GE-F, Quantitative Reasoning

Courses that meet this requirement teach students to use a set of formal tools (such as logical or statistical inference, probability, or mathematical analysis) to pose and evaluate hypotheses, claims, questions, or problems within a formal mode of thought.

BUAD 310g, Applied Business Statistics

The Applied Business Statistics course (BUAD 310), which is offered by the Data Sciences and Operations Department at USC Marshall, is a quantitative reasoning course that focuses on empirical analysis and aims to increase students’ statistical literacy and their ability to perform statistical inference. BUAD 310 teaches students how to summarize, analyze, and interpret real-world data in a manner that will assist them in making decisions, particularly in business contexts. They learn to think critically about how statistics is used by others and how it impacts their day-to-day life and career.

BUAD 310 is a required class for all Marshall undergraduates. The classes are coordinated such that all instructors who teach the class adhere to a common syllabus, book, and set of course deliverables. The class is coordinated by Professor Jinchi Lv, who ensures that all faculty adhere to a common structure.

This course description has been provided by Professor Jinchi Lv.

ECON 203g, Principles in Microeconomics

Economics is the study of production and allocation of scarce resources, and how agents make decisions under conditions of scarcity and uncertainty. This course provides a rigorous introduction to economics, with special emphasis on microeconomics. It will introduce you to economics as a discipline and as a way of thinking. It will also provide you with a set of tools, which will be very useful in other economics courses.

We will first study the behavior of individual consumers and firms. Then we will give you some insight into how markets work and whether market outcomes are desirable. We will also look at situations in which the firm is a monopolist, or competes with a limited number of rivals. Some of the key concepts we will introduce include economic incentives, marginal analysis, opportunity cost (which costs matter), market efficiency (what does it mean for a market to work) and strategic behavior (how to predict and respond to your rivals’ decisions). The tools that you will be acquainted with in this class are fundamental for most upper division courses of the Economics major as well as classes in Finance, Accounting and Marketing.

This course description has been provided by Professor Mark Moore.

ECON 205g, Principles in Macroeconomics

The purpose of this course is to introduce the main concepts and terminology of macroeconomics and to learn how to apply the tools of economic analysis to “real world” questions. We start with the basic principles and tools of economic analysis. We then address questions such as the effect of taxation and subsidies and discuss the benefits of international trade and the issues associated with it. We then move on to learn how major economic indicators such as the Gross Domestic Product and Inflation are measured. Finally we address issues such as growth and development over time and between countries, the importance of the financial system, what determines unemployment and economic crisis and what can fiscal and monetary policy do about it.
Most importantly, my goal is that you and I have fun with this course. Macroeconomics is an exciting subject that studies some of the most important issues facing the world today.

This course description has been provided by Professor Mark Moore.

**HP 340Lg, Health Behavior Statistical Methods**

Throughout this class students will learn statistical methods to organize, summarize, and interpret health related behaviors. This course will familiarize students with different types of statistics, review the underlying assumptions, and teach students to critically review and understand statistical analysis used in health related fields. Students will also gain experience selecting and employing appropriate statistical procedures for data analysis in these areas.

**IR 211g, International Relations: Approaches to Research**

IR 211 is the complement to IR 210. This sequence of classes is required for all IR majors and for IR honors. The purpose of IR 211 is to introduce you to approaches toward research. International Relations is a diverse, multidisciplinary field of study. Our texts represent more than one social science in reflection of that reality. This course provides fundamental material about approaches to research while also conveying the need for skepticism as the foundation of scientific inquiry.

This course description has been provided by Professor Patrick James.

**LING 210g, Introduction to Linguistics**

Linguistics is the scientific study of language as it is represented in the human mind. In this course you will learn to examine language data in a systematic way in order to uncover abstract patterns and generalizations. We will explore some of the key representational tools that linguists use to analyze these patterns, generate predictions, and test hypotheses. The data that we consider will come from English and many other languages.

The major subfields of theoretical linguistics that this course will introduce you to are:

- Phonetics – the production and perception of speech sounds
- Phonology – the systematic organization of speech sounds
- Morphology – the structure of words
- Syntax – the structure of phrases and sentences
- Semantics – the meaning of words and phrases

We will also spend some time discussing how the abstract representation of language relates to child language acquisition, language change and language universals. All of these areas are connected, so we will revisit ideas from earlier in the course throughout the semester.

This course description has been provided by Professor Karen Jesney.

**LING 385Lg, Human Language as Computation**

Human Language is an incredibly complex natural system, allowing for the transmission of information between individuals and generations of our species through the highly structured hierarchical media of the word, the sentence, and discourse. The everyday task of conversing, which usually seems almost effortless, requires us to carry out highly complex mental computations, which scientists have started to understand through the use of various symbolic and statistical methods. In this course, you will learn about the complexity of these computations by learning the computer-based techniques used to analyze human languages, which also form the basis for many current technologies such as grammar-checking, dialogue systems, and semantic networks—technologies that are revolutionizing human-machine communication. The predictions of the theoretical models will be compared to sentences that you come up with as evidence for or against the theoretical
predictions, showing you how the scientific method is consistently applied through computational modeling and data collection. You will learn how sentences are computationally parsed using techniques developed by linguists and computer scientists. Students will also learn how techniques developed for linguistic computation involving a sequence of words have been adapted to expose the structure of other biological sequences like DNA base sequences and amino acid sequences, illustrating how computational techniques bridge the gap between disparate areas, a consistent theme in mathematically-based science.

