

Course Title	Introduction to Computational Political Science
Course Code	GOV3219
Recommended Study Year	Any
No. of Credits/Term	3
Mode of Tuition	Lecture-Tutorial
Class Contact Hours	3 hours per week
Category	Major in Government and International Affairs (Elective Course)
Discipline	Social Sciences
Prerequisite(s)	NIL
Co-requisite(s)	NIL
Exclusion(s)	NIL
Exemption Requirement(s)	NIL

Brief Course Description

How has the rise of big data and computational tools transformed the process of political science research? This course provides students with a foundation in computational tools used in political science research, such as web scraping, natural language processing (NLP), social network analysis (SNS), and machine learning.

Aims

This course aims to:

1. Introduce students to the fundamentals of computational political science.
2. Develop students' understanding of political science research questions and how computational methods can be applied to address them.
3. Provide hands-on experience with data collection, processing, analysis, and visualization.
4. Encourage students to apply computational methods to real-world problems and challenges.
5. Design and build computational systems to explore and analyze some aspects of the human world.

Learning Outcomes

On completion of the course, students should be able to:

1. Describe the opportunities and challenges of political science in the age of big data.
2. Evaluate research on social phenomena from different fields, including political science, computer science, and data science.
3. Practice the essential techniques to analyze social big data using Python or R.
4. Propose research questions that are suited to be examined by computational methods.
5. Design a research project that utilizes the techniques and methods to address political science problems.

Indicative Content

Module I: Introduction to Computational Political Science

- a. Overview of computational political science: goals, challenges, and applications
- b. Interdisciplinary nature of the field
- c. Ethical considerations in computational political research

Module II: Social Network Analysis

- a. Introduction to social networks in political studies
- b. Measures of centrality and structural analysis
- c. Network visualization and interpretation

Module III: Web Scraping and Data Collection

- a. Web scraping techniques for collecting social media and web data
- b. APIs for data retrieval
- c. Data preprocessing and cleaning
- d. Ethical considerations in web scraping

Module IV: Natural Language Processing

- a. Introduction to Natural Language Processing
- b. Pre-processing text data: tokenization, stemming, and stop-word removal
- c. Sentiment analysis and topic modelling

Module V: Machine Learning

- a. Supervised and unsupervised machine learning
- b. Training data, test data, validation data
- c. Dimension reduction, clustering, and prediction

Module VI: Ethics and principles in Computational Research

Teaching Method

Lectures combined with tutorials involving written assignments and presentations. Real political and social events and research examples will be used to illustrate the concepts and techniques of various research methods. Students are required to construct their own research project to apply what they have learnt in the course.

Measurement of Learning Outcomes

Components	LOs to be measured	Description
Class participation and attendance (20%)	measures LOs 1-3	Students will be graded according to their degree of class participation and other relevant contributions to the class discussion.

Homework assignments (30%)	measures LOs 2-3	There will be 3 hands-on exercises to reinforce concepts and techniques learnt in class. Each exercise is due in two weeks after the release of assignment.
Final exam (50%)	measures LOs 4-5	This will assess students' understanding of the basic concepts, case studies, and debates encountered in this course.

Assessment

Class participation and attendance	20%
Homework assignments	30%
Final Exam	50%

Required/Essential Readings

Grimmer, Justin, Margaret E. Roberts, and Brandon M. Stewart. Text as data: A new framework for machine learning and the social sciences. Princeton University Press, 2022.

Salganik, Matthew J. Bit by bit: Social research in the digital age. Princeton University Press, 2019.

Van Atteveldt, W., Trilling, Damian and Calderón, Carlos. A. Computational analysis of communication. Wiley Blackwell, 2022.

Recommended/Supplementary Readings

Buyalskaya, Anastasia, Marcos Gallo, and Colin F. Camerer. "The golden age of social science." *Proceedings of the National Academy of Sciences* 118, no. 5 (2021): e2002923118.

