SYLLABUS FOR MATH 1401 (Fall 2012)

*Calculus 1 for Science Majors*

**Prerequisite:** Math 1015 or appropriate placement.

**INSTRUCTOR:** Bert G. Wachsmuth  
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**CLASS MEETINGS**: MWF 8:30am – 9:45am

**OFFICE HOURS**: MW 10am – 11am and by appointment  
 Office: Science Hall 118 D (formerly McNulty Hall)

**TEXT:** James Stewart’s *Essential Calculus* (2nd SHU custom edition available in Bookstore)

In addition we will make use of a computer algebra system, either Maple or Wolfram Alpha, or maybe both. You should visit the CH Help Desk to obtain the latest version of Maple. Wolfram Alpha will be available for free through their web interface at <http://www.wolframalpha.com/>

**COURSE CATALOGUE DESCRIPTION:** Real numbers, functions, elements of plane analytic geometry, limits, continuity, derivatives, differentiation of algebraic functions, applications of the derivative, antiderivatives, definite integral and Fundamental Theorem of Calculus. Applications using computer software packages. 4 *credits*

**PLAGIARISM & CHEATING*:*** Misrepresentation of someone else’s work as one’s own is a grave violation of academic ethics. This includes all graded assignments and examinations. Any material that is not your own work needs to be properly indicated and cited. This includes any work produced together with fellow students. You MUST indicate any sources of help outside of the course text(s) and your own work, including the names of students with whom you worked, internet resources or other sources of help. Failure to do so constitutes a violation of academic integrity (see below). When in doubt, cite or ask your instructor.

**STUDENTS WITH DISABILITIES:** It is the policy and practice of Seton Hall University to promote inclusive learning environments. If you have a documented disability you may be eligible for reasonable accommodations in compliance with University policy, the Americans with Disabilities Act, Section 504 of the Rehabilitation Act, and/or the New Jersey Law against Discrimination. Please note, students are not permitted to negotiate accommodations directly with professors. To request accommodations or assistance, please self-identify with the Office for Disability Support Services (DSS), Duffy Hall, Room 67 at the beginning of the semester. For more information or to register for services, contact DSS at (973) 313-6003 or by e-mail at [DSS@shu.edu](mailto:DSS@shu.edu). **Link to Disability Policy -** <http://www.shu.edu/offices/disability-support-services/faculty-syllabus-statement.cfm>

**GRADE:** The grade is determined by the following scores:

* Tests: 300 points
* Final exam: 100 points
* Quizzes: 100 points
* Computer: 100 points

Please note that homework will be assigned daily but not collected. Instead we have regular short quizzes at least once per week, which will contain questions similar to homework questions. I will drop the worst two quiz scores automatically. There are no make-up exams or quizzes unless a student is seriously ill.

**OVERVIEW:** This course will stress both theoretical concerns of calculus and real-world applications.

**OBJECTIVES:**

* To acquaint the student with many concepts of differential calculus and their important applications through algorithmic techniques and/or computer usage.
* To introduce the student to basic mathematical proof, including proof by induction.
* Competency in the mathematical material in the course will be assessed through tests and final examination as well as daily homework assignments, some of which will be collected for grading.
* Competency in Information Technology will be enhanced by the use of a Computer Algebra System for some “number crunching” and visualization.
* While theory and applications are both important, the 1401 course places a greater emphasis on real-world applications, while the 1501 course places a greater emphasis on theoretical concerns, including proof by induction.

**OTHER NOTES:** It is expected that all work submitted by students is their own. Any type of plagiarism or cheating could result in a reduction in grade or formal disciplinary actions depending on the severity and the specific policy of the instructor.

**Course material**:

# Chapter 1: FUNCTIONS AND LIMITS

* 1. Functions and Their Representations (\*)
  2. A Catalog of Essential Functions (#)

1.3 The Limit of a Function

1.4 Calculating Limits

1.5 Continuity

1.6 Limits involving infinity

**Chapter 2: DERIVATIVES**

2.1 Derivatives and Rates of Change

2.2 The Derivative as a Function

2.3 Basic Differentiation Formulas

2.4 The Product and Quotient Rules

2.5 The Chain Rule

2.6 Implicit Differentiation

2.7 Related Rates

**Chapter 3: Inverse Functions (**Exponential, Logarithmic, and Inverse Trig Functions)

3.1 Exponential Functions

3.2 Inverse Functions and Logarithms

3.3 Derivatives of Logarithmic and Exponential Functions

3.4 Exponential Growth and Decay

3.5 Inverse Trigonometric Functions

3.6. Hyperbolic Functions

3.7. Indeterminate Forms and L’Hospital’s Rule

**Chapter 4: Applications of Differentiation**

4.1 Maximum and Minimum Values

4.2 The Mean Value of Theorem

4.3 Derivatives and the Shape of a Graph

4.4 Curve Sketching

# 4.5 Optimization Problems

4.6 Newton’s Method

4.7 Antiderivatives

**Chapter 5: Integrals**

5.1 Areas and Distances

5.2 The Definite Integral

5.3 Evaluating Definite Integrals (\*)

5.4 The Fundamental Theorem of Calculus

5.5 The Substitution Rule