



National Chengchi University, College of Social Sciences
Course Numbers: 070396001 (CSS-ETP), ZU1880001 (ICI)

Introduction to Computational Social Science



Course Information

Office Hours	Tu, W 2-4 PM & by appt.	Class Time	Monday 1-4pm
Office #	綜北13樓	Classroom #	綜北270106
Instructor	Jacob Reidhead	Websites	https://moodle.nccu.edu.tw/course/view.php?id=38129
Email	reidhead@g.nccu.edu.tw		

1. Introduction

From social media and online shopping to self-driving cars and ChatGPT, digital technology is ubiquitous in the social world. If the social sciences are to keep pace, then they must also embrace computational methods and the digital world. This course will survey text analysis, machine learning and social network analysis. We will use these tools to analyze a wide variety of digital sources such as online text, images and metadata. We will also learn how computational tools and digital data are changing the face of social science! This course has no prerequisites and no programming experience is required. The course will introduce you to code in several languages, but sample code and data will be provided. And as your instructor, I will walk you through each exercise, step-by-step. No fear! Let's start coding!

2. Intended Learning Outcomes

Through this course you will become familiar with:

1. computational tools and digital data
2. the ways computational tools and digital data are impacting the social sciences

And you will practice:

3. Implementing computational methods on sample code and data
4. Communicating your computational analyses and their broader applications

3. Course Organization

Modules

The course is organized around an introductory section and three methodology modules:

1. Introduction: Ethics and AI
2. Module 1: Text Analysis
3. Module 2: Machine Learning
4. Module 3: Social Network Analysis

Teams

By the second week of the semester, the class will organize into teams of 2 or 3 students. Students will work in teams on team projects and video presentations.

Activities

In class, students will actively participate in:

- Lectures & In-class Activities

Out of class, students will work individually on:

- Research Reviews
- Coding Tasks

Out of class, students will work in teams on:

- Team Videos

ILO-Activity Matrix

Course activities are designed to satisfy the following Intended Learning Outcome (ILO).

Activity	ILO1 Familiar with tools and data	ILO2 Impact on social science	ILO3 Implement CSS methods	ILO4 Communicate analysis & apps
1. Lectures	x	x	x	x
2. Research Reviews		x		x
3. Coding Tasks	x		x	x
4. Team Videos	x	x	x	x

4. Assessments & Grades

Grading Rubric

Task	Points per Assessment	Percent of Semester Grade
Attendance	After TWO FREE ABSENCES, each unexcused absence is -5%	10%
Research Reviews	3 tasks * 10% each	30%
Coding Tasks	3 reviews * 10% each	30%
Team Videos	3 videos * 10% each	30%

Research Reviews - 30%

For each of the three modules, a research review will be assigned. The instructor will specify a computational method or type of data. Students will be asked to find three research papers using that type of method or data, and then to summarize and compare the three papers in a 2-page research review (1000 words).

Coding Tasks – 30%

A coding task will be assigned for Modules 1-3. The instructor will provide sample code and data. Students will execute the sample code and make small changes, as the task requires. Findings will be summarized in a 2-page report (1000 words).

Team Video – 30%

For each of the three modules, students will work in teams to complete a research project and make a 10-minute video presenting their results. Each project will expand on that module's coding task and research review. Teams will be asked to implement a computational method and

analyze findings in ways similar to the research we have reviewed. Then they will create a team video, using AI or whichever tools they prefer, to present the results of their project.

5. Course Materials

References

- Text Analysis
 - Grimmer, J., Roberts, M. E., & Stewart, B. M. (2022). Text as data: A new framework for machine learning and the social sciences. Princeton University Press.
 - Bengfort, B., Bilbro, R., & Ojeda, T. (2018). Applied text analysis with Python: Enabling language-aware data products with machine learning. " O'Reilly Media, Inc."
 - Szabó, G., Polatkan, G., Boykin, P. O., & Chalkiopoulos, A. (2018). Social media data mining and analytics. John Wiley & Sons.
- Machine Learning
 - Jacobucci, R., Grimm, K. J., & Zhang, Z. (2023). Machine Learning for Social and Behavioral Research. Guilford Publications.
 - Beyeler, M. (2017). Machine Learning for OpenCV. Packt Publishing Ltd.
- Social Network Analysis
 - Borgatti, S. P., Everett, M. G., Johnson, J. C., & Agneessens, F. (2022). Analyzing social networks using R. Sage.
 - Jackson, M. O. (2008). Social and economic networks (Vol. 3). Princeton: Princeton university press.

Moodle

All course materials are available on Moodle. Course materials include:

- Syllabus, Academic Calendar, Records of attendance and grades
- Lecture slides and Assigned Readings
- Worksheets and URLs used for all in-class activities
- Video tutorials, sample code, data and instructions for all coding tasks
- Instructions for all research reviews

6. Academic Policies

Grading Scale

The grading scale for this course follows the system typically used at NCCU.

Extra Credit

I rarely offer extra credit. However, if extra credit is offered, it will not be arbitrarily offered to individual students, but systematically offered to all students equally.

Academic Integrity

NCCU requires all students to adhere to high standards of integrity in their academic work. No type of academic misconduct (including but not limited to plagiarism, cheating, or lying to the professor) will be tolerated in this class and may result in penalties including but not limited to scores of 0 on assignments and forfeiture of extra credit points. Instances of academic misconduct will be referred directly to the appropriate disciplinary committee. For full information on these matters, please refer to the NCCU catalog or official website.

Generative AI

Students are encouraged to use generative AI to augment any aspects of all assignments including literature reviews, coding and team videos. If AI-generated results do not fully satisfy assignment criteria, some human intervention may be required in order to complete the assignment and receive full credit.

7. Course Schedule

Week	Date	Topic	Assignment
<i>Introduction: Ethics and AI</i>			
1	2/19	Ethics of Big Data and Computational Methods	
2	2/26	ChatGPT and AI prompt engineering	
<i>Module 1: Text Analysis</i>			
3	3/4	Survey of Text Analysis	
4	3/11	Token-Level: Keyword and Latent Topic Analysis	Sun 3/17: Review #1
5	3/18	Document-Level: Sentiment Analysis	Sun 3/24: Code #1
6	3/25	Corpus-Level: Semantic Network Analysis	Sun 3/31: Team Video #1
7	4/1	Team Video Roundtable #1	
<i>Module 2: Machine Learning</i>			
8	4/8	Principal Components Analysis (PCA)	
9	4/15	Machine Learning Classification I	Sun 4/21: Review #2
10	4/22	Machine Learning Classification II	Sun 4/28: Code #2
11	4/29	Hierarchical Clustering & Sequence Analysis	Sun 5/5: Team Video #2
12	5/6	Team Video Roundtable #2	
<i>Module 3: Social Network Analysis</i>			
13	5/13	Node-Level: Centrality Measures	
14	5/20	<i>NCCU Birthday</i>	
15	5/27	Network-Level: Network Models & Metrics	Sun 6/2: Review #3
16	6/3	Meso-Level: Clustering & Structural Equivalence	Sun 6/9: Code #3
17	6/10	<i>Dragon Boat Festival</i>	Sun 6/16: Team Video #3
18	6/17	Team Video Roundtable #3	