Edelmann, Achim, Tom Wolff, Danielle Montagne, and Christopher A. Bail. "Computational social science and sociology." *Annual Review of Sociology* 46 (2020): 61-81.

Lazer, David, Alex Pentland, Lada Adamic, Sinan Aral, Albert-László Barabási, Devon Brewer, Nicholas Christakis et al. "Computational social science." *Science* 323, no. 5915 (2009): 721-723.

Lazer, David MJ, Alex Pentland, Duncan J. Watts, Sinan Aral, Susan Athey, Noshir Contractor, Deen Freelon et al. "Computational social science: Obstacles and opportunities." *Science* 369, no. 6507 (2020): 1060-1062.

Lindstedt, Nathan C. "Structural topic modeling for social scientists: A brief case study with social movement studies literature, 2005–2017." *Social Currents* 6, no. 4 (2019): 307-318.

Rodriguez, Maria Y., and Heather Storer. "A computational social science perspective on qualitative data exploration: Using topic models for the descriptive analysis of social media data." *Journal of Technology in Human Services* 38, no. 1 (2020): 54-86.

Schroeder, Ralph. "Big Data and the brave new world of social media research." *Big Data & Society* 1, no. 2 (2014): 2053951714563194.

Theocharis, Yannis, and Andreas Jungherr. "Computational social science and the study of political communication." *Political Communication* 38, no. 1-2 (2021): 1-22.

Zhang, Han, and Jennifer Pan. "Casm: A deep-learning approach for identifying collective action events with text and image data from social media." *Sociological Methodology* 49, no. 1 (2019): 1-57.

Important Notes:

- (1) Students are expected to spend a total of 9 hours (i.e. 3 hours of class contact and 6 hours of personal study) per week to achieve the course learning outcomes.
- (2) Students shall be aware of the University regulations about dishonest practice in course work, tests and examinations, and the possible consequences as stipulated in the Regulations Governing University Examinations. In particular, plagiarism, being a kind of dishonest practice, is “the presentation of another person’s work without proper acknowledgement of the source, including exact phrases, or summarised ideas, or even footnotes/citations, whether protected by copyright or not, as the student’s own work”. Students are required to strictly follow university regulations governing academic integrity and honesty.
- (3) Students are required to submit writing assignment(s) using Turnitin.
- (4) To enhance students’ understanding of plagiarism, a mini-course “Online Tutorial on Plagiarism Awareness” is available on <https://pla.ln.edu.hk/>.
- (5) Students are allowed the use of AI for (i) information search (which should be subsequently fact-checked) and (ii) as an additional tool for language checking (other than Grammarly, Google, etc.). They will also be asked to submit a declaration form for the assignments. For more details, students should consult the Teaching and Learning Centre (TLC)’s handbook, “*Best Practice for Ethical and Responsible Use of Generative AI*” (online available at: https://www.ln.edu.hk/f/upload/84485/AI%20Practice_updated%2024%20Jul%202023_final.pdf). In addition, students using ChatGPT must adhere to the University’s data privacy and security policies.

Grading rubric for class participation and attendance (20 marks)

Criteria	Excellent	Good	Fair	Pass	Failure	Marks
Frequency of class participation and attendance (50%)	Student initiates contributions more than once in each session Attend all lectures and tutorials (50)	Student initiates contributions once in each session. Attend 60 to 80 percent of lectures and tutorials (35)	Student provides contributions after the instructor solicits input Attend 20 to 40 percent of lectures and tutorials (25)	Student provides limited contributions after the instructor solicits input Attend 10 percent of lectures and tutorials (15)	Student does not provide contributions after the instructor solicits input Never show up in lectures and tutorials (0)	
Quality of Comments (30%)	Comments are always insightful & constructive. Comments balanced between general impressions, opinions & specific, thoughtful criticisms or contributions (30)	Comments mostly insightful & constructive. Occasionally comments are too general or not relevant to the discussion (20)	Comments are sometimes constructive, with occasional signs of insight. Comments not always relevant to the discussion (15)	Comments are sometimes constructive, although mostly are not relevant to the discussion (10)	Comments are uninformative. Heavy reliance on personal opinion & personal feeling (e.g., “I like it”, “I do not like it”) (0)	
Attention (20%)	Student listens attentively when others present, as shown by comments that build on others’ remarks (i.e., student hears what others say & contributes to the dialogue) (20)	Student is mostly attentive when others present, as shown by comments that build on others’ remarks. Occasionally needs encouragement or reminder from instructor of focus of comment (15)	Student is often inattentive. Instructor has to remind student of focusing on class (10)	Student is often inattentive. Instructor has to remind student of focusing on class, And sometimes works (5)	Does not listen to others; regularly talks while others speak or does not pay attention while others speak; detracts from discussion; sleep, etc (0)	
Total Marks						

