, or intimate partner violence. If you have been the victim of sexual misconduct we encourage you to report this. If you report this to a faculty/staff member, they must notify our college's Title IX coordinator about the basic facts of the incident (you may choose to request confidentiality from the University). If you encounter sexual harassment, sexual misconduct, sexual assault, or discrimination based on race, color, religion, age, national origin, ancestry, sex, sexual orientation, gender identity, or disability please contact the Title IX Coordinator, Caroline Koziatek at (203)-932-7479 or [CKoziatek@newhaven.edu](mailto:CKoziatek@newhaven.edu). Further information about Title IX at UNH may be found at <http://www.newhaven.edu/about/title-ix.php/>.

## Religious Observance Policy for Students

The University of New Haven respects the right of its students to observe religious holidays that may necessitate their absence from class or from other required university-sponsored activities. Students who wish to observe such holidays should not be penalized for their absence, although in academic courses they are responsible for making up missed work. More information about religious observance policies can be found in the Student Handbook on p.48 at <http://viewer.zmags.com/publication/bc83d17d#bc83d17d/48>.

More information about religious observance policies can be found in the Student Handbook, and there is also a separate handbook for International students at <https://www.newhaven.edu/student-life/international-service>

<sup>2</sup> Please note that study guidelines are important, i.e., there is substantial evidence that shows that the pass rates for students in math courses decrease dramatically as the time spent on outside study falls below 2 hours of homework per credit per week.

[index.php](#).

## University Support Services

The University recognizes students often can use some help outside of class and offers academic assistance through several offices. In addition to discussing any academic issues you may have with your instructor, advisor, or with the the courses or department coordinator or chair, the University provides these additional resources for students:

### The Academic Success Center

<http://www.newhaven.edu/AcademicSuccess>, located in Maxcy 208 for help with your academic studies, or call 203.932.7234 to set up an appointment.

### The Center for Learning Resources (CLR)

<http://www.newhaven.edu/academics/CLR>. located in Peterson Library, provides academic content support to the students of the University of New Haven using metacognitive strategies that help students become aware of and learn to apply optimal learning processes in the pursuit of creating independent learners CLR tutors focus sessions on discussions of concepts and processes and typically use external examples to help students grasp and apply the material.

### Writer to Writer

<http://www.newhaven.edu/writertowriter/> is a peer-tutoring program inspired by the belief that all writers struggle and can benefit from talking through their ideas. Tutors are undergraduate students trained to work with you at any stage in the writing process.

### Accessibility Resources Center

<http://www.newhaven.edu/student-life/accessibility-resources-center/index.php>. Students with disabilities are encouraged to share, in confidence, information about needed specific course accommodations. The Accessibility Resources Center (ARC) provides comprehensive services and support that serve to promote educational equity and ensure that students are able to participate in the opportunities available at the University of New Haven. Accommodations cannot be made without written documentation from the ARC. The ARC is located on the ground floor in the rear of Sheffield Hall. Sheffield Hall is located in the Residential Quad area, and can be contacted at 203-932-7332. The ADA/Section 504 Compliance Officer is Rebecca Johnson, [RJohnson@newhaven.edu](mailto:RJohnson@newhaven.edu), and can be reached by phone at 203-932-7238. Information on the ARC can be found at