Math Camp 2019

September 3rd – 13th, 2019 | 9 AM - 12 PM | EDUC334

Instructors:
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Overview
The primary purpose of the Math Camp is to review mathematical concepts and tools that are needed for a host of Stanford courses that teach statistical and econometric methods, both within the Graduate School of Education and in other departments (e.g., Economics, Political Science and Sociology).

The camp will be held over two weeks. The first week will focus on foundational concepts in mathematics and software packages, while the second week will cover introductory statistics. All students are welcome to attend any part of Math Camp that they feel would benefit them based on their background and needs. If you would like advice as to which day(s) or week(s) to attend, please consult with the instructors.

Requirements
Students will have readings to complete before each class and a problem set after each class. All students are expected to complete these assignments, as they are designed to give students a background on the concepts as well as practice on the material covered in class. Class time will consist of group work, problem sets and discussion. There are no quizzes or exams, and students will not receive a grade in Math Camp.

Textbooks
There are no required textbooks. We have developed a series of lectures that we hope can serve as a reference for students. These will be posted on the course website as the material is covered during Math Camp.

Class Meetings
The class will meet daily for nine sessions, each lasting three hours (9 AM to 12 PM). Class will incorporate both mini-lectures and small group problem-solving activities.

Office Hours
Instructors will hold office hours by appointment.

Math Camp Syllabus

Week 1: Foundational Concepts and Software Packages

Topic
Introduction to Quantitative Education Research ● Common Methods ● Course Sequences ● Less Common Methods ● Other Courses **Pre-Calculus & Limits** ● Linear Equations ● Quadratics ● Systems of equations ● Limits
Calculus ● Rates of change ● Intuiting the derivative ● Computing derivatives ● Applications of derivatives ● Area under a curve ● Intuiting integrals ● Computing integrals ● Definite and indefinite integrals ● The anti-derivative ● Applications of integrals
Linear Algebra ● Matrices and vectors ● Matrix mathematics ● Representing systems of equations ● Applications of linear algebra
Software Packages & Working with Data ● Statistical packages ● Programming languages ● Other useful software ● Working with large datasets ● Representing Data

Week 2: Introductory Statistics

Topic
Descriptive Statistics & Describing Distributions ● Quantitative/Categorical Data ● Graphical Representations ● Measures of Center ● Measures of Spread ● Frequency Tables
Linear Regression ● Least-Squares Regression ● Covariance ● Pearson's Correlation Coefficient (r) ● Coefficient of Determination (R^2) ● Residuals, Leverage (if time allows) ● Interpreting slope and intercept
Distributions, Standardized scores, Empirical Rule ● Normal Distribution ● Empirical Rule ● Student's t Distribution ● Standardized Scores
Statistical Tests ● 1 sample z/t test for means ● 1 sample z test for proportions ● 2 sample tests (if time allows)
Confidence Intervals ● 1 sample confidence intervals ● 2 sample confidence intervals (if time allows)