*This course description has been provided by Professor Khalil Iskarous.*

**MATH 108g, Precalculus**

This course is meant to serve as a preparation for learning calculus. Special attention will therefore be given to understanding functions: what they are, why they are useful, and which types are encountered in calculus. We will also look at how to graph both functions and solutions of equations, and how to algebraically solve equations.

*This course description has been provided by Professor Larry Goldstein.*

**MATH 114xg, Foundations of Statistics**

Math 114 is an introduction to the basic tools of statistics. It covers descriptive statistics, probability, expected value, normal approximation, sampling, chance models and tests of significance. Students in this course learn to understand and analyze quantitative and statistical data and gain insight into how natural and social phenomenon are modeled. By use of statistical tests, students are trained how valid inferences are obtained from observation, experiment and data, the types of statistical errors, and the meaning of statistical significance.

*This course description has been provided by Professor Larry Goldstein.*

**MATH 117g, Introduction to Mathematics for Business and Economics**

This course constitutes a study of the notions of function and equality, with particular attention devoted to several special classes of functions that play fundamental roles in quantitative analyses in many of the natural and social sciences: polynomial, rational, exponential and logarithmic functions. We will also study matrix arithmetic and apply it to the solution of systems of linear equations and further topics as time permits.

*This course description has been provided by Professor Larry Goldstein.*

**MATH 118xg, Fundamental Principles of Calculus**

The main goal of this course is to give an introduction to the fundamental principles, methods, and tools of Calculus: we will cover single variable calculus and touch upon multivariable calculus. We will illustrate these concepts with examples from economics and business.

*This course description has been provided by Professor Larry Goldstein.*

**MATH 125g, Calculus I**

Differential and Integral Calculus is the study of limits, change, area and volume, with applications in the physical sciences, biology, and engineering. The study of calculus is the fundamental gateway for further exploration into advanced mathematics. Math 125 develops the fundamental mathematical concepts of calculus through logical derivations composed of chains of formal reasoning. Through the use of the rules of calculus on mathematical models describing phenomena
within its scope of application, students discover the utility of abstracting essential particulars of a situation so that logical tools can be subsequently applied.

This course description has been provided by Professor Larry Goldstein.

PSYC 240xg, Scientific Inquiry and Reasoning

This course addresses the inquiry and reasoning skills that are required to solve scientific problems in human behavior. Although focused on psychology, the material is broadly applicable to the study of behavior, and examples will include medical and other social science research. In order to clarify good design, the course also explains sources of error in common examples of nonscience, pseudoscience, psychobabble, and biobunk.

This course description has been provided by Professor Margaret Gatz.

PSYC 274g, Statistics

This course is only for a specified cohort of students.

This course teaches you how to use statistics in the context of research. We will complete exercises in formulating and testing hypotheses both by hand and with computer software (SPSS, R). We will cover the logic of hypothesis testing, including the merits and limitations of classic and more modern approaches. Topics to be covered include z-scores, one- and two-sample tests, one-factor and two-factor Analysis of Variance, between-subjects and repeated-measures designs, correlation, simple and multiple regression, effect size, confidence intervals, power and sample size, and nonparametric tests for categorical and ranked data.

This course description has been provided by Professor Ann Renken.

SSCI 135Lg, Numbers and Maps

This course explores all the ways in which maps are been used to compile, build and share knowledge of the world around us. The first maps appeared long ago and today maps are used extensively across the physical, life and social sciences as well as the humanities. Numbers and quantitative data feature prominently in the preparation of most maps and the overarching intent is to examine some of the ways in which formal reasoning, abstract representation, and empirical analysis are used to construct the maps that you see and use in a given field of study and in everyday life. The topics covered in this course will range from geodetic principles (the ways things are located and measured on the Earth’s surface) to the various ways in which information is captured and represented on maps, the role of scale and map projections, and the ways in which various hierarchies and classifications can be combined and used with empirical analysis to add meaning to maps. Maps are used to engage you in the analysis and manipulation of data and information related to quantifiable objects, symbolic elements, and logic to help navigate the complexity and sophistication of the modern world. The lectures and accompanying homework assignments will focus on the role of maps in modern life and how numbers are used to construct maps of the world around us. The assignments and final project will increase your capacity to evaluate chains of formal reasoning (the use of formal logic and mathematics), abstract representation (the use of symbolic and diagrammatic representations), and empirical analysis (the use of statistical inference) in building and interpreting various kinds of maps.

This course description has been provided by Professor John Wilson.