Fiscal Unit/Academic Org	Political Science - D0755
Administering College/Academic Group	Arts and Sciences
Co-adminstering College/Academic Group	
Semester Conversion Designation	New Program/Plan
Proposed Program/Plan Name	Computational Social Science
Type of Program/Plan	Undergraduate bachelors degree program or major
Program/Plan Code Abbreviation	CSS-BS
Proposed Degree Title	Computational Social Science

Credit Hour Explanation

Program credit hour requirements		A) Number of credit hours in current program (Quarter credit hours)	B) Calculated result for 2/3rds of current (Semester credit hours)	C) Number of credit hours required for proposed program (Semester credit hours)	D) Change in credit hours
Total minimum credit hours required for completion of program				47	
Required credit hours offered by the unit	Minimum			18	
	Maximum				
Required credit hours offered outside of the unit	Minimum			5	
	Maximum				
Required prerequisite credit hours not included above	Minimum				
	Maximum				

Program Learning Goals

Note: these are required for all undergraduate degree programs and majors now, and will be required for all graduate and professional degree programs in 2012. Nonetheless, all programs are encouraged to complete these now.

Program Learning Goals

- Social Theory. Students will learn about theoretical camps in the social sciences. Students will apply social theory to interpret and explain patterns in social science data and to generate testable hypotheses that can be supported or falsified.
- Computational Modeling and Analysis: Students will learn the data generation process and acquire skills for developing mathematical and algorithmic expressions of social theory. Students will learn how to analyze data using computational method.
- Research Design: Students will learn to develop analytic strategies for answering social science questions using computational methods. This entails knowledge of data collection, cleaning, testing, and inference.
- Interdisciplinary Collaboration: Student will work effectively as part of a team and understand disciplinary and transdisciplinary approaches to social science research.

Assessment

Assessment plan includes student learning goals, how those goals are evaluated, and how the information collected is used to improve student learning. An assessment plan is required for undergraduate majors and degrees. Graduate and professional degree programs are encouraged to complete this now, but will not be required to do so until 2012.

Is this a degree program (undergraduate, graduate, or professional) or major proposal? Yes

Does the degree program or major have an assessment plan on file with the university Office of Academic Affairs? No

DIRECT MEASURES (means of assessment that measure performance directly, are authentic and minimize mitigating or intervening factors)

Classroom assignments

- Embedded testing (i.e. specific questions in homework or exams that allow faculty to assess students' attainments of a specific learning goal)
- Other classroom assessment methods (e.g., writing assignments, oral presentations, oral exams)

Evaluation of a body of work produced by the student

- Practicum, internship or research evaluation of student work
- Capstone course reports, papers, or presentations

INDIRECT MEASURES (means of assessment that are related to direct measures but are steps removed from those measures)

Additional types of indirect evidence

- Grade review

USE OF DATA (how the program uses or will use the evaluation data to make evidence-based improvements to the program periodically)

- Meet with students directly to discuss their performance
- Analyze and discuss trends with the unit's faculty
- Analyze and report to college/school
- Make improvements in curricular requirements (e.g., add, subtract courses)
- Make improvements in course delivery and learning activities within courses
- Periodically confirm that current curriculum and courses are facilitating student attainment of program goals

Program Specializations/Sub-Plans

If you do not specify a program specialization/sub-plan it will be assumed you are submitting this program for all program specializations/sub-plans.

Pre-Major

Does this Program have a Pre-Major? No

Attachments

- Computational Social Science Curriculum Map.pdf
  (Curricular Map(s). Owner: Smith,Charles William)
- Computational Social Science Major Proposal.pdf
  (Program Proposal. Owner: Smith,Charles William)
- Final Combined Letters of Support for CSS.pdf
  (Support/Concurrence Letters. Owner: Smith,Charles William)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Smith,Charles William	04/30/2025 03:23 PM	Submitted for Approval
Approved	Kurtz,Marcus Jurgen	04/30/2025 03:38 PM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	05/06/2025 11:12 AM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Hilty,Michael Neff,Jennifer Vankeerbergen,Bernadette Chantal Steele,Rachel Lea	05/06/2025 11:12 AM	ASCCAO Approval

COMPUTATIONAL SOCIAL SCIENCE: UNDERGRADUATE PROGRAM PROPOSAL

College of Arts & Sciences at The Ohio State University

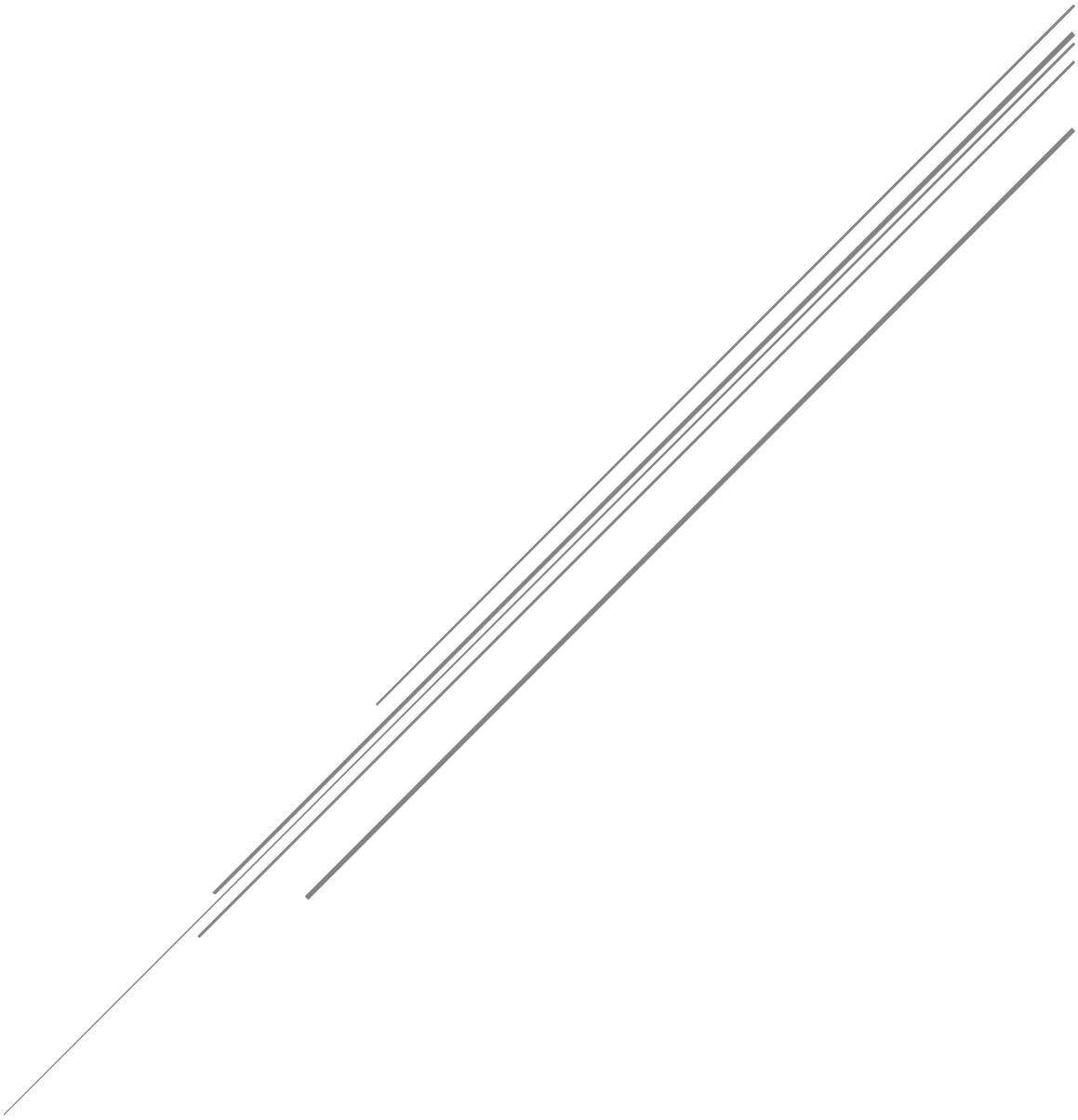

Table of Contents

Section 1: General Information

Name of proposed major: **Computational Social Science**
Degree students completing the major will receive: **Bachelor of Science (BS)**
Proposed implementation date: **Autumn 2026**
Academic units responsible for administrating the major program: **College of Arts and Sciences**
Delivery: **In Person (P)**

Section 2: Rationale

Overview

The Computational Social Science (CSS) Bachelor of Science program trains future transdisciplinary scientists and policymakers to integrate social theory with computational and quantitative expertise. Students will learn to address complex issues in areas such as climate change, sustainability, ethical AI, networked inequality, social cybersecurity, and political complexity. The program combines computational modeling and theory-guided data science to develop practical solutions for contemporary social problems. Leveraging the intellectual breadth of The Ohio State University, the program offers diverse curricular pathways tailored to students' interests while providing consistent training in core CSS skills, tools, and theory.

Narrative

What justifies a new Computational Social Science major at Ohio State? There are a few answers.[1]

[1] We acknowledge Professor Bear Braumoeller's foundational vision and leadership developing this CSS major proposal. Bear was the Baronov and Timashev Chair in Data Analytics in the Department of Political Science at OSU prior to his untimely passing on May 3rd, 2023, in Oslo, Norway.

Intellectual Justification

Computer science has revolutionized fields from linguistics to biology, but its impact throughout most of the social sciences has been modest, mostly due to lack of integration and organization.[2] Social scientists use available machine-learning and NLP methods to process data largely in isolation from the computer science community. At the same time, computer and data scientists focus on a narrow range of social science questions, such as election prediction, ideology classification, and analysis of digital trace data, often without grounded hypotheses or clear explanations. In other words, these two communities have largely stood apart from one another, with CS researchers sometimes unaware of interesting applications in the social sciences, and social scientists not applying cutting-edge computational methods to their problems.[3]

Part of the reason for the disconnect is that social science domain expertise has not traditionally been easy to connect to computational methods. That difficulty is rapidly disappearing. A renewed emphasis on computational modeling in the social sciences, combined with a focus on theory-guided data science in computation, has laid the groundwork for a deeper, richer, and more fruitful engagement between computational methods and the social sciences, which in turn will lead to better social science domain knowledge and practical applications that will contribute to contemporary society. An indication of the growth of interest in computational social science is shown in Figure 1.

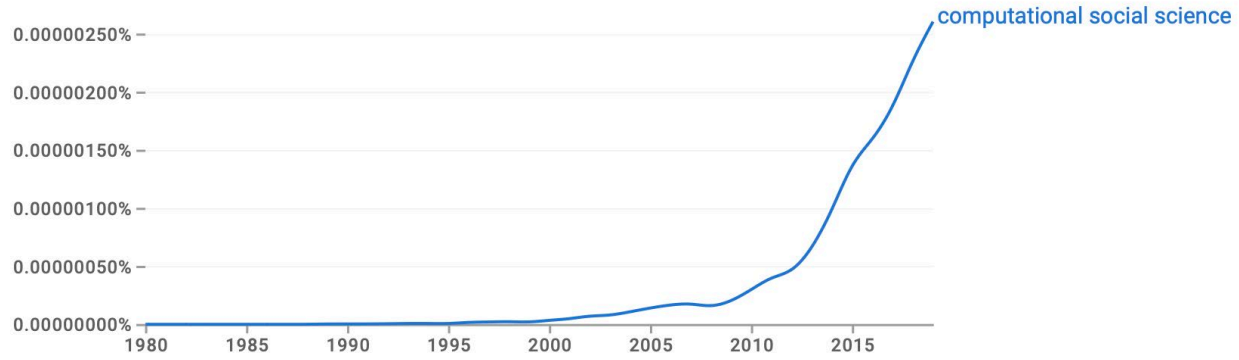

Figure 1:
Growth of the use of the term "computational social science" in Google's corpus of books (1980-2020).

