

COURSE SYLLABUS



STATISTICS FOR SOCIAL SCIENCES

IFSA Rome

US semester credit hours: 3

Contact Hours: 45

Course Code: MA386-05 / SO386-05

Course Length: Semester

Delivery Method: Face to face

Language of Instruction: English

Suggested cross-listings: Statistical Mathematics, Sociology

COURSE DESCRIPTION

Every day we hear comments about the social world, like, “Women earn 79 cents to the man’s dollar,” “children who grow up in two-parent households are healthier than those in one-parent households,” and “People with higher education tend to live longer and healthier.” How do researchers and the media make such conclusions? Calculating statistics is one way of organizing data about the social world, testing our hypothesis for social phenomena, and evaluating whether certain claims about the social world are supported by empirical evidence.

Katherine Lin, PhD, Assistant Professor of Sociology & Instructor of Quantitative Analysis for Social Data, Dartmouth University

This course aims to demonstrate the value of being critical of the conclusions one hears reported and to apply statistical methods to answer the kinds of questions social scientists ask about the social world. A wide range of examples from various fields in the social sciences will be used to demonstrate the role of statistical analysis in the research process. Statistics is essentially the study of how we describe and make inferences from data. You will be introduced to the methods and statistical techniques of quantitative analysis. Although research design is part of course discussions, the focus here is less on design and more on the techniques of measuring and counting for the purposes of analyzing data and showing how the numbers come to tell us what the facts are. Our overarching goal as a community of learners in this course is, quite simply, to learn how to make the numbers make sense.

As part of this course, you will gain facility with key computerized tools of analysis such as SAS and SPSS, but also Excel descriptive statistics features.

Social science questions and issues will be connected to Italy whenever possible, simultaneously acquainting students with the use of quantitative analysis to understand our social world while also deepening understanding of Italian society.

Prerequisites: solid arithmetic and basic algebraic skills

STUDENT LEARNING OBJECTIVES

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Students who successfully complete this course will:

- Demonstrate facility with the methods and statistical techniques of quantitative analysis used by social scientists.
- Be able to select an appropriate statistical approach to illuminate a social science question.
- Interpret and write about statistical calculations.
- Demonstrate basic facility with SAS, SPSS, and Excel descriptive statistics features.
- Recognize the value of questioning the premises upon which information may be based and being an informed consumer of information (critical thinking).
- Strengthen collaborative working skills, through engagement in a group project that requires identification of a topic, methods, original statistical research, and cooperation throughout.
- Deepen awareness of social issues in Italy.
- Become familiar with resources available for further learning on statistics for social sciences.
- Make cognitive connections between learning in this course and other learning experiences in IFSA Rome.

COURSE DELIVERY

This course delivery emphasizes the analysis and interpretation of data to give students a feel for how data interpretation is related to the methods by which the information was obtained. The course structure and delivery approach aims to build students' confidence and ability in doing statistical analysis by slowly moving from concepts that require little computational work to those that require more, demonstrating along the way how statistics can be used so that their utility is appreciated.

The course includes text reading, problem demonstrations, in-class and independent problem sets, terminology learning, topical discussions, examination and group work to accomplish learning objectives. We will utilize computerized tools of analysis such as SAS and SPSS, but also Excel descriptive statistics features. The instructor will provide directions for accessing necessary statistical software for demonstrations and individual student work. Weeks marked "Computer Applications Lab" in the Course Outline below are dedicated to these efforts.

You will need a calculator to complete your assignments, exams, and in-class activities. The calculator should be able to square and handle square roots.

In addition to the core text, journal articles will be provided by the instructor to offer real-world examples of the application of quantitative analysis to social science questions to foster dynamic classroom discussions.

Social science questions and issues utilized in the course will be connected to Italy whenever possible, simultaneously acquainting students with the use of quantitative analysis to understand our social world while also deepening understanding of Italian society.

