

**Istituto Lorenzo de' Medici**

**2019 Summer Program**

**MATH 111 Calculus 1**

**Course Outline**

**Term: June 17-July 19, 2019**

**Class Hours: 16:00 - 17:50PM (Monday through Friday)**

**Course Code: MATH 111**

**Instructor: TBA**

**Office Hours: TBA**

**Email: TBA**

**Credit: 4**

**Class Hours:** This course will have 72 class hours, including 40 lecture hours, professor 10 office hours, 10-hour TA discussion sessions, 2-hour review sessions, 10-hour extra classes.

**Course Description:**

This is the first course in calculus for engineers, physicists, computer scientists, and mathematicians.

The goal is for students to build a solid understanding of fundamental concepts such as sequences, functions, limits, continuity, differentiability, and basics of integration.

Calculus studies the limiting behavior of functions. Functions themselves are among the most important discoveries in history, because they describe the dependence of objects and phenomena in nature. Most functions of interest exhibit a rather regular behavior which makes it possible to understand their infinitesimal properties. This enables us to describe the nature and predict its behavior.

The proper understanding of calculus plays a crucial role in careers of mathematicians, physicists, economists, engineers, programmers, and in recent years biologists and other life scientists. This course will teach students how to think and to understand the reasons behind formulas. The calculus will give meaning to the future courses and life.

**Required Textbooks:**

*Stewart: Calculus – Early Transcendentals*

**Grading & Evaluation:**

Homework and quizzes: 30%  
Midterm: 30%  
Final: 40%

**Course Schedule:**

**Week 1:**

Session 1: Four Ways to Represent a Function; Mathematical Models  
Sessions2: New Functions from Old Functions; Exponential Functions  
Session 3: Logarithmic functions; Tangents and Velocity; The Limit of a Function

**Week 2:**

Session 1: Using Limit Laws; Continuity; Limits at Infinity: Horizontal Asymptotes  
Session 2: Derivatives and Rates of Change; The Derivative as a Function; Derivatives of Polynomials and Exponential Functions  
Session 3: The Product and Quotient Rules; Derivatives of Trigonometric Functions

**Week 3:**

Session 1: The Chain Rule; Implicit Differentiation  
Session 2: Derivatives of Logarithmic functions  
Session 3: Rates of Change; Related Rates

**Week 4:**

Session 1: Linear Approximation and Differentials; Maximum and Minimum Values; How Derivatives Affect the Shape of a Graph  
Session 2: Indeterminate Values and L'Hospital's Rule; Curve Sketching  
Session 3: Optimization Problems; Newton's Method; Antiderivatives

**Week 5:**

Session 1: Areas and Distances

Session 2: The Definite Integral

Session 3: The Fundamental Theorem of Calculus