Pedagogical Justification

Ohio State's size, and the ease with which undergraduate students can integrate hands-on research with their program of study, is fertile ground for the growth of team science in the social sciences. Social science research labs, once rare, are now present in most SBS departments. While some undergraduate researchers perform advanced research tasks, most undergraduates lack the combination of substantive knowledge and data-analytics skills that would allow them to investigate modern computational social science research questions. A computational social science program at OSU would greatly expand

[2] See David M. Lazer et al. (2020), "Computational Social science: obstacles and opportunities." *Science*, 369,6507:1060-1062.
[3] For an accessible discussion, see John L. Anderson, "Why Social Science? Because engineering is intended to benefit society." Consortium of Social Science Associations, March 23, 2021.

collaborative research and training opportunities for Ohio State undergraduates and give them a leg up in graduate school admissions and in the job market.

Vocational Justification and Workforce Contributions

In the process of planning a Computational Social Science degree program, we assembled a steering committee comprising faculty from various departments as well as representatives from industry, including Jason Morgan, Vice President for Behavioral Intelligence, Aware; Benjamin Campbell, data scientist at Cover My Meds; Adam Lauretig, Vice President at Barclay's Investment Bank; and Michael McCaslin, Director of Data Science at Nationwide Insurance.

The latter group helped us to articulate a list of specific skills and qualities for the sort of employee that they most hoped to attract and retain, which we then developed into our present curriculum proposal. The ideal employee combines the following in equal measures: (1) real-world knowledge of society and business, (2) basic and advanced quantitative research skills in statistics, machine learning and research design, (3) and programming skills in modern and traditional software platforms and languages. The combination of these characteristics is captured most elegantly in a slide from a recruitment presentation by Nationwide's Center for Advanced Customer Insights, which regularly hires graduate from across the social and behavioral sciences (Figure 2).

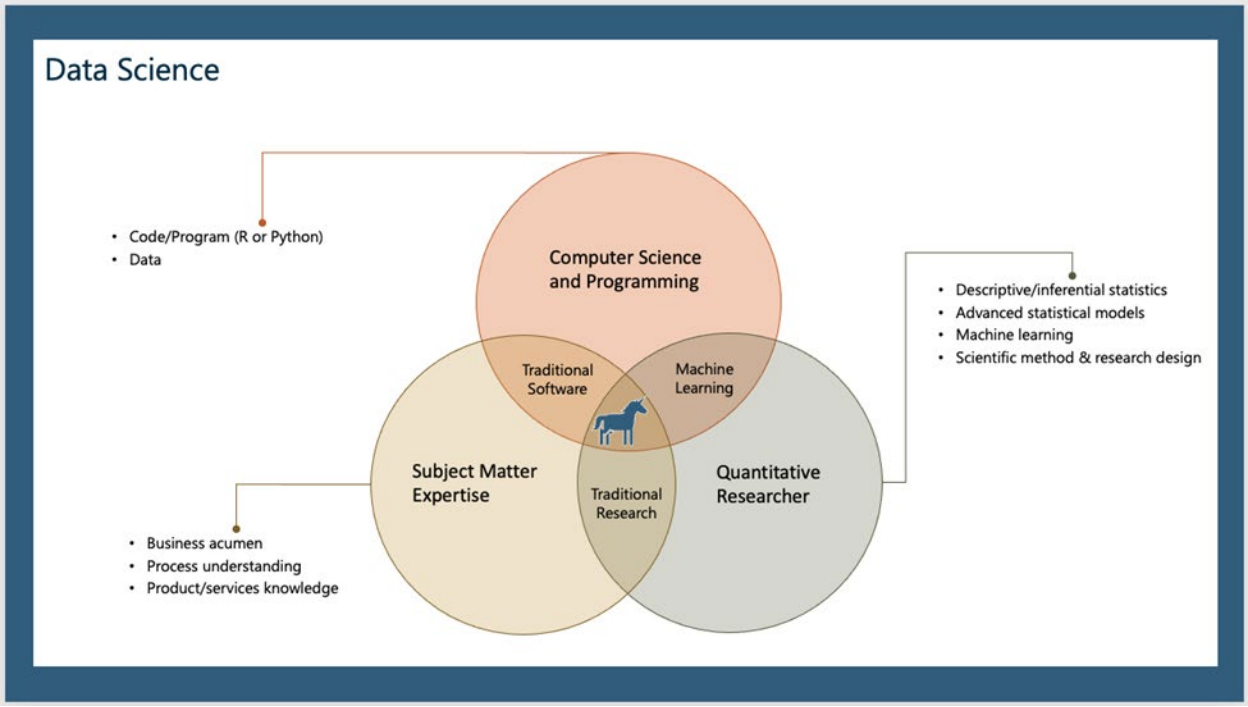

Figure 2:
Nationwide Insurance recruitment slide outlining need for employees with transdisciplinary computational social science training including domain expertise, programming, and quantitative data analysis.

The diagram captures a knowledge gap, not just at Nationwide, but in a broad swath of businesses and government agencies (e.g., U.S. Department of Defense) that seek to understand and predict human behavior using advanced computational methods, including Amazon, Disney, Microsoft, and Facebook, among others. They intentionally place a fictitious *unicorn* at the center of the diagram to hint at the recruiters' frustrations and lack of success in finding candidates with this combination of skills. The CSS

curriculum we developed will position OSU as a national and global leader in training students to fill this proficiency gap in business and industry and thereby help address the challenges of contemporary society.

Section 3: Goals/Outcomes & Evaluation of Program

Goals & Outcomes

Upon completion of the BS degree in Computational Social Science, students should demonstrate proficiency in the following skills and abilities (goals and learning outcomes listed below; corresponding courses are listed in Section 7 of this document):

Goal 1: Social Theory. Students will learn about theoretical camps in the social sciences. Students will apply social theory to interpret and explain patterns in social science data and to generate testable hypotheses that can be supported or falsified.

a) **Critical theorizing.** Describe and critique social science theory as presented in published studies and/or lectures.
b) **Theory development.** Adapt existing social theories or frameworks to address new cases, contexts, or ideas while maintaining their overall coherence and logic.
c) **Theory building.** Explain how algorithmic or mathematical models complement, extend, or enhance existing or new theoretical social-science theories, frameworks, or approaches.
d) **Theory modeling.** Create or apply computational approaches to represent and test theoretical relationships.

Goal 2: Computational Modeling and Analysis: Students will learn about the data generation process and acquire skills for developing mathematical and algorithmic expressions of social theory. Students will learn how to analyze data using computational methods.

a) **Computational platforms.** Conduct statistical and computational analyses by using current tools and technologies for data generation, collection, and processing.
b) **Software proficiency.** Demonstrate proficiency in relevant statistical and computational environments.
c) **Comprehension of computational approaches.** Understand and be able to reproduce computational models and analyses described in published work.
d) **Model testing**. Use comparative model testing strategies and theory-guided data science techniques to compare the explanatory power of models when applied to data.
e) **Communicating computational methods**. Best practices for coding, describing analyses, and disseminating work to enables replication and evaluation.

Goal 3: Research Design: Students will learn to develop analytic strategies for answering social science questions using computational methods. This entails knowledge of data collection, cleaning, testing, and inference.

a) **Distinguishing methodologies.** Explain the pros and cons of various computational approaches when addressing specific research questions in the social sciences.

b) **Experimental modeling**. Create experiments that generate data suitable for computational analyses that inform research questions in the social sciences.
c) **Questions from data**. Use exploratory qualitative and inferential methods to generate research questions and hypotheses.
d) **Interpreting findings**. Explain the significance of findings discovered through computational methods, including proper inferences and limitations of the data.
e) **Research ethics**. Design computational social science research projects and methodologies that are compatible with ethical standards of research.

Goal 4: Interdisciplinary Collaboration: Student will work effectively as part of a team and understand disciplinary and transdisciplinary approaches to social science research.

a) **Data visualization.** Communicate social science data and results of statistical analyses by presenting them in accessible forms to a variety of audiences.
b) **Technical communication.** Communicate scientific findings to professional and public stakeholders, including academics, policymakers, and public audiences.
c) **Professional engagement.** Gain familiarity with the CSS job market and best practices for networking and displaying professionalism.
d) **Collaborative research design.** Co-create computational models by collaborating with teams with diverse disciplinary interests.
e) **Translational ethics.** Demonstrate knowledge of ethics and shared values as related to CSS, particularly when working in industry or with industry partners.

Assessment Plan

The abovementioned goals and learning outcomes are assessed throughout the curriculum. The assessment plan calls for direct assessment of 5-6 outcomes each year, such that all objectives will be assessed every 3-4 years. In addition, programmatic assessment will be embedded in the capstone course. Assessment will be completed by designing questions on exams and rubrics for writing assignments that map onto the proficiencies associated with each learning objective.

Criteria to Evaluate Successful Student Learning

Our metric of success for CSS students will be that ≥75% of students will achieve a four out of five, or "above average," per proficiency assessed. Rubrics will be developed by the faculty advisory committee in consultation with initial course instructors.

A sample assessment plan is provided below (Table 1) in which proficiencies embedded in four of the five goals were assessed across three CSS core courses. Please see Section 7 for the complete set of goals, outcomes, and courses.

Table 1: Example one year assessment plan

Goals and Outcome Assessed	Assessment Location	Assessment Tool	Criteria
Goal 3, outcome E: Design computational social science research projects and methodologies that are compatible with ethical standards of research.	CSS 2100	An in-class short response written after reading an article on bias in technology design.	≥75% of students will achieve a 4 out of 5 in demonstrating this proficiency.

Goal 3, outcome C: a)Use exploratory qualitative and inferential methods to generate research questions and hypotheses.	CSS 4900	Research proposal for CSS 4900 capstone project.	≥75% of students will achieve a 4 out of 5 in demonstrating this proficiency.
Goal 3, outcome B: Create experiments that generate data suitable for computational analyses that inform research questions in the social sciences.	CSS 4900	Team-science capstone project in CSS 4900 that requires a formal presentation to a mock group of business stakeholders.	≥75% of students will achieve a 4 out of 5 in demonstrating this proficiency.
Goal 2, outcome B: Demonstrate proficiency in relevant statistical and computational environments.	CSS 3500	Coding appendix on final data analysis project for CSS 3500.	≥75% of students will achieve a 4 out of 5 in demonstrating this proficiency.

Timeline for Implementation of Assessment Plan

In August of each academic year, the faculty advisory committee will select proficiencies to be assessed over the course of the year. The directors will work directly with instructors of courses mapped to selected proficiencies to request data collection by the conclusion of each semester. In May, the faculty co-directors will review, consolidate, and summarize this data. The resulting report will be shared with the faculty advisory committee for further discussion and uploaded to the University's assessment results platform. Reports will be discussed the following August and used to guide the selection of proficiencies in coming assessment cycles.

Section 4: Relationship to Other Programs & Benchmarking

Market demand

We have identified a very small number of CSS programs at the undergraduate level (BS) across the country that are offered out of, or in collaboration with, Colleges of Arts and Sciences. The most comparable programs we have identified thus far are the BS in Computational Social Sciences at the University of Pittsburgh, and the BS in Quantitative Theory and Methods at Emory. Numerous CSS programs exist at the graduate level, as well as undergraduate certificates and minors (e.g., https://www.sjsu.edu/acbss/).

