

# Computational Social Sciences (COMPSS)

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## Courses

### COMPSS 201 Introduction to Computing 3 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 Second 6 Week Session

The Master of Computational Social Science program requires students to be proficient in the basic computing skills required for computational social science — this class aims to bring all entering students up to the required level of proficiency. It covers the process of setting up a computing environment for data science tasks, usage of Python for scientific programming, the ecosystem of common Python packages for data science tasks, accessing data from different types of files, databases, and web scraping, APIs, and computing on remote systems.

#### Objectives & Outcomes

**Student Learning Outcomes:** Design the processing of computing tasks for distributed and remote systems

Determine which Python packages are appropriate for analyzing a given data set in tabular, image, textual, structured, geographic or network format

Recognize the applicability and make use of techniques for extracting, scraping and crawling web data

Set-up a computing environment appropriate for conducting data science analyses using Python and the ecosystem of Python data science packages

Transform data from various sources into a form appropriate for analysis and training machine learning models

Write modular, performance and idiomatic Python code for data science tasks

#### Hours & Format

**Summer:** 6 weeks - 6-9 hours of lecture per week

#### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

### COMPSS 202 Introduction to Applied Statistics 3 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 Second 6 Week Session

Statistical analysis is the backbone of applied scientific thought, and it also features prominently in business and policy, both historically and today. This course aims to help bring all entering MaCSS students up to the required level of proficiency in applied statistics to be successful in their coursework and future careers. Students will develop the statistical intuition and analytical techniques to achieve proficiency in programming in R with Jupyter notebooks and with RStudio, univariate statistics, measurement reliability and validity, sampling and inference, hypothesis testing, and linear regression.

#### Objectives & Outcomes

**Student Learning Outcomes:** Apply statistical analysis tools to answer the problem

Develop critical thinking skills

Identify relevant statistical information associated with a problem

Summarize quantitative and qualitative data accurately, responsibly, and effectively

#### Hours & Format

**Summer:** 6 weeks - 6-9 hours of lecture per week

#### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

### COMPSS 211 Advanced Computing 3 Units

Terms offered: Fall 2025, Fall 2024

Predictive models are a core tool for computational social scientists. This class aims to provide students with a practitioner's level of understanding of different models and techniques: which methods exist, how they relate to each other, the shortcomings they may have, and their most relevant applications. The focus is on methods which are used in practice in industry, which tend to be off-the-shelf rather than cutting edge, and are often chosen for reliability and ease of use rather than performance.

#### Rules & Requirements

**Prerequisites:** COMPSS 201 or passing the computing waiver exam

#### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

#### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 211B Data Visualization 3 Units

Terms offered: Fall 2025

In this course, students will learn to create effective visualizations for both analysis of data and communication of findings.

### Objectives & Outcomes

**Course Objectives:** Apply appropriate visualization techniques for exploratory data analysis, including understanding distributions and relationships, and identifying patterns and anomalies  
Create effective visualizations using Tableau and code-based libraries in R and/or Python

Critically evaluate visualizations created by others, identifying both effective techniques and problematic design choices that may mislead viewers

Design explanatory charts that clearly convey insights to intended audiences, and organize these visualizations into coherent narratives for presentation

### Rules & Requirements

**Prerequisites:** Passing grade in COMPSS 201 (Introduction to Computing) and COMPSS 202 (Introduction to Applied Statistics), or waiver exams for those courses

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of seminar per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 212 Applied Statistics I 3 Units

Terms offered: Fall 2025, Fall 2024

As social scientists we study human behavior and its consequences on others and the world around us - both physical (e.g. the environment) and non-physical (e.g. currency markets). In order to test hypotheses of interest, one needs to choose the right tool for the right problem in order to come up with a valid answer to the question(s) one is asking. The goal of this course is to get students to: identify a problem or research question of interest, formulate a testable hypothesis, characterize the data generating process, choose the correct statistic to test their hypothesis, carefully characterize the data to conduct their test, conduct their test using software, correctly interpret test results, and write up or present their findings.

### Rules & Requirements

**Prerequisites:** COMPSS 201 and COMPSS 202

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 213 Data, Ethics and Society 3 Units

Terms offered: Fall 2025, Fall 2024

If knowledge is power, then what is data? In this course, we will examine the power that lies within data and learn to recognize and manage the many ways data shape and are shaped by power relations in organizations and more broadly in society. As someone using data in applied settings, you will play an important role in determining how data are used and how the risks and benefits of analysis are balanced within organizations. We will learn from approaches taken by scholars, data science practitioners, and regulators, and we will devise our own ways to answer these questions.