Grading rubric for homework assignments (3 x 10 marks)

Criteria	Excellent	Good	Fair	Pass	Failure	Marks
Concepts and conceptualization (20%)	Covered directly relevant concepts and conceptualization that fit the topic (20)	Used some definitions and concepts that fit the topic (15)	Included definitions and concepts that fairly fit the topic (10)	Included definitions and concepts that do not fit the topic (5)	Used no concepts and showed little effort of conceptualization (0)	
Argument (20%)	Arguments both well supported and compared to conflicting explanations (20)	Main arguments valid, systematic, and well supported (15)	Some arguments valid and well supported (10)	Some arguments valid but not well supported (5)	Weak, invalid, or no argument, a simple assertion (0)	
Use of Data or Evidence (50%)	Fully exploits the richness of the data/evidence/ideas, and is sufficiently persuasive (50)	Feasible evidence, appropriately selected and not over-interpreted (35)	Some appropriate use of evidence but uneven (20)	Some appropriate use of evidence but very uneven (5)	Weak, invalid, or no argument, a simple assertion (0)	
Organization and Writing (10%)	Structure enhances the argument, strong sections and logical flow. Clear writing (10)	Structure supports the argument, clearly ordered sections fit together well. Some minor English errors (7)	Bad structure (inconsistent, redundant, or disconnected). Minor English errors (4)	Bad structure (inconsistent, redundant, or disconnected). Frequent English errors (1)	Needs significant re-organization. Too many grammatical errors. Low readability (0)	
Total Marks						

Grading rubric for final exam (50 marks)

Criteria	Excellent	Good	Fair	Pass	Failure	Marks
Comprehension of all the relevant concepts (40%)	Shows a deep and insightful level of understanding (40)	Shows a good level of understanding (30)	Shows a fair level of understanding (20)	Shows an inadequate level of understanding (10)	Shows no understanding (0)	
Application of concepts to the problem posed (40%)	Concepts are all applied correctly (40)	Most concepts are applied correctly (30)	Some concepts are applied too generally or misapplied but the central concepts are applied correctly (20)	Many concepts are applied too generally or misapplied but the central concepts are applied correctly (10)	Most concepts are applied too generally or misapplied (0)	
Ideas are expressed logically, accurately and clearly (10%)	Expression of ideas is consistently accurate, logical and clear (10)	Expression of ideas is generally accurate, logical and clear, with some minor lapses (7)	Expression of ideas is comprehensible but there are some major lapses (4)	Expression of ideas is comprehensible but there are many major lapses (1)	Expression of ideas is largely comprehensible with some major inconsistencies and errors (0)	
Quality of English (10%)	English is excellent (10)	English is proficient with no major errors (7)	English conveys the essential meaning but has a number of errors (4)	English inadequately conveys the essential meaning and has a number of errors (1)	English is below acceptable university standard (0)	
Total Marks						

Final Overall Grade

Mark Ranges	Grade
85 -100	A
80-84	A-
75-79	B+
70-74	B
65-69	B-
60-64	C+
55-59	C
50-54	C-
45-49	D+
40-44	D
0-39	F