- University of Pittsburgh BS in CSS (https://www.sci.pitt.edu/academics/undergraduate-majors/computational-social-science)
    - The Computational Social Science major educates students to build, compute, and improve theoretically informed models of social processes, bridging domain and technical expertise.
- Emory University Arts and Sciences: Quantitative Science (QSS) BS (https://quantitative.emory.edu/academics/bachelors/index.html)
    - QSS goes beyond data science degrees available elsewhere by teaching disciplinary theory and context alongside data science methods. "We are the integration of Liberal Arts and Data Science."

In addition, several undergraduate programs in Data Analytics with concentrations in social sciences are operated out of some departments of computer science, such as the X+CS initiative at UIUC.

- University of Illinois Urbana Champaign CS+X BS[4] (https://cs.illinois.edu/academics/undergraduate/degree-program-options/cs-x-degree-programs)
    - The University of Illinois has designed an innovative blended degree option called CS + X that allows students to pursue a flexible program of study incorporating a solid grounding in computer science with technical or professional training in the arts and sciences.
    - In 2023, the UIUC CS+X program has a total enrollment of 1,224 students across 14 majors: CS + Animal Science (6), CS + Anthropology (26), CS + Astronomy (47), CS + Chemistry (24), CS + Linguistics (100), CS + Advertising (71), CS + Economics (200), CS + Education (21), CS + Geography and GIS (16), CS + Philosophy (87), CS + Music (30), CS + Crop Sciences (22), CS + Math (270), CS + Statistics (304).
    - OSU has 22,000 more students than UIUC, indicating possible untapped demand at OSU.

At OSU, the most comparable program is the Data Analytics BS operated out of Statistics and CSE (https://data-analytics.osu.edu).

- This rapidly growing field needs practitioners with expertise that cuts across core disciplines of computer science, mathematics and statistics, and highly developed critical thinking, problem-solving and communication skills.
- As of October 2023: 155 single majors, 18 double majors, and 221 enrolled in the pre-major (Total: 394) across five specializations **Social Science Analytics (6)**, Business Analytics (58), Biomedical and Public Health Analytics (13), Computational Analytics (68), Visualization (26).

We note that the OSU Data Analytics (DA) Social Science Analytics specialization has relatively low enrollment. We do not interpret this as evidence of low demand for CSS at OSU. Rather, we think it is due to the lack of bespoke training in computational social science theory and methods. Enrollment levels are higher in related OSU DA specializations such as business and public health, and there are significant social sciences enrollments in the CS+X program at UIUC, despite being a smaller institution. OSU ASC currently (2023) has 6,000 students declared as a major or minor in SBS disciplines (please refer to Table 2 for a breakdown of enrollments in collaborating departments). Our steering committee (see below) also reinforced the growing demand for professionals with computational skills, domain knowledge, and training in the social sciences, and we expect robust student interest for this program and employer interest in its graduates. The ASC CSS major is differentiated from the CSE DA-Social Science Specialization by providing students with structured disciplinary coursework in the social sciences and bespoke training in computational social science methods.

[4] Information about UIUC obtained from CSE School for Computing Town Hall presentation, Dec. 2023

Section 5: Student Enrollment & Program Structure

Projected Enrollments

Based on the information above, we tentatively estimate stable enrollment of 300 enrolled students by Y4 of the program. The initial cohort will be capped at 25 students in Y1, expanding to 50 in Y2, 100 in Y3, and uncapped in Y4, contingent on course availability and teaching capacity.

Staffing

Faculty Director

The staffing structure will use the existing and successful interdisciplinary major in Philosophy, Politics and Economics (PPE) as a guide. The CSS program will require a faculty director serving a 3-year term and receiving one course release per year to provide time for CSS administrative and advising duties. The director will be required to teach one course in the CSS curriculum per year during their term. To ensure that adequate teaching coverage is available in departments, the specific term of the CSS faculty director, including ASC course buyouts, will be negotiated between the TIU Chair and the appropriate ASC Dean in advance of the director's term.

CSS core faculty

Faculty recruitment

To sustainably staff courses over the long-term, and assuming full enrollment by Y4, the program will require the equivalent of two new CSS Core faculty hires. We envision these as positions with a 2-1 load, with half of the teaching responsibilities to the CSS Major Core classes, and 1 course per year in their TIU. Due to the phased rollout of the program, full staffing will not be needed in Y1.

One of these hires already joined OSU this fall (2024), and another search is currently underway so that the new CSS Core faculty can be online to teach their first CSS classes in 2026. The schedule for Core CSS class offerings 2026-2031 is included below.

Program Coordinator

The program coordinator will be responsible for fiscal and business operations, course scheduling, website maintenance, and curriculum management. FTE will be determined by demand. The structure of staffing will be modeled after recent interdisciplinary programs in the college, namely the successful Politics, Philosophy and Economics (PPE) major.

Academic Advisor

There will be a dedicated CSS professional academic advisor located in the ASC Advising office. The advisor will coordinate with students, co-directors, affiliated faculty, and advisors in participating departments to guide student coursework and minors to ensure that they are aligned with the CSS Core framework and student goals. The CSS Advisor will work closely with departmental advisors to ensure that students fulfill the disciplinary requirements for earning a Minor degree, while also selecting disciplinary classes that fulfill the necessary transdisciplinary training in social science and computational methods.

Program Organization

The Program will include an Advisory Committee, Collaborating Departments, and Affiliated faculty.

Advisory Committee

The advisory committee consists of affiliated faculty from departments and colleges across campus with expertise in teaching CSS theory or methods. The advisory committee will have a minimum of four members, including the director, with priority given to participating departments. The director will be selected from a participating unit by the SBS Divisional Dean. The Chair of Statistics (or her designee) is an ex officio member.

Affiliated Faculty

The program will maintain a list of affiliated faculty members, who will teach courses that are part of the CSS curriculum. Affiliated faculty can also provide input to the core CSS curriculum as needed. Courses may be cross-listed with departments or affiliated faculty may negotiate course-buyouts from TIU to teach Core CSS classes.

Collaborating Departments

CSS will work with collaborating departments to cross-train students in computational methods, social science theory, and domain knowledge. The undergraduate curriculum committee in each collaborating department will provide a list of courses for CSS students and approve department-specific CSS advising sheets. The departmental undergraduate advisor(s) will coordinate with the CSS advisor to help students select suitable transdisciplinary coursework when selecting courses for required minors. There are nine collaborating departments at the initiation of the program (Table 2), and additional collaborations may be established in the future. Letters of support are attached to this proposal. Departments have the option of determining which of their Minor offerings are aligned with the CSS curriculum described in this proposal.

Table 2: Collaborating units and disciplinary foci

Collaborating Unit	SP 2024 enrollment (all majors & minors)	Disciplinary foci
1. Anthropology (ASC)	365	Human biology, behavior, and culture, past and present
2. Geography (ASC)	214	Urban growth/decline, regional population shifts, societal change, spatial patterns of human activity, spatial models and mapping
3. Linguistics (ASC)	126	Computational linguistics, historical linguistics, morphology, phonetics, syntax
4. Political Science (ASC)	725	Political psychology, political economy, formal theory and political theory, race, ethnicity, and gender.
5. Psychology (ASC)	2,298	Neuroscience and imaging, Social processes in human interaction, psychopathology, decision psychology
6. School of Communication (ASC)	1,487	Interpersonal and mass communication in marketing, business, and society.
7. Sociology (ASC)	987	Criminology, criminal justice, stratification and inequality, social networks
8. Statistics (ASC)	653	Bayesian statistics, spatiotemporal statistics, statistical learning and biostatistics
9. Economics (ASC)	1122	Behavioral economics, macroeconomics, labor economics, econometrics, economic theory, monetary economics, industrial organization, and economic history.
TOTAL:	**7,977**	

CSS Operating Budget

An operating budget is necessary for the ongoing success of the program. An allocation for student recruitment will be particularly important to promote the B.S. because Computational Social Science is a relatively new transdisciplinary specialization without the name recognition of traditional disciplines.

We estimate the full budget in Y4 (AY2028-29) assuming full enrollment. Budgetary requirements for Years 1, 2 and 3 will be lower by using shared ASC resources, and faculty from existing departments who can teach core CSS classes.

- Salary & benefits (assuming full enrollment by Y4)
    - 1 Student Advisor (100% FTE or in-kind from ASC Advising)
    - 1 faculty director
- Operating Budget
    - Student recruitment ($10,000/year in Y1 and Y2, $5,000/yr. thereafter) for advertising on campus and nationally using online and traditional media.
    - Annual student welcome reception and commencement ceremony ($2,000).
    - Faculty affiliates event ($1,000/year) – Annual 1-day CSS curriculum coordination and development workshop for affiliated faculty and collaborating departments.

Section 6: Curricular Requirements

The major requires 35 credit hours with a required minor of 12-15 credit hours for a grand total of 47-50 credit hours for the Bachelor of Science in Computational Social Science (with minor). See Figure 3. There is no stand-alone CSS minor available at this time.

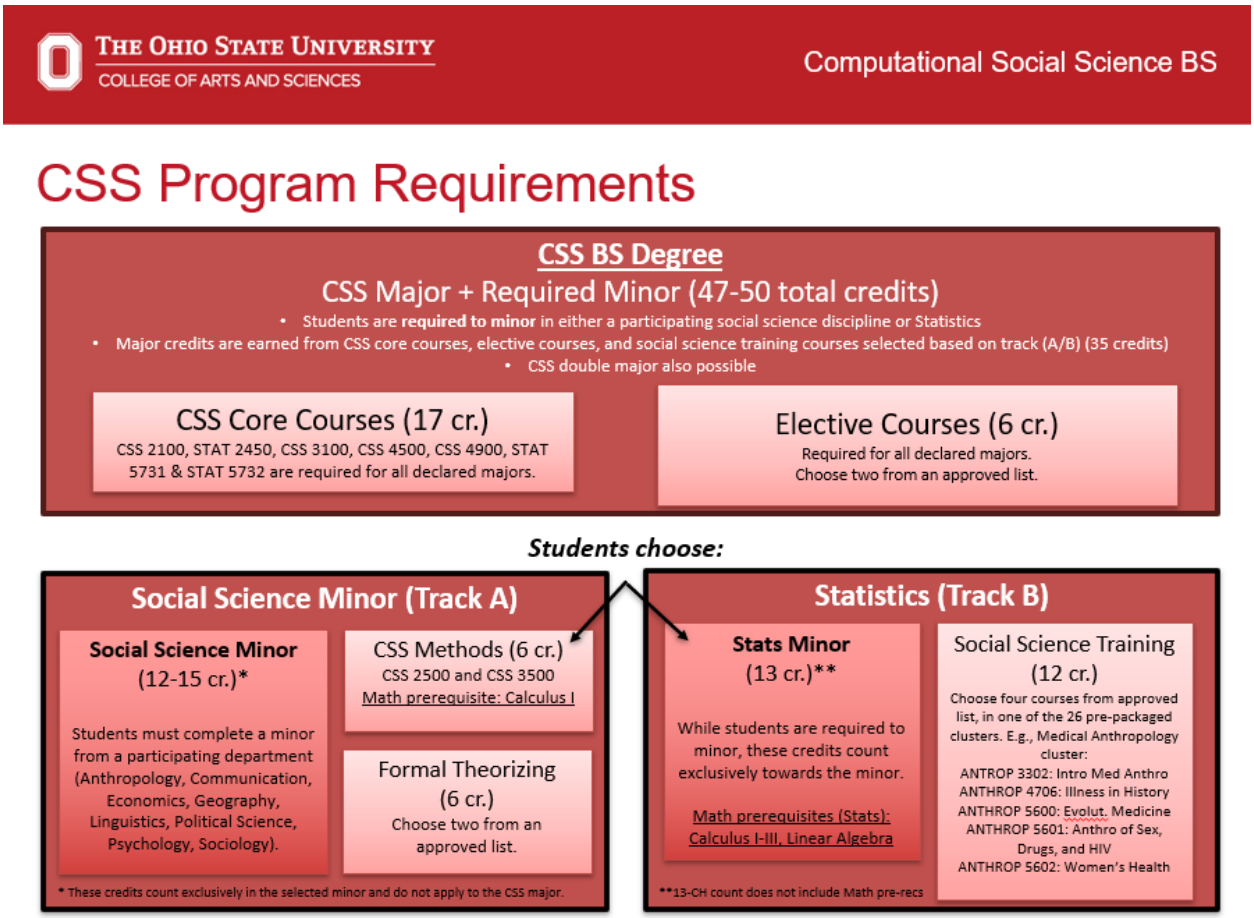

Figure 3:
Diagram of CSS Bachelor of Science Curricular Requirements

CSS Prerequisite Classes

While there are no prerequisite courses for the major, STAT 2450 requires MATH 1151 or equivalent and Track B students have additional prerequisites to complete the Statistics minor. Students may take other courses in the major before taking MATH 1151.

