



Department of Mathematics
Johns Hopkins University

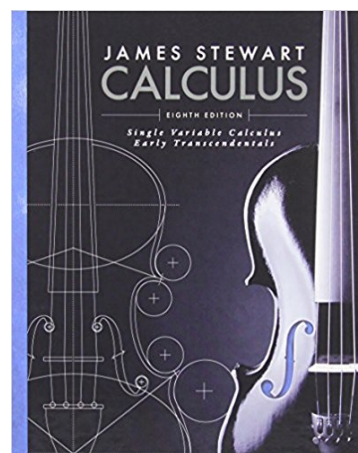
110.108 Calculus I (Phys. Sci. & Eng.) **Course Syllabus**

The following list of topics is considered the core content for the course 110.108 Calculus I (Physical Sciences and Engineering). The current text for the course is:

Text: Single Variable Calculus: Early Transcendentals, 8th Edition, James Stewart, Brooks-Cole, February 2015, ISBN-10: 1305270339, ISBN-13: 978-1305270336.

Course Topics

- **Review basic properties of Functions (1- weeks)**
 - Chapter 1
- **Limits (1+ weeks)**
 - 2.1 The Tangent and Velocity Problem
 - 2.2 The Limit of a Function
 - 2.3 Calculating Limits Using the Limit Laws
 - 2.4 The Precise Definition of limit
 - 2.5 Continuity
 - 2.6 Limits at Infinity: Horizontal Asymptotes
- **Derivatives (5- weeks)**
 - 2.7 Derivatives and Rates of Change
 - 2.8 The Derivative of a Function
 - 3.1 Derivatives of Polynomial and Exponential Functions
 - 3.2 The Product and Quotient Rules
 - 3.3 Derivatives of Trigonometric Functions
 - 3.4 The Chain Rule
 - 3.5 Implicit Differentiation
 - 3.6 Derivatives of Logarithmic Functions
 - 3.9 Related Rates
 - 3.10 Linear Approximations and Differentials
 - [Optional] 3.11 Hyperbolic Functions
- **Applications of the Derivative (2 weeks)**
 - 4.1 Maximum and Minimum Values
 - 4.2 The Mean value Theorem
 - 4.3 How Derivatives Affect the Shape of a Graph
 - 4.4 Indeterminate Forms and L'Hospital's Rule
 - 4.7 Optimization Problems
 - [Optional] 4.8 Newton's Method
- **Integration (2 weeks)**
 - 4.9 Antiderivatives
 - 5.1 Areas and Distances
 - 5.2 The Definite Integral
 - 5.3 The Fundamental Theorem of Calculus
 - 5.4 Indefinite Integrals and the Net Change Theorem
 - 5.5 The Substitution Rule





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- **Applications of the Integral (1+ week)**
 - 6.1 Areas between Curves
 - 6.2 Volumes
 - 6.3 Volumes of Cylindrical Solids
 - 6.5 Average Value of a Function
 - 8.1 Arc Length
 - 8.2 Area of a surface of Revolution