### Objectives & Outcomes

**Student Learning Outcomes:** Anticipate or identify ethical tensions related to their analyses

Be recognized as data science professionals with high levels of integrity and intellectual rigor

Clearly communicate the ethical tensions present when designing research questions, protocols, and analysis

Make well-reasoned and actionable recommendations about how to make necessary trade-offs, and how to minimize the risks associated with recommendations

### Rules & Requirements

**Prerequisites:** COMPSS 201, COMPSS 202

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 214A Computational Social Science 1A 1.5 Unit

Terms offered: Fall 2025, Fall 2024

This course will cover issues that often arise in analyzing data about larger aggregates, primarily regions or countries, companies, and government agencies. How do these different aggregates interact in market and non-market spaces? How do resources (financial, network), culture (norms, values, expectations, symbols), and power and politics (formal authority, informal power) affect such interactions?

### Rules & Requirements

**Prerequisites:** COMPSS 201, COMPSS 202

### Hours & Format

**Fall and/or spring:** 7 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 214B Computational Soc Sci 1B 1.5 Unit

Terms offered: Fall 2025, Fall 2024

This course will cover concepts and tools needed to understand how individuals, households, and other small groups behave and interact. Specific applications include when and how people vote, what people choose to buy and at what price, and how they interact in various social networks. It will pay special attention to how such behavior varies depending on gender, race, education, and income. And it will introduce students to interpersonal networks: how they arise and evolve, how they are structured, and what their effects are on individual and group behavior.

### Rules & Requirements

**Prerequisites:** COMPSS 201, COMPSS 202

### Hours & Format

**Fall and/or spring:** 7 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 215 Career Development I 2 Units

Terms offered: Fall 2025, Fall 2024

This course is designed to provide students with the tools to strategically plan their careers at the crossroads of data science and social science. Through a blend of self-discovery, career exploration, and targeted skill enhancement, students will emerge with a clear, strategic plan for their professional future. This course will involve a blend of self-discovery, career exploration, and skill development. The course is structured to help students understand their interests, values, and skills, and how these align with various career paths.

### Rules & Requirements

**Prerequisites:** COMPSS 201, COMPSS 202

### Hours & Format

**Fall and/or spring:** 9 weeks - 2 hours of lecture per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 221 Data Visualization 2 Units

Terms offered: Spring 2025

In this course, students will learn to create charts that effectively communicate insights, to ensure that their data science work has impact.

### Objectives & Outcomes

**Student Learning Outcomes:** Combine a sequence of charts with a narrative, to tell a complete story based on data.

Create these chart types using popular libraries in R and Python.

Design explanatory charts that convey a point to an intended audience, including effective use of text and color.

Evaluate charts created by others and detect instances of poor or misleading design.

Understand the main types of charts (including maps and tables) and how to choose the right chart for representing different kinds of data.

### Rules & Requirements

**Prerequisites:** A grade of C+ or better in the following courses:

COMPSS 211: Advance Computing COMPSS 212: Applied Statistics I

COMPSS 213: Data, Ethics and Society COMPSS 214A: Computational

Social Science 1A COMPSS 214B: Computational Social Science 1B

COMPSS 215: Career Development I

### Hours & Format

**Fall and/or spring:** 10 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 222 Applied Statistics II 3 Units

Terms offered: Spring 2025

This course continues with the development of applied statistical methods appropriate for program evaluation and social science research initiated in COMPSS 212: Applied Statistics I. Topics may include the design of randomized control trials (RCTs), logistic regression, the Bayesian bootstrap, average treatment effect (ATE) estimation under unconfoundedness, local average treatment effects (LATE) and the method of instrumental variables, regression discontinuity design (RDD), quantile regression and discrete hazard analysis. Instruction will involve a mix of theory, illustration and application.