CSS Major Core Classes

All students will take **17 credit hours of core CSS coursework** (CSS 2100: Core Concepts in CSS; STAT 2450: Intro to Statistical Analysis I; CSS 3100: Social Theory-Guided CSS; CSS 4500: Advanced Computational Social Science Toolbox; CSS 4900: CSS Capstone; STAT 5731 & STAT 5732: Introduction to R for Data Science I & II).

An **additional 6 credit hours are required from a list of approved electives**. These 23 credit hours will comprise the core classes that will ensure that all students receive training in foundational skills and theory in the transdisciplinary field of computational social science.

CSS Elective Classes

All students will take 6 credit hours of elective credits, choosing two courses from the following:

- COMM 2540: Introduction to Communication Technology
- INTSTDS 3702: Herding Cyber Cats- Information Security Management
- PHILOS 2332.01: Engineering Ethics for a Diverse and Just World
- SOCIOL 3302: Technology and Global Society

The above courses are designed to introduce students to social science approaches to technology and society and/or engaging with complex multidisciplinary problems.

Transdisciplinary CSS education Tracks

The CSS Major provides transdisciplinary training for students with different skills, backgrounds, and interests. In addition to the CSS Major Core Classes listed above, students will follow one of two tracks through the program to fulfill major requirements, guided by student interests and in consultation with a CSS advisor. Students will be expected to meet all department level rules and regulations of the department governing their minor, including prerequisites, enrollment constraints and course scheduling priorities.

Track A: Social Science Minor

Requires students to take an approved social science minor, a sequence of transdisciplinary CSS methods training, and two theory courses.

Social science minor options (12 credit hours)

Current participating departments for the minor include Anthropology, Economics, Geography, Political Science, Psychology, Sociology, Communication, and Linguistics. Additional minors may be approved in the future with the approval of the faculty advisory committee.

Theory and Methods CSS sequence (6 credit hours)

Track A students must take the following sequence of CSS methods classes. See below for fuller course descriptions.

1. CSS 2500: Methods and Theory in Computational Social Science I
2. CSS 3500: Methods and Theory in Computational Social Science II

Formal theorizing courses (6 credit hours)

Students must take 6 credit hours of coursework that covers formal theorizing. Formal theorizing courses must teach students to make connections between abstract theoretical models (frameworks, heuristic models, etc.) and data. Examples include formal mathematical models, econometric approaches, social networks, game theory, and agent-based models, among others. Students should be able to explain how such models link data to theory, and how they are used to test, reject, validate and improve theory in the social sciences.

The following courses meet the criteria for formal theorizing and have been discussed with the relevant directors of undergraduate studies:

- ANTH 3623: Environmental Anthropology
- ANTH 5505: Wicked Science (move here instead of the list of CSS Electives)
- COMM 4665: Human Communication in Social Networks

- ECON 2202: Principles of Macroeconomics
- ECON 2001: Principles of Microeconomics
- ECON 4001.01: Intermediate Microeconomics
- GEOG 2200: Mapping our World
- GEOG 5210: Fundamentals of GIS
- POLITSC 4553: Game Theory for Political Scientists
- POLITSC 3500: Political Games: Rational Choice Theory and the Study of Politics
- SOCIOL 4650: Social Networks
- SOCIOL 5463: Advanced Social Stratification

Track B: Statistics

Track B students minor in Statistics and then take four courses in a designated cluster of social science training courses (see below and Section 8 for listing).

Statistics minor (13 credit hours)

The Statistics minor encompasses 13 credit hours. Prerequisites for the minor total a minimum of 17 additional credit hours, provided students do not have prior credit for any of the Math Calculus sequence.

Required courses (10 credit hours):

- STAT 3201: Introduction to Probability for Data Analytics (3 credit hours)
    - Prerequisites:
        - MATH 1151 – Calculus I (5 credit hours)
        - MATH 1152 - Calculus II (5 credit hours)
- STAT 3202: Introduction to Statistical Inference for Data Analytics (4 credit hours)
    - Prerequisite:
        - STAT 3201
- STAT 3301: Statistical Modeling for Discovery I (3 credit hours)
    - Prerequisites:
        - STAT 3202; or STAT 4202 and STAT 5730
    - Prerequisites or Corequisite:
        - MATH 2568 - Linear Algebra (3 credit hours)
            - MATH 2568 has an additional prerequisite of MATH 2153 – Calculus III (4 credit hours)

Elective courses (3 credit hours; choose 1):

- STAT 3302: Statistical Modeling for Discovery II (3 credit hours)
    - Prerequisites:
        - STAT 3301 and MATH 2568
- STAT 3303: Bayesian Analysis and Statistical Decision Making (3 credit hours)
    - Prerequisites:
        - STAT 3301 or
        - STAT 4202 and STAT 5731 and STAT 5732
- STAT 3410: Principles of Data Collection and Analysis (3 credit hours)

    - Prerequisites:
        - STAT 3200 or
        - STAT 4202 and STAT 5731 and STAT 5732
- STAT 5510: Statistical Foundations of Survey Research (3 credit hours)
    - Prerequisite:
        - GE Data Analysis course

Social Science Training Clusters (12 credit hours)

Students are required to select four courses for a minimum of 12 credit hours from a list of classes that have been curated by faculty affiliates in participating units to complement the core CSS course sequence. Each unit developed a list of courses around one or more subareas of their discipline (see Section 8 for full list), including courses that satisfy intermediate and formal theorizing. Intermediate theorizing course in the social sciences are designed to teach students to describe the range of theoretical approaches that are most commonly used, as well as emergent theoretical trends, and the ability to apply appropriate theory to social science questions within their discipline. These classes will usually be at the 3000 or 4000 level, and may be considered intermediate or advanced coursework, depending on disciplinary norms. Formal theorizing courses refer to classes that teach students to make connections between abstract theoretical models (frameworks, heuristic models, etc.) and data. Most often, these courses will teach students about so-called "mid-range theory", though this term may not be used in all disciplines. They should be able to explain key examples of such approaches in their field, and how they relate to theory development.

For example, a student interested in political science with a focus on American politics and law would choose four courses from the following list:

- POLITSC 2150: Voters and Elections
- POLITSC 3115: Introduction to the Policy Process
- POLITSC 4110: American Presidency
- POLITSC 4115: Bureaucracy and Public Policy
- POLITSC 4120: U.S. Congress
- POLITSC 4130: Law and Politics
- POLITSC 4135: American Constitutional Law

Each of the cluster areas has a similar list, which has been reviewed by the relevant Director of Undergraduate Studies (see Section 8).

If a selected cluster cannot be completed in a reasonable timeframe due to fluctuations in individual departmental course offerings, students may work with their academic and faculty advisors to select alternative courses. Additionally, if a student has compelling interest in selecting approved courses outside a predetermined cluster, they may work with their academic and faculty advisors to select alternative courses.

Double Majoring in CSS

Students wishing to pursue a double major with one of the collaborating departments may do so in lieu of pursuing the required minor. Students pursuing a double major outside of the partnering departments will not be permitted to waive the minor requirement. Per University policy, 18 credit hours must be unique to each major. CSS double majors are required to count the following courses exclusively towards the CSS major:

- CSS 2100
- CSS 3100
- CSS 4900
- Track A students:
    - CSS 2500
    - CSS 3500
    - One 3 credit hour formal theorizing course; **OR** one 3 credit hour elective course
- Track B students:
    - Three 3 credit hour social science training courses; **OR** three 3 credit hour elective courses; **OR** a combination thereof

CSS New Course Offerings

Six new courses will be developed. Computational social science courses will use the "CSS" course prefix. Complete syllabi are included for review in Section 9 of this proposal.

CSS 2100: Core Concepts in CSS – This course provides students with an introduction to the transdisciplinary field of computational social science using a textbook and readings, engaging case studies that draw on real-world examples, and hands-on laboratory exercises designed to provide a gentle entrée into the emergent field of computational social science research and practice.

CSS 2500: Methods and Theory in Computational Social Science I – The goal of this course is to introduce students to key formalisms and applied computational, mathematical, and statistical tools used in the field of computational social science, with particular emphasis on how they relate to "big questions" and theory in the social sciences. Students will be introduced to the scientific method, research design, structured and unstructured data, programming, statistics, and algorithms to gain insights about the world. Case studies will draw on data from the social and behavioral sciences. Students will begin to learn how to translate social norms, practices and theory into "data generation processes" using simple models and simulations. This is the first course in a 2-course core sequence in CSS methods. (Required for Track A; optional for Track B)

CSS 3100: Social Theory-Guided Computational Social Science – This intermediate-level course is designed to provide students theoretical and methodological training combining social science theory with data science methods and conducting research. It will provide students with the opportunity to generate hypotheses based on theories from the social sciences and to then analyze and test them with computational tools, and translating and interpreting these results to broaden the impact of CSS methods in social theory development and social applications in policy and industry. Particular attention is paid to research design, identifying and addressing biases in data and algorithms, and application to the development of theory and practice in the computational social sciences.

CSS 3500: Methods and Theory in Computational Social Science II – The goal of this course is to develop students' ability to apply formalisms and applied computational, mathematical, and statistical tools to "big questions" and theory in the social sciences. This is the second course in a 2-course core Methods and Theory sequence which includes applications of limited responses, multi-level models, modeling and simulating social and behavioral data generation processes, intermediate visualization, and introductory causal inference. (Required for Track A; optional for Track B)

CSS 4500: Advanced Computational Social Science Toolbox – This course will provide students with exposure, intuition, and practice in advanced computation, simulation, and analytics with emphasis on applications to theory and data in the computational social sciences. A key learning outcome is to provide students with context and intuition with advanced methods to foster interdisciplinary collaboration with technical experts (e.g., in machine learning) and social theorists (e.g., in political science). Students will explore practical ways to create data mining and machine learning workflows suitable for social science data and for modeling and simulating more complex social theory and behavioral data generation processes. (Prerequisites: CSS 2100, CSS 3100)

CSS 4900: Computational Social Science Capstone – In this course, students work together in small teams to solve a translational problem using computational social science methods and theory. Teams will choose from a set of possible translational problems identified by the instructor and/or community partners, and work together to conceptualize a research project, if necessary, obtain, process and clean relevant data, and then implement computational methods to identify solutions. This course also includes training in professional development. (Prerequisites: CSS 2100, CSS 3100, CSS 4500)**.**

Example student pathways

This section demonstrates examples of the courses and timing that a representative student might take through the curriculum to achieve a major in CSS.