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COURSE OUTLINE

Week 1 – Introductions and Setting the Stage / Levels of Measurement and Forms of Data

Review syllabus, discuss expectations, build community of learners

Definitions of Social Science, Empirical Questions, Normative Questions

Discussion Topics:

- How Humans Reason: Process of Using Analytical Techniques to Answer Empirical Questions
- Review The Scientific Method

In-class Activities:

- Generate lists of Sample Empirical Questions and Normative Questions
- Partner work: Exercises pp. 30-31, Sirkin

- Measure, nominal level of measurement, ordinal level of measurement
- Likert Scales
- Scores Versus Frequencies
- Internal and Ratio Levels of Measurement

Reading: Sirkin, chapters 1 & 2

Week 2 – Personal Goal-setting / Defining Variables / Measuring Central Tendency

Assignment. Reflection Paper (5% of grade) - Personal Goals for Course: How can this course apply to an academic project, academic major, thesis, graduate school goal, career planning, etc.? Provide a 1-2 page, thoughtful response. Times New Roman 12-point font, double-spaced.

Discussion Topics:

- Gathering the Data
- Operational Definitions
- Index and Scale Construction
- Validity
- Reliability

- Central Tendency
- The Mean
- The Median
- The Mode
- Interpreting Graphs
- Central Tendency and Levels of Measurement
- Skewness

Reading: Sirkin, chapters 3 & 4

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Week 3 – Measuring Dispersion / Constructing and Interpreting Contingency Tables

Discussion Topics:

- Visualizing Dispersion
- The Range
- The Mean Deviation
- Variance and Standard Deviation
- Computational Formulas for Variance
- Variance and Standard Deviation for Data in Frequency Distributions

- Contingency Tables
- Regrouping Variables
- Generating Percentages
- Interpreting
- Controlling for a Third Variable
- Partial Tables
- Causal Models

Reading: Sirkin, chapters 5 & 6

Week 4 – Computer Applications (through Chapter 6)

Computer Applications Lab

Week 5 – Statistical Inference and Tests of Significance / Probability Distributions and One-Sample z and t Tests

Discussion Topics:

- Random Samples
- Comparing Means
- The TGest Statistic
- Probabilities
- Decision Making
- Directional Versus Non-Directional Alternative Hypotheses (one-tailed versus two-tailed tests)
- Normal Distributions

- The One Sample z Test for Statistical Significance
- The Central Limit Theorem
- The Normality Assumption
- The One-Sample t Test
- Degrees of Freedom
- The t Table
- An Alternative t Formula
- A z Test for Proportions
- Interval Estimation
- Confidence Intervals for Proportions

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- Permutations and Combinations

Reading: Sirkin, chapters 7& 8

Week 6 – Two-Sample t Tests / One-Way Analysis of Variance

Discussion Topics:

- Independent Samples Versus Dependent Samples
- The Two-Sample t Test for Independently Drawn Samples
- Adjustments for Sigma-Hat Squared ($\hat{\sigma}^2$)
- Interpreting a Computer Generated t Test
- The Two-Sample t Test for Dependent Samples
- Statistical Significance Versus Research Significance
- Statistical Power

- Analysis of Variance in Experimental Situations
- F – An Intuitive Approach
- Anova Terminology
- The Anova Procedure
- Comparing F with t
- Analysis of Variance with Experimental Data
- Post Hoc Testing
- Two-Way Analysis for Variance

Reading: Sirkin, chapters 9 & 10

Week 7 – Computer Applications (Chapters 7-9)

Computer Applications Lab

Week 8 – Mid-Term

Assignment. Reflection Paper (5% of grade) – Statistics in Context: What sorts of social science issues are you seeing in Rome that could be illuminated through the application of quantitative analysis? Based on your understanding of Statistics thus far, why do you believe this? Provide a 1-2 page, thoughtful response. Times New Roman 12-point font, double-spaced.

Review for Mid-Term Exam

Mid-Term Exam

Week 9 – Measuring Association in Contingency Tables / The Chi-Square Test

Discussion Topics:

- Measures for Two-By-Two Tables
- Measures for n-BY-n
- Curvilinearity

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- Interpreting an Association Matrix
- Observed Versus Expected Frequencies
- Using the Table of Critical Value of Chi-Square
- Calculating the Chi-Square Value
- Yates' Correction
- Validity of Chi-Square
- Directional Alternative Hypotheses
- Testing Significance of Association Measures
- Chi-Square and Phi

Reading: Sirkin, chapters 11 & 12

Week 10 – Computer Applications (Chapters 10-12)

Computer Applications Lab

Week 11 – Correlation and Regression Analysis

Discussion Topics:

- Cartesian Coordinates
- The Concept of Linearity
- Linear Equations
- Linear Regression
- Statistical Significance for r and b
- Significance of r
- Partial Correlations and Causal Models
- Multiple Correlation and the Coefficient of Multiple Determination
- Multiple Regression
- The Standardized Partial Regression Slope
- Using a Regression Printout
- Stepwise Multiple Regression

Reading: Sirkin, chapters 13 & 14

Week 12 – Computer Applications (Chapters 13-14)

Computer Applications Lab

Assignment. Reflection Paper (5% of grade) - Integration of Learning: Return to Week 2 goal-setting conversations. Reflect and share thoughts. What has changed? What was confirmed? What was challenged? How will you apply your new learning from this course? Provide a 1-2 page, thoughtful response. Times New Roman 12-point font, double-spaced.

Week 13 – Computer Applications (Review All) / Integration of Learning

Computer Applications Lab

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Prepare for Group Research Project Presentations

Week 14 – Group Research Project Presentations / Review for Final Exam

Group Research Project Presentations

Review for Final Exam

Week 15 – Final Exam

Final Exam

RESOURCES

Sirkin, Mark R. (2006). *Statistics for the Social Sciences (3rd Ed.)*. Sage Publications.
[also available as e-book]

Additional journal articles will be provided by the instructor to offer real-world examples of the application of quantitative analysis to social science questions.

EVALUATION METHODS

The course instructor will provide specific requirements, indicators of success, and/or grading rubrics for individual assignments for the course. Your final grade in the course will be comprised of the following course requirements:

Reflective Papers (3 x 5% each) – 15%

Problem Sets – 20%

Mid-Term Exam – 20%

Final Exam – 25%

Group Research Project Paper – 15%

Group Research Project Presentation – 5%

Reflective Papers

Instructions included in the Course Outline above. You will be required to write three Response Papers. Each is worth 5% of your final grade.

Problem Sets

10 problems sets will be required in this course. Submit hard copies of your completed problems sets, which show your work, on the due dates provided by the instructor. The Problem Sets (2% each x 10) will comprise a total 20% of your final grade.

Exams*

You will have two in-class exams during the course of the semester. The exams are not “open book” and are cumulative. The Mid Term exam addresses content covered in the roughly the first half of the course, and the Final Exam builds on content covered in roughly the first half of the course but focuses more strongly on the content covered in later weeks of the course. Each

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student may bring one single page (front/back) hand-written set of notes to the Mid Term Exam and to the Final Exam. The Mid Term Exam is worth 20% of your final grade and the Final Exam is worth 25% of your final grade.

Group Research Project/Presentation*

During the course of the semester you will work in a small group with other students on a research project. This project will involve picking an Italy-focused research question that can be answerable with an existing secondary data set, outlining a brief literature review as well as a set of testable hypotheses, a justification for choosing which statistical analyses to test the hypotheses, and a written interpretation of your results and discussion. This component is rigorous and key part of class – it is not enough to be able to replicate statistical analyses – a learning goal here is that you be able to apply your knowledge to some real world social science research. Progress deadlines are built into the course to ensure you are on track with this project. At the end of the course, you will give a group presentation to the class about your research question and findings. The final paper will be 15% of your total grade, and the presentation will be 5% of your total grade.

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Timely Submissions

Assignments submitted after the deadline will be accepted at the discretion of the course instructor and generally only in the event of a documented illness or emergency.

ACADEMIC INTEGRITY

Any academic endeavor must be based upon a foundation of honesty and integrity. Students are expected to abide by principles of academic integrity and must be willing to bear individual responsibility for their work while studying abroad. Any academic work (written or otherwise) submitted to fulfill an academic requirement must represent a student's original work. Any act of academic misconduct, such as cheating, fabrication, forgery, plagiarism, or facilitating academic dishonesty, will subject a student to disciplinary action.

IFSA takes academic integrity very seriously. Students must not accept outside assistance without permission from the instructor. Additionally, students must document all sources according to the instructions of the professor. Should your instructor suspect you of plagiarism, cheating, or other forms of academic dishonesty, you may receive a failing grade for the course and disciplinary action may result. The incident will be reported to the IFSA resident director as well as your home institution.

Note: Some syllabus content and structural elements above were designed with permission of Katherine Lin, PhD, Assistant Professor of Sociology & Instructor of Quantitative Analysis for Social Data, Dartmouth University, and guided by her "Quantitative Analysis for Social Data" syllabus.

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