### Rules & Requirements

**Prerequisites:** A grade of C+ or better in the following courses:

COMPSS 211: Advance Computing COMPSS 212: Applied Statistics I

COMPSS 213: Data, Ethics and Society COMPSS 214A: Computational

Social Science 1A COMPSS 214B: Computational Social Science 1B

COMPSS 215: Career Development I

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 223 Ethics, Data, and Society 2 Units

Terms offered: Not yet offered

This course covers the essentials of ethical decision making in data ethics from obtaining consent from participants to communicating findings with stakeholders. It also covers special cases, such as collecting data online and protecting privacy when predicting personal traits.

### Hours & Format

**Fall and/or spring:** 10 weeks - 3 hours of seminar per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 224A Forced Out: Decoding Housing Displacement through Data 1.5 Unit

Terms offered: Spring 2025

Residential displacement is the involuntary relocation of residents from their homes or neighborhoods due to factors beyond their control. The consequences of displacement are dire and reinforces racial, ethnic, gender, and economic disparities. This course merges social and data science to help you understand the origins, drivers, and indicators of displacement in the US as well as train you on how to measure and visualize it for a stakeholder audience. You will be introduced to the leading research on displacement and will exercise computational social science skills to conduct data wrangling, spatial analysis, statistical modeling, and visualization. These skills are translatable to many other topics and data science applications.

### Rules & Requirements

**Prerequisites:** Passing grade (C+ or better) on COMPSS 201 and COMPSS 202 or passing grade on waiver exams for these courses

### Hours & Format

**Fall and/or spring:** 7 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 224B Quantitative Political Risk Analysis 1.5 Unit

Terms offered: Spring 2025

The “political risk” industry is a prominent application of political science, macroeconomics, and political economy in the private sector. While political risk analysis is still mostly qualitative, its growing importance to commercial outcomes has spurred a limited but growing use of quantitative methods. This course provides an overview of (i) country/ political risk industry, (ii) current applications of data science and machine learning in the industry; and (iii) the quantitative methods behind most of these applications. The course will both provide MaCSS students an introduction to career opportunities in this domain as well as a practical toolkit for risk analysis.

### Rules & Requirements

**Prerequisites:** Passing grade (C+ or better) on boot-camp courses or passing grade on waiver exams for COMPSS 201 (Introduction to Computing) and COMPSS 202 (Introduction to Applied Statistics). This includes familiarity with either R or Python

### Hours & Format

**Fall and/or spring:** 7 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 225 Mastering the Corporate Arena: Strategic Skills for Professional Success 2 Units

Terms offered: Spring 2025

An engaging 9-week course tailored to empower you with a deep understanding & the necessary skills to navigate & excel in the complex corporate landscape. This course is meticulously designed to cover key aspects such as understanding diverse corporate cultures, mastering effective communication, leveraging office politics positively, & building influential leadership traits. You'll gain practical experience through case studies of real-world corporate scenarios, participate in simulations that hone decision-making & conflict-resolution skills, & receive personalized feedback from experienced professionals. We also focus on personal development, teaching strategies for managing work-life balance, enhancing productivity, & avoiding burnout.

### Objectives & Outcomes

**Course Objectives:** Cultivate advanced communication and negotiation skills to effectively manage and lead diverse teams. Develop and implement strategies for personal and professional growth. Engage with industry leaders and experts to gain practical insights and skills. Enhance the ability to analyze and adapt to various corporate cultures, ensuring alignment with personal and organizational values. Implement robust personal management strategies that prioritize sustainable productivity and healthful work-life balance. Navigate the complexities of corporate environments effectively.

### Rules & Requirements

**Prerequisites:** Computational Social Science (COMPSS) 215

### Hours & Format

**Fall and/or spring:** 9 weeks - 2 hours of lecture per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.

## COMPSS 230 Capstone Project 4 Units

Terms offered: Spring 2025

In this capstone course, students will harness the comprehensive skill set developed throughout their Master of Computational Social Science (MaCSS) program to undertake a significant analytical project with real-world applications. Students will work in small teams, but on individual projects, and will experience work practices such as pair-programming, rubber-ducking, white-boarding, coding with an AI co-pilot, and collaborative analysis review practices. Accessing public data sources and interacting with organizations that do work in this field, students will produce a comprehensive, well-documented portfolio project that demonstrates their capability to contribute useful tools or insights to the field of social sciences.

### Rules & Requirements

**Prerequisites:** COMPSS 201, COMPSS 202

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of workshop per week

### Additional Details

**Subject/Course Level:** Computational Social Sciences/Graduate

**Grading:** Letter grade.