Sample Student Pathway- Social Science Minor (Track A)

CSS-BS Sample 4-Year Plan (Track A)

CSS Major with Minor in Sociology

Note: major coursework can be completed in 3 years for students who add the major in year 2

Year One

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
MATH 1151: Calc I	5	Pre-Rec/GE Foundation*	STAT 2450: Intro to Statistical Analysis I	3	Core
ASC 1100.XX: Survey	1	College Requirement	GENED 1201: GE Launch Seminar	1	GE Bookend
CSS 2100: Core concepts in CSS	3	Core	CSS 3100: Social Theory Guided Data Science	3	Core
SOCIOL 1101: Introduction to Sociology	3	Pre-Rec/GE Foundation*	World Language 1101	4	College Requirement
Writing & Information Literacy GE	3	GE Foundation	Nautral Science GE	4	GE Foundation
Total CH per semester	**15**		**Total CH per semester**	**15**	

*Cannot demand students take this for GE Foundation, but this course may be used to fulfill this requirement

Year Two

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
Phil 2332.01: Engineering Ethics for a Diverse and Just World	3	CSS Elective	STAT 5731 & STAT 5732**	2	Core
CSS 2500: Data Science for CSS I	3	Track A (CSS Skillset)	CSS 3500: Data Science for CSS II	3	Track A (CSS Skillset)
World Language 1102	4	College Requirement	World Language 1103	4	College Requirement
Race, Ethnicity & Gender Diversity GE	3	GE Foundation	SOCIOL 3487: Research Methods in Sociology	3	Track A (SBS Minor)
SOCIOL 2463: Social Stratification: Race, Class, and Gender	3	Track A (SBS Minor)	Literary, Visual & Performing Arts GE	3	GE Foundation
Total CH per semester	**16**		**Total CH per semester**	**15**	

**STAT 5731 & 5732 are each 7-week session courses at 1-CH per course

Year Three

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
GEOG 2200: Mapping our World	3	Track A (CSS Skillset)	ANTH 5505: Wicked Science	3	Track A (CSS Skillset)
SOCIOL 2309: Law & Society	3	Track A (SBS Minor)	CSS 4500: Advanced CSS Toolbox	3	Core
SOCIOL 2202: Social Problems & Public Policy	3	Track A (SBS Minor)	SOCIOL 4000S: Social Science Business Collaborative	3	Track A (SBS Minor)
Historical & Cultural Studies GE	3	GE Foundation	Citizenship for a Diverse & Just World GE	3	GE Theme
IntStds 3702: Herding Cyber Cats: Information Security Management	3	CSS Elective	Theme GE	3	GE Theme
Total CH per semester	**15**		**Total CH per semester**	**15**	

Year Four

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
CSS 4900: CSS Capstone	3	Core	CSS 4999: Undergrad Research***	3	CSS Elective or Full time status
Citizenship for a Diverse & Just World GE	3	GE Theme	Theme GE	3	GE Theme
Elective	3	Full-time Status	GENED 4001: Reflection Seminar	1	GE Bookend
Elective	3	Full-time Status	Elective	3	Full-time Status
Elective	3	Full-time Status	Elective	3	Full-time Status
			Elective	2	Full-time Status
Total CH per semester	**15**		**Total CH per semester**	**15**	

***CSS 4999 can be used to replace the final advanced research elective by students pursuing formal research distinction

Figure 4:
CSS-BS Sample 4-year plan for Track A students

Sample Student Pathway- Statistics Minor (Track B)

CSS-BS Sample 4-Year Plan (Track B)

CSS Major with Minor in Statistics & Cluster in Media & Society

Note: major coursework can be completed in 3 years for students who add the major in year 2

Year One

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
MATH 1151: Calc I	5	Pre-Rec/GE Foundation*	MATH 1152: Calc II	5	Track B/Stats Minor Pre-Rec
ASC 1100.XX: Survey	1	College Requirement	GENED 1201: GE Launch Seminar	1	GE Bookend
CSS 2100: Core concepts in CSS	3	Core	CSS 3100: Social Theory Guided Data Science	3	Core
SOCIOL 1101: Introduction to Sociology	3	Pre-Rec/GE Foundation*	World Language 1101	4	College Requirement
Writing & Information Literacy GE	3	GE Foundation	Nautral Science GE	4	GE Foundation
Total CH per semester	**15**		**Total CH per semester**	**17**	

**Cannot demand students take this for GE Foundation, but this course may be used to fulfill this requirement*

Year Two

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
Phil 2332.01: Engineering Ethics for a Diverse and Just World	3	CSS Elective	STAT 5731 & STAT 5732**	2	Core
MATH 2153: Calc III	4	Track B/ Stats Minor Pre-Rec	MATH 2568: Linear Algebra	3	Track B Stats Minor Pre-Rec
World Language 1102	4	College Requirement	World Language 1103	4	College Requirement
Race, Ethnicity & Gender Diversity GE	3	GE Foundation	STAT 3201: Introduction to Probability for Data Analytics	3	Track B Stats Minor
STAT 2450: Intro to Statistical Analysis I	3	Core	Literary, Visual & Performing Arts GE	3	GE Foundation
Total CH per semester	**17**		**Total CH per semester**	**15**	

*** STAT 5731 & 5732 are each 7-week session courses at 1-CH per course*

Year Three

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
STAT 3202: Introduction to Statistical Inference for Data Analytics	4	Track B Stats Minor	COMM 4240: Science Communication	3	Track B Social Science Cluster
COMM 3440: Mass Communication & Society	3	Track B Social Science Cluster	CSS 4500: Advanced CSS Toolbox	3	Core
COMM 3404: Media Law & Ethics	3	Track B Social Science Cluster	COMM 4820: Public Opinion & Communication	3	Track B Social Science Cluster
Historical & Cultural Studies GE	3	GE Foundation	Citizenship for a Diverse & Just World GE	3	GE Theme
IntStds 3702: Herding Cyber Cats: Information Security Management	3	CSS Elective	Theme GE	3	GE Theme
Total CH per semester	**16**		**Total CH per semester**	**15**	

Year Four

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
CSS 4900: CSS Capstone	3	Core	CSS 4999: Undergrad Research*	3	CSS Elective or Full time status
Citizenship for a Diverse & Just World GE	3	GE Theme	Theme GE	3	GE Theme
STAT 3301: Statistical Modeling for Discovery I	3	Track B Stats Minor	GENED 4001: Reflection Seminar	1	GE Bookend
Elective	3	Full-time Status	STAT 3302: Statistical Modeling for Discovery II	3	Track B Stats Minor
Elective	3	Full-time Status	Elective	3	Full-time Status
			Elective	2	Full-time Status
Total CH per semester	**15**		**Total CH per semester**	**15**	

Additional Notes: all MATH courses are offered in SU terms as well

STAT 3201, 3202 are offered AU&SP only

STAT 3301 is AU only

STAT 3302 is SP only

Students are 9-CH away from Math minor with this plan

*CSS 4999 can be used to replace the final advanced research elective by students pursuing formal research distinction

Figure 5:
CSS-BS Sample 4-year plan for Track B students

Section 7: Integrated Learning Goals, Objectives, and Proficiencies

Table 3: Summary of Goals, Learning Outcomes, and Assessment

Goal	Outcome	Relevant course(s)	Assessment course(s)
Goal 1: Social Theory. Students will learn about theoretical camps in the social sciences. Students will apply social theory to interpret and explain patterns in social science data and to generate testable hypotheses that can be supported or falsified.			
a)	**Critical theorizing**. Describe and critique social science theory as presented in published studies and/or lectures.	CSS 2500, CSS 3500	CSS 3500
b)	**Theory development**. Adapt existing social theories or frameworks to address new cases, contexts, or ideas while maintaining their overall coherence and logic.	Minor or Social Science Training Courses	Minor program
c)	**Theory building**. Explain how algorithmic or mathematical models complement, extend, or enhance existing or new theoretical social-science theories, frameworks, or approaches.	Electives (Social theory, Advanced methods), CSS 3100, CSS 4900	CSS 3100 CSS 4900
d)	**Theory modeling**. Create or apply computational approaches to represent and test theoretical relationships.	CSS 4500 and Advanced Methods Electives	CSS 4500
		Relevant course(s)	**Assessment course(s)**
Goal 2: Computational Modeling and Analysis: Students will learn about the data generation process and acquire skills for developing mathematical and algorithmic expressions of social theory. Students will learn how to analyze data using computational methods.			
	Computational platforms. Conduct statistical and computational analyses by using current tools and technologies for data generation, collection, and processing.	CSS 2500, CSS 3100, CSS 3500	CSS 3500

	Software proficiency. Demonstrate proficiency in relevant statistical and computational environments.	CSS 3500, CSS 4500, Advanced methods electives	CSS 3500 CSS 4500
	Comprehension of computational approaches. Understand and be able to reproduce computational models and analyses described in published work.	CSS 3500, CSS 4500 and Advanced Methods Electives	CSS 3500 CSS 4500
		Relevant course(s)	**Assessment course(s)**
Goal 3: Research Design: Students will learn to develop analytic strategies for answering social science questions using computational methods. This entails knowledge of data collection, cleaning, testing, and inference.			
a)	**Distinguishing methodologies.** Explain the pros and cons of various computational approaches when addressing specific research questions in the social sciences.	CSS 4500, CSS 4900 (capstone)	CSS 4500 CSS 4900
b)	**Experimental modeling**. Create experiments that generate data suitable for computational analyses that inform research questions in the social sciences.	CSS 2100, CSS 2500, CSS 3100, CSS 4900, Minor or Social Science Training Courses	CSS 3100 CSS 4900
c)	**Questions from data**. Use exploratory qualitative and inferential methods to generate research questions and hypotheses.	CSS 3100, CSS 4500	CSS 4500
d)	**Interpreting findings**. Explain the significance of findings discovered through computational methods, including proper inferences and limitations of the data.	CSS 2500, CSS 3500	CSS 3500
e)	**Research ethics**. Design computational social science research projects and methodologies that are compatible with ethical standards of research.	CSS 2100, CSS 3100	CSS 3100
		Relevant course(s)	**Assessment course(s)**
Goal 4: Interdisciplinary Collaboration: Student will work effectively as part of a team and understand disciplinary and transdisciplinary approaches to social science research.			

a)	**Data visualization.** Communicate social science data and results of statistical analyses by presenting them in accessible forms to a variety of audiences.	CSS 3500, CSS 4500, Advanced methods electives	CSS 3500 CSS 4500
b)	**Technical communication.** Communicate scientific findings to professional and public stakeholders, including academics, policymakers, and public audiences.	CSS 3100, CSS 4900, CSS 3100	CSS 4900
c)	**Professional engagement.** Gain familiarity with the CSS job market and best practices for networking and displaying professionalism.	CSS 4900	CSS 4900
d)	**Collaborative research design.** Co-create computational models by collaborating with teams with diverse disciplinary interests.	CSS 4900	CSS 4900
e)	**Translational ethics.** Demonstrate knowledge of ethics and shared values as related to CSS, particularly when working in industry or with industry partners.	CSS 2100, Minor or Social Science Training Courses, CSS 3100, CSS 4900	CSS 2100 CSS 4900

Section 8 : List of Social Science Training Clusters for Track B students

Sociocultural anthropology

- ANTHROP 2202(H): Introduction to Cultural Anthropology
- ANTHROP 3027: Disasters and Health
- ANTHROP 4525: History of Anthropological Theory
- ANTHROP 5626: More: Culture and Economic Life
- ANTHROP 5627: Migrants and Refugees
- ANTHROP 5650: Research Design and Ethnographic Methods

Medical anthropology

- ANTROP 3302: Introduction to Medical Anthropology
- ANTHROP 4706: Chronic Illness, Injury, and Disability in Modern History
- ANTHROP 5600: Evolutionary Medicine
- ANTHROP 5601: The Anthropology of Sex, Drugs, and HIV
- ANTHROP 5602: Women's Health in Global Perspective

Socio-ecological systems

- ANTHROP 3050: Social and Ecological Systems: From Problems to Prospects
- ANTHROP 3411: Human Ecological Adaptations
- ANTHROP 3604: Introduction to the Methods of Archaeological Science
- ANTHROP 3623: Environmental Anthropology
- ANTHROP 5505: Wicked Science
- ANTHROP 5610: Ethnobotany
- ANTHROP 5620: Hunters and Gatherers

Archaeology

- ANTHROP 2201(H): Introduction to Archaeology
- ANTHROP 3401: Fundamentals of Archaeology
- ANTHROP 4597.03H: Models of Sustainability and Resilience: Lessons from the Past
- ANTHROP 5603: Strategy of Archaeological Field Research
- ANTHROP 5604: Archaeology Lab Methods
- ANTHROP 5651: Spatial Analysis for Anthropologists

Biological and forensic anthropology

- ANTHROP 2200(H): Introduction to Biological Anthropology
- ANTHROP 2210: Race, Ethnicity, Gender Diversity, and Human Biology
- ANTHROP 3300: Human Origins
- ANTHROP 3301: Human Biological Diversity and Health
- ANTHROP 3305: Introduction to Forensic Anthropology
- ANTHROP 5642: Growth and Development
- ANTHROP 5641: Primate Behavior
- ANTHROP 5645: Life History Evolution, Aging, and Senescence

General Psychology

Note: select only one course from each bullet, up to 12 credit hours total

- PSYCH 3313: Behavioral Neuroscience ***or*** PSYCH 3513: Cognitive Neuroscience
- PSYCH 3310: Sensation & Perception ***or*** PSYCH 3312: Learning & Memory
- PSYCH 3331: Abnormal Psychology ***or*** PSYCH 3335: Psychology of Adjustment
- PSYCH 3340: Lifespan Development ***or*** PSYCH 3550: Psychology of Childhood ***or*** 3551: Psychology of Adolescence
- PSYCH 3325: Social Psychology ***or*** PSYCH 3375: Stereotyping & Prejudice

Clinical Psychology

- PSYCH 2303: Positive Psychology
- PSYCH 2333: Human Sexuality
- PSYCH 2376: Interpersonal Relationships
- PSYCH 3331: Abnormal Psychology
- PSYCH 3530: Psychology of Personality
- PSYCH 3335: Psychology of Adjustment

Developmental Psychology

- PSYCH 2303: Positive Psychology
- PSYCH 2333: Human Sexuality
- PSYCH 3335: Psychology of Adjustment
- PSYCH 3340: Lifespan Development
- PSYCH 3530: Psychology of Personality
- PSYCH 3550: Psychology of Childhood
- PSYCH 3551: Psychology of Adolescence

Organization & Performance Psychology

- PSYCH 2311: Psychology of Motivation
- PSYCH 2420: Psychology Applied to Sport
- PSYCH 2462: Psychology of Creativity
- PSYCH 3325: Introduction to Social Psychology
- PSYCH 3522: Organizational Psychology

Social & Personality Psychology

- PSYCH 2376: Interpersonal Relationships
- PSYCH 3325: Introduction to Social Psychology
- PSYCH 3375: Stereotyping & Prejudice
- PSYCH 3530: Psychology of Personality
- PSYCH 3900: A Practical Guide to Ruling the World

Note on Economics clusters: ECON 2001.02 is a pre-requisite for all 4000-level ECON courses. It may be waived by instructors for CSS students.

Empirical methods in economics

- ECON 2001.02: Principles of Microeconomics
- ECON 2002.02: Principles of Macroeconomics
- ECON 4001.02: Intermediate Microeconomics

- ECON 4410: Data Management and Econometric Analysis
- ECON 5410: Econometrics I
- ECON 5420: Econometrics II
- ECON 4002.02: Intermediate Macroeconomic Theory

Applied microeconomics

Required courses in this cluster:

- ECON 2001.02: Principles of Microeconomics
- ECON 4001.02 Intermediate Microeconomic Theory

Choose two from:

- ECON 5700 Industrial Organization
- ECON 5860 Health Economics
- ECON 5850 Labor Economics
- ECON 5001 Game Theory

Macroeconomics

- ECON 4001.02 Intermediate Microeconomic Theory
- ECON 4002.02 Intermediate Macroeconomic Theory
- ECON 4200 Money and Banking
- ECON 5660 Financial Aspects of International Trade

Criminology and criminal law

- SOCIOL 2209: Introduction to Criminal Justice
- SOCIOL 2309: Introduction to Law & Society
- SOCIOL 3410(H): Criminology
- SOCIOL 4462: Advanced Social Stratification
- SOCIOL 4507: The Criminal Justice System
- SOCIOL 4509: Sociology of Law
- SOCIOL 4511: Juvenile Delinquency
- SOCIOL 4611: Jails, Prisons, and Community Corrections
- SOCIOL 5525: Global Criminology

Social Inequality

- SOCIOL 2320: Sociology of Education
- SOCIOL 2367.01H: The Political Elite and Interest Groups
- SOCIOL 2367.02: Urban Social Problems
- SOCIOL 3200: Sociology of Immigration
- SOCIOL 3306: Sociology of Poverty
- SOCIOL 3380: Race and Ethnic Relations in America
- SOCIOL 3464: Work, Employment & Society
- SOCIOL 4462: Advanced Social Stratification
- SOCIOL 4635: Gender and Society
- SOCIOL 4655: Sociology of Sport
- SOCIOL 5605: Sociology of Sexuality

Population dynamics and wellness

- SOCIOL 2202: Social Problems
- SOCIOL 2290: Sociology of Death & Dying
- SOCIOL 3200: Sociology of Immigration
- SOCIOL 3630: Medical Sociology
- SOCIOL 4462: Advanced Social Stratification
- SOCIOL 4629: Health Disparities in Social Context
- SOCIOL 5450: The Sociology of Global Health & Illness

American Democracy and Law

- POLITSC 2150: Voters and Elections
- POLITSC 3115: Introduction to the Policy Process
- POLITSC 4110: American Presidency
- POLITSC 4115: Bureaucracy and Public Policy
- POLITSC 4120: U.S. Congress
- POLITSC 4130: Law and Politics
- POLITSC 4135: American Constitutional Law

International Conflict and Cooperation

- POLITSC 2300: American Foreign Policy
- POLITSC 3240: Political Violence
- POLITSC 4300: Theories of International Relations
- POLITSC 4310: Security Policy
- POLITSC 4315: International Security and the Causes of War
- POLITSC 4320: Strategies for War and Peace
- POLITSC 4330: Global Governance
- POLITSC 4318: United Nations System

Political Economy and Development

- POLITSC 3220: Politics of the Developing World
- POLITSC 3280: Politics of Markets
- POLITSC 3460: Global Justice
- POLITSC 4250: African Politics
- POLITSC 4282: Politics of Income Inequality
- POLITSC 4332: Politics of Globalization
- POLITSC 4940: Politics of Immigration

Computational Spatial Data Analytics in Geography

- GEOG 2200.01: Mapping our World
- GEOG 4103: Introductory Spatial Data Analysis (Prerec: MATH 1116; 1151 accepted for CSS students)
- GEOG 5103: Intermediate Spatial Data Analysis (Prerec: GEOG 4103)
- GEOG 5200: Cartography and Map Design
- GEOG 5201: GeoVisualization (Prerec: GEOG 5200)
- GEOG 5210: Fundamentals of Geographic Information Systems
- GEOG 5212: Geospatial Databases for GIS (Prerec: GEOG 5210)

Human Connections

- GEOG 2100: Human Geography
- GEOG 2400.01 ***or*** GEOG 2400.02: Economic and Social Geography
- GEOG 2500: Cities and their Global Spaces
- GEOG 3597.01: World Urbanization
- GEOG 3600: Space, Power and Political Geography
- GEOG 3701: The Making of the Modern World
- GEOG 3801: Political Ecology

Earth, Environment, and Sustainability

- GEOG 2800: Our global environment
- GEOG 3497.03: Environmental Citizenship
- GEOG 3800: Geographical Perspectives on Environment and Society
- GEOG 3900: Global Climate Change: Causes and Consequences
- ENR 2000: Natural Resources Data Analysis
- ENR 2100: Introduction to Environmental Sciences
- ENR 2501: Introduction to Sustainability
- ENR 3400: Psychology of Environmental Problems

Communication Technology

- COMM 2540: Introduction to Communication Technology
- COMM 2511: Visual Communication Design
- COMM 3165: Evaluation and Usability Testing
- COMM 3545: Human Computer Interaction & User Experience
- COMM 3554: Social Implications of Communication Technology
- COMM 3558: Social Media
- COMM 4511: User-Centered Communication Design
- COMM 4555: Computer Interface and Human Identity
- COMM 4556: Information Tech and Organizational
- COMM 4557: Communication Network Infrastructure
- COMM 4738: Health Communication and New Media

Health, Environment, Risk, and Science Communication

- COMM 2596: An Introduction to Health, Environment, Risk, & Science Communication
- COMM 3340: Principles of Environmental Campaigns
- COMM 4240: Science Communication
- COMM 3332: Risk Communication
- COMM 3333: Crisis Communication
- COMM 4736: Health Communication in Interpersonal Contexts
- COMM 4737: Health Communication in Mass Mediated Contexts
- COMM 4738: Health Communication and New Media

Media and Society

- COMM 3440: Mass Communication and Society
- COMM 3402: Crime and the News Media
- COMM 3404H: Media Law & Ethics

- COMM 3413: Media Entertainment
- COMM 3414: Sports Media Relations
- COMM 3466: Communication and Popular Culture
- COMM 4240: Science Communication
- COMM 4401: Mass Communication and Youth
- COMM 4814: Political Communication
- COMM 4820: Public Opinion and Communication

Organizational Communication

- COMM 3325: Introduction to Organizational Communication
- COMM 3330: Communication and Conflict Management
- COMM 3331: Communication and Decision Making
- COMM 3628: Contemporary Persuasion Theory
- COMM 3668: Intercultural Communication
- COMM 4556: Information Technology and Organizational Communication
- COMM 4557: Communication Network Infrastructure
- COMM 4635: Communication Dynamics in Groups
- COMM 4665: Human Communication in Social Networks

Media Production and Analysis

- COMM 2223: Lantern Practicum
- COMM 2321: Writing for Strategic Communication
- COMM 3403: Sports Journalism
- COMM 3405: Introduction to Lantern TV
- COMM 3413: Media Entertainment
- COMM 3414: Sports Media Relations
- COMM 3554: Social Implications of Communication Technology

Psycholinguistics

- LING 2000(H): Introduction to Linguistics
- LING 3701(H) / PSYCH 3371: Language and the Mind
- LING 5701: Psycholinguistics I
- LING 5702: Cognitive Models of Language
- LING 5612 / PSYCH 5612 / PHILOS 5830 / CSE 5531: Introduction to Cognitive Science

Sociolinguistics

- LING 2000(H): Introduction to Linguistics
- LING 3601: Language, Race, and Ethnicity in the U.S.
- LING 3605: Language and Social Justice
- LING 3606: Language, Gender, and Sexuality
- LING 4602: Language and Belonging in the U.S. (4 credit)
- LING 5601: Introduction to Sociolinguistics
- LING 5602: Quantitative Sociolinguistics

Section 9: Appendices

This section contains appendices for this proposal:

1. Letters of support
2. Letter of programmatic concurrence
3. Syllabus for CSS 2100: Core Concepts in CSS
4. Syllabus for CSS 2500: Methods and Theory in Computational Social Science I
5. Syllabus for CSS 3100: Social Theory-Guided Computational Social Science
6. Syllabus for CSS 3500: Methods and Theory in Computational Social Science II
7. Syllabus for CSS 4500: Advanced Computational Social Science Toolbox
8. Syllabus for CSS 4900: Computational Social Science Capstone
9. CSS Advising Sheet for Track A
10. CSS Advising Sheet for Track B
11. CSS Sample Plan for Track A
12. CSS Sample Plan for Track B
13. Diagram of CSS Program Requirements

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

186 University Hall
230 North Oval Mall
Columbus, Ohio 43210

8 May 2024

RE: Proposal for new Computational Social Science degree

Dear Colleagues and Curricular Committee Members,

On behalf of the College of Arts and Sciences, I am pleased to present a proposal for an undergraduate major in Computational Social Science. The major, leading to a Bachelor of Science, will provide students with a transdisciplinary curriculum that encourages theory-driven problem-solving, creative thinking, and team science. The program leverages existing courses and curricular structures already present at OSU and prepares students for jobs that require a combination of theoretical and domain knowledge in the social sciences, quantitative research and analytics, and up-to-date computational skills.

The demand for professionals with transdisciplinary training in computational social science has never been greater. Industry, Government, the non-profit sector, and the Academy alike all demand computationally literate professionals. Undergraduate majors in Computational Social Science are rare nationally, and we believe it is an area of growth for the College and for the University. We hope you agree that the program we constructed will expand the career prospects of our undergraduates, strengthen the overall quality of the College of Arts and Sciences, and enhance the reputation of OSU. Thank you for your consideration.

Sincerely,

Sean S. Downey, ASC-CSS Committee Chair

Members of the ASC-CSS Committee (SU 2023 – SP 2024)
Sean S. Downey (Associate Professor, Department of Anthropology)
Rob Bond (Associate Professor, School of Communication)
David Melamed (Professor, Department of Sociology)
Tom Metzger (Assistant Professor of Teaching Practice, Department of Statistics)
Jackson Stotlar (Business Operations Consultant, College of Arts and Sciences)

THE OHIO STATE UNIVERSITY

Office of Undergraduate Education

385 Student Academic Services Building
281 W. Lane Avenue
Columbus, OH 43210

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May 5, 2024

Dr. Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
Columbus OH, 43210-1106

Dear Dr. Downey,

The Office of Undergraduate Education is pleased to support the proposed Computational Social Science B.S. in the College of Arts and Sciences at Ohio State. Currently, student demand for majors that focus on computational thinking significantly exceeds the capacity of our existing degree programs. This imbalance between demand and supply is a contributing factor in increasing time to degree as well as student debt for some undergraduates. Nationwide trends suggest that student demand for degrees in computational thinking will continue to increase. Given these factors, the Office of Undergraduate Education strongly supports the expansion of degree pathways in computational thinking at Ohio State.

Sincerely,

Norman W. Jones
Vice Provost and Dean for Undergraduate Education

College of Arts and Sciences

THE OHIO STATE UNIVERSITY

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230 North Oval Mall
Columbus, OH 43210

614-292-1667 Phone

artsandsciences.osu.edu

April 29, 2024

Dear Curriculum Committee,

We submit this letter in support of the proposal for an undergraduate Bachelor of Science major in Computational Social Science (CSS). The proposed curriculum is informed by, and contributes to, the University's Academic Plan. A hallmark feature of this plan is accelerating student success, which requires that programs engage in curricular innovations to align with modern-day challenges, to promote interdisciplinary training, and to prepare students for the modern workforce. The CSS major aligns with these aspirations and promises to bring distinction to The Ohio State University. Only a few CSS programs exist nationally, although many colleges or divisions of social science are moving in this direction. At Ohio State, we are ahead of the curve and can serve as a model for others to emulate.

The College of Arts and Sciences has a critical mass of faculty working in computational social science. These faculty were recruited because of their research distinction, and they are eager to train CSS majors in computational social science so that they can be viable candidates for top graduate programs and to succeed in the workforce, where these skills are in high demand.

The proposed curriculum is unique in that it is genuinely interdisciplinary. The social sciences at Ohio State have a long tradition of collaboration. Importantly, the CSS curriculum is not merely a collection of courses that touch on a similar topic. It represents a genuine effort to integrate disciplinary expertise and social theory with computational approaches that are used across the social sciences, such as network analysis and agent-based modeling.

Computational social science will soon be a feature of highly ranked colleges and universities. We are uniquely positioned at OSU to serve as a model for advancing this curriculum. As such, the major would serve our students and bring distinction to the university.

Sincerely,

David Horn
Dean

Ryan King
Divisional Dean, Social and Behavioral Sciences

THE OHIO STATE UNIVERSITY

College of Arts and Sciences
Department of Political Science

2140 Derby Hall
154 North Oval Mall
Columbus, OH 43210

614-292-1146 Phone
Caldeira.1@osu.edu

April 29th, 2024

Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
Columbus OH, 43210-1106

Dear Professor Downey:

My colleagues and I in the Department of Political Science whole heartedly support your proposal for a B.S. in Computational Social Science in the College of Arts and Sciences. This new major will make Ohio State one of the national leaders in integrating the methods, models, and analytics of computational science to the social sciences (with University of North Carolina, University of California Davis, and the University of Illinois). We are committed to providing classes in this curriculum and we see the holder of the Timashev Chair, for which we are currently recruiting, as a mainstay in the new major. I am very happy to report that nearly a third of my colleagues have expressed interest in the Computational Science B.S.

Sincerely yours,

Gregory Caldeira

GREGORY A. CALDEIRA
Chair
Distinguished University Professor,
Dreher Chair in Political Communication and Policy Thinking,
Professor of Law

THE OHIO STATE UNIVERSITY

Department of Geography
College of Arts and Sciences

1036 Derby Hall
154 North Oval Mall
Columbus, Ohio 43210
www.geography.osu.edu

Dr. Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
Columbus OH, 43210-1106

April 11, 2024

Dear Dr. Downey,

The Department of Geography is very pleased to support the proposed Computational Social Science B.S. in the College of Arts and Sciences at Ohio State. From our perspective, this proposed degree promises a transformative shift in how students study and understand social phenomena, integrating computational methods, models, and data analytics with established social science practices. We expect students in this degree to have an enhanced understanding of complex social systems, the methodological 'chops' to process and analyze large-scale social science-relevant data, as well as cutting edge predictive skills with respect to social trends and human behavior.

We are happy to be involved in terms of contributing classes and, if needed, instructional support.

Sincerely,

Mat Coleman

Professor and Chair, Department of Geography, College of Social and Behavioral Sciences
http://u.osu.edu/coleman.373/

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

Department of Anthropology
4034 Smith Laboratory
174 West 18th Ave.
Columbus, OH 43210-1106

614-292-4149 Phone
614-292-4155 Fax

anthropology.osu.edu

April 12, 2024

Members of the Curriculum Committee:

The Department of Anthropology's Undergraduate Studies Committee is pleased to provide concurrence for Professor Sean Downey's proposal for a new B.S. in Computational Social Science. We are enthusiastic about the proposal and look forward to our Department's participation in this new interdisciplinary major.

Sincerely,

Debbie Guatelli-Steinberg, Ph.D.
Professor and Chair of the Undergraduate Studies Committee

W. Scott McGraw, Ph.D.
Professor and Chair, Department of Anthropology

THE OHIO STATE UNIVERSITY

Duane T. Wegener, Ph.D.

College of Arts and Sciences Distinguished Professor of Psychology
Chair, Department of Psychology
225A Psychology Building
1835 Neil Avenue
Columbus, OH 43210

Phone: 614- 292-3038
E-mail: wegener.1@osu.edu

May 1, 2024

To whom it may concern,

On behalf of the Department of Psychology at Ohio State University I am writing to support the proposed Computational Social Science (CSS) major.

In the department, we look forward to contributing to the major in various ways. We have faculty who could potentially offer core courses in such a major. We also have a number of psychology courses that include computational aspects, such that they would be of interest to potential students who might want to focus on the computational aspects of psychology. This could either take the form of CSS electives or as a minor in Psychology as part of Track A in the proposed CSS major.

We eagerly anticipate the launch of the CSS major. We are confident that this cross-campus collaboration would benefit students and facilitate their career development.

I hope you will view the proposal favorably. If you have any questions or I could provide any additional information, please feel free to email me at wegener.1@osu.edu.

Sincerely,

Duane T. Wegener, Ph.D.
College of Arts and Sciences Distinguished Professor of Psychology
Chair, Department of Psychology
Ohio State University

Department of Sociology

College of Social and Behavioral Sciences
238 Townshend Hall
1885 Neil Ave. Mall
Columbus, OH 43210

Phone (614) 292-6681
Fax (614) 292-6687
http://sociology.osu.edu

April 12, 2024

Curriculum committee,

The department of sociology offers concurrence for the proposed Computational Science Degree.

The program is well-positioned to leverage new and exciting data as a way of understanding human behavior.

Sincerely,

Douglas B. Downey
Professor of Sociology

THE OHIO STATE UNIVERSITY

School of Communication

Derby Hall
154 North Oval Mall
Columbus, OH 43210
614-292-3400 Phone
www.comm.ohio-state.edu

Dr. Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
Columbus OH, 43210-1106

May 1, 2024

Dear Dr. Downey,

The School of Communication enthusiastically endorses the proposed Computational Social Science B.S. program within the College of Arts and Sciences at Ohio State University. The program aims to equip students with the capacity to seamlessly integrate computational methods, models, and data analytics into established social science theory and practices. Graduates of this program will have a distinctive skill set and valuable perspectives that can enhance both their future academic pursuits and their professional careers.

We are happy to have our some of courses included in the social science sequences and to have our communication technology and media and society minors listed as options within the program.

Sincerely,

R. Kelly Garrett
Professor and Director
School of Communication

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

Department of Linguistics

100 Oxley Hall
1712 Neil Avenue
Columbus, OH 43210

614-292-4052 Phone
614-292-8833 Fax

linguistics.osu.edu

April 26, 2024

Prof. Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
CAMPUS

Dear Prof. Downey,

The Linguistics Undergraduate Curriculum Committee has reviewed the concurrence request for the proposed major in Computational Social Science. Linguistics is happy to support this CSS major. In our assessement, this new major will provide valuable and forward-looking training that is not currently available at OSU. The new major will also complement the strengths of the Linguistics program. Linguistics expects to be a collaborating department in the CSS major in the ways outlined in the proposal.

We wish the CSS program much success with this new major.

Sincerely,

William Schuler
Professor and Interim Chair
Department of Linguistics
The Ohio State University
schuler@ling.osu.edu

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

Department of Economics

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1945 North High Street
Columbus, OH 43210-1172

614-292-6701 Phone
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Economics.osu.edu

April 24, 2024

Dr. Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
Columbus OH, 43210-1106

Dear Dr. Downey,

The Department of Economics is very pleased to support the proposed Computational Social Science B.S. in the College of Arts and Sciences at Ohio State. From our perspective, this proposed degree promises a transformative shift in how students study and understand social phenomena, integrating computational methods, models, and data analytics with established social science practices. We expect students in this degree to have an enhanced understanding of complex social systems, the tools to process and analyze large-scale social science-relevant data, as well as cutting edge predictive skills with respect to social trends and human behavior. We are happy to be involved in terms of contributing classes.

Sincerely,

Huanxing Yang
Professor and Chair
Department of Economics

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

Department of Statistics

404B Cockins Hall
1958 Neil Ave.
Columbus, OH 43201

614-247-2585 Phone

kaizar.1@osu.edu
stat.osu.edu

April 11, 2025

Computational Social Sciences (CSS) major committee:

On behalf of the Department of Statistics, we thank the Computational Social Sciences (CSS) major committee for sharing their thoughtful and detailed proposal for the new major. We found the major proposal overall to be an interesting idea and structure, and see value and potential in the proposed CSS major. We are glad to see that the major includes a foundational course in Statistics. The Department of Statistics has a strong track-record of curricular collaboration both by providing specialized coursework (as in our collaborations with undergraduate majors related to the biological sciences, engineering, and business) and by partnering in other programs (as in our work with the data analytics undergraduate major, the Masters of Translational Data Analytics [MTDA] and Certificate in Practice of Data Analytics [CPDA]).

As your CSS proposal suggests, and as discussed previously with Divisional Dean Ryan King, the Department of Statistics will participate in the program as a Collaborating Unit. We also appreciate that interested Statistics faculty can participate in the program as co-directors, affiliated faculty, and CSS course instructors. The Department welcomes the opportunity to partner with other collaborating units in faculty searches that could potentially include joint appointments.

We find that the learning objectives and schedule of topics for the newly proposed courses CSS 2500, CSS 3100, CSS 3500 and CSS 4500 include substantial core statistical content that align with the expertise of our faculty. As such, the Department of Statistics reserves the right to develop courses that focus on these topics but have a target audience that is different from or broader than computational social sciences.

With this condition of potential similar course development, the Department of Statistics is pleased to grant concurrence for the CSS BS proposal. We again would like to emphasize that we see value and potential in the proposed CSS major. We appreciate the opportunity to engage with students across

disciplines, and hope that we can also enrich the proposed CSS program and help to guarantee its long-term success.

Sincerely,

Eloise E. Kaizar
Professor and Chair
Department of Statistics

The following is the email correspondence requested on April 11, 2024, to Computer Science & Engineering for concurrence on the CSS program. Computer Science & Engineering did not respond to the request for concurrence, therefore concurrence was assumed.

Tuesday, April 29, 2025 at 8:37:42 AM Eastern Daylight Time

Subject: Computational Social Science major proposal (concurrence review)
Date: Thursday, April 11, 2024 at 12:51:25 PM Eastern Daylight Time
From: Downey, Sean
To: Arora, Anish
Attachments: image001.png, ASC-ComputationalSocialScienceBS-proprosal.10Apr2024-CIRCULATE.pdf

Dear Anish,

I am writing to share with you our proposal for a new major in Computational Social Science and to ask for concurrence review and a letter of support from the Department of Computer Science and Engineering. I realize that we did not get a chance to discuss CSS this semester, but I am confident that this new curriculum aligns well with the CS curriculum based on my previous work with Eric during the reverse course-design process. Given his earlier input and your note regarding CSS during your SOC town hall in January, we incorporated the CS minor as an option for CSS students. I am happy to pick up this thread whenever it is convenient. We have a longstanding goal of submitting to the ASC curriculum committee in early May, so in the interim, I would be grateful if you could provide us with a brief letter of support by Friday, 26 April. I realize that it is a very busy moment at the end of the semester, so please keep me apprised if you need more time and we can plan accordingly.

Please feel free to reach out if you have any questions.

Sincerely,

Sean Downey
ASC-CSS Program Chair

THE OHIO STATE UNIVERSITY

Sean S. Downey | He/Him/His/Dr.
Associate Professor, Department of Anthropology
Core Faculty, Sustainability Institute
Leadership Team, Translational Data Analytics
Review Editor, Human Ecology (Springer)
The Ohio State University
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Recent paper: **An intermediate level of disturbance with customary agricultural practices increases species diversity in Maya community forests in Belize** in *Communications Earth and Environment*.

Website: https://u.osu.edu/
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Office: 614-688-3904
Mobile: 240-392-0220
Zoom: http://go.osu.edu/zoom-downey

CSS 2100: Core Concepts in Computational Social Sciences

Course Information

- **Proposed course number:** CSS 2100
- **Course times and location:** Tuesdays and Thursdays
- **Credit hours:** 3
- **Mode of delivery:** Lecture and lab

Instructor

- **Name:** Brutus Buckey
- **Email:** brutus.1@osu.edu
- **Office location:** The Shoe
- **Office hours:** Tuesdays from 3 – 5 PM
- **Preferred means of communication:** CARMEN messaging. Class-wide communications will be sent through announcements in CarmenCanvas. Please check your notification preferences to be sure you receive these messages.

Course Description

This course is designed to change the way students think about social science research. It will provide students with an introduction to the interdisciplinary field of computational social science (CSS). The course has two audiences: social scientists who have training in studying human behavior, but who are less familiar with computational methods; and data scientists who are adept with the tools of the digital age but who are new to studying human behavior. The course will survey some of the most remarkable insights and discoveries across the computational social sciences in order to inspire the next generation of undergraduate and graduate students in this interdisciplinary field. The course will highlight CSS studies with practical applications for society and business and highlight the important of theory-guided data science for providing important theoretical insights into the behavior of human social systems. Over the semester, students will gain an appreciation for the types of questions in the social sciences that computational methods have be used to address and develop the ability to conceive of computational social science methodologies of their own.

Course Goals and Learning Outcomes

This course has the following integrated learning objectives.

Goals	Outcomes	Proficiencies
1. Ideation: Translation, Theoretical Modeling, Social Theory. Students should be able to articulate and translate a wide array of social theories into theoretical models, in the form of computational or mathematical algorithms.	a. Work with a diverse set of skills for generating and analyzing both theoretical/mathematical and algorithmic/computational models	i) Explain the use and purposes of theoretical models for providing insights into social phenomena [B]
	e) Demonstrate knowledge of how shared values relates to CSS as a interdisciplinary field of study, and within the student's field of study.	i) Explain how computational analyses can produce unintended and negative consequences for individuals, groups, and society (by, e.g., reproducing human biases, institutionalizing biased training data, etc.) and identify practical solutions. [B]
		ii) Explain how differential access to computational tools can intersect with personal identity, institutions, and social power. [B]
2) Research Design / Learning from Data. Students should understand the diverse approaches to the generation of knowledge in social science and computational disciplines and be able to integrate them in a way that is methodologically sound.	a) Employ logics of inference in experimental and observational studies	i) Use exploratory qualitative and inferential methods to generate research questions and hypotheses [B]
		iii) Develop plan for sharing research materials (results, models, code, data)
	b) Explain the elements of effective teamwork and importance of diverse, multidisciplinary teams	i) Recognize indicators of successful teamwork [P]
		ii) Identify and correct threats to team success [P]
	c) Explore issues of critical importance to society	i) Conduct both basic and applied social research [P]
		ii) Demonstrate a commitment to producing research that will improve societal welfare [P]

5) Ethics in Research. The successful student will appreciate and understand both moral and ethical considerations in computational social science research and practice.	a) Design computational social science research projects and methodologies that are compatible with ethical standards of research	i) Accurately describe the general ethical principles that apply to different areas of research, as codified in (for example) the IEEE Code of Ethics, the Data Values and Principles Manifesto at DataPractices.org, the American Political Science Association's Guide to Professional Ethics, etc. [B] (Proficiencies)
		ii) Evaluate the importance of key events in the history of ethical research in science and medicine (e.g, Tuskegee Syphilis Study, the National Research Act, the Belmont Report) to our understanding of ethical and moral computational social science research. [B]
		iii) Explain the specific harms that computational social science research can inflict on individuals and society (e.g., unethical treatment of human subjects, producing algorithms that reproduce inequality, etc.) [B]
		vi) Demonstrate familiarity with human subjects training standards (e.g., Demonstrate ability to prepare a IRB application for 'exempt' computational social science research, and/or identify an application for potential review problems. [I]). [B]
		v) Ability to identify and explain the ethical considerations of data science (e.g., algorithms, hacking, responsible innovation, professional codes of conduct) [B]

How this Course is Organized

Mode of delivery: This is an **in-person class** that meets twice per week combining lectures and class-room and online activities. Attendance is required at all class meetings, except in case of an emergency.

Pacing: Class will meet twice a week, on Tuesdays and Thursdays.

Course activities:

1. **Participation:** Participation in class discussion is an essential aspect of this course and attendance is mandator.
2. **Homework activities (Easy/Medium):** Each week you will complete a homework activity which will provide you experience working with some of the different datasets, tools, approaches, and ideas in we encounter throughout the course. Homework problems in the textbook are rated 1-4 (1=easy, 2=medium, 3=hard, and 4=very hard), and they are classified with respect to the skills required to complete them (math, coding, data collection). Easy and Medium problems typically focus on CSS research design, ethics, and interdisciplinary collaboration and student will be expected to complete these independently; hard and very hard problems typically research design, data collection and coding and typically require multiple skill sets spanning the data science / social sciences disciplinary boundary.
3. **Homework activities (Hard/Very Hard):** Over the semester, students will be expected to form collaborative partnerships with other students to complete two hard or very hard problems during the weeks of their choice. Homeworks are due two weeks after they are assigned.
4. **Exams:** there are three (4) in-class exams in the course including the final exam.

Prerequisites: CSS is inherently interdisciplinary field of study and this course is intended to be accessible to a wide range of students. As an introductory course in CSS, it is intended to inspire and engage students to further study, we encourage participation from students with preparation the following areas, though others may apply:

- Students in the social sciences who are eager to learn about coding, big-data analytics, and computer modeling.
- Students from the data or computer sciences with background in coding, math, and modeling from computer science who are eager to learn about social science research design and theory-driven modeling.

The course will provide opportunities for interdisciplinary collaboration.

However, given the diverse range of expertise students will come with, the course has no technical or social-science prerequisites. While there are no prerequisite, we recommend that students have completed precalculus or have a math placement level L. CSS all students will be expected to develop expertise outside of their core aptitudes. The homework assignments and final project will provide opportunities to learn and practice these skills individually and in collaborative groups, and several technical workshops will be offered that provide exposure to key CSS technologies.

Credit hours and work expectations: This is a 3 credit-hour course. According to Ohio State bylaws on instruction (go.osu.edu/credit hours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and CarmenCanvas activities, for example), in addition to 6 hours of homework (reading and assignment preparation, for example) in order to receive a resulting grade of C.

How Your Grade is Calculated

Assignment Category	Percentage
Participation	10%
Homework activities	30%
Exams (4)	40%
Technical workshop (3)	20%
Total	**100%**

Late Assignments

Due dates are set to help you stay on pace and to allow timely feedback that will help you complete subsequent assignments. If you are unable to submit your assignments by the assigned due date, please contact the instructor as soon as possible to arrange a plan to complete late submission. Otherwise, late assignments will not be accepted.

Instructor Feedback and Response Time

Remember that you can call 614-688-4357 (HELP) at any time if you have a technical problem.

- **Preferred contact method:** If you have a question, please contact me first through CARMEN messaging. I will reply as quickly as possible.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to ensure you receive these messages.

- **Grading and feedback:** For assignments submitted before the due date, I will try to provide feedback and grades within **seven days**. Assignments submitted after the due date may have reduced feedback, and grades may take longer to be posted.

Required Equipment and Software

Students will need a Mac or PC capable of running the Chrome browser and a reliable internet connection. You are required to bring your laptop to class. If you need to borrow a device, please see https://it.osu.edu/student-technology-loan-program.

Grading Scale

Final grades are based on the OSU Standard Scheme. A general guide to how you are doing is: A 93-100; A- 90-92; B+ 87-89; B 83-86; B- 80-82; C+ 77-79; C 73-76; C- 70-72; D+ 67-69; D 60-66; E< 60.

Course Schedule

This is a general overview of the topics covered in the course. Please see the CARMEN site for more details and due dates.

Textbook(s):

Salganik, Matthew J. 2019. Bit by bit: Social research in the digital age. Princeton University Press [MJS]. Student cost $25; also, freely available from the author's website. (MJS)

Smaldino, P. (2023). Modeling social behavior: mathematical and agent-based models of social dynamics and cultural evolution. Princeton University Press. Chapters 1-3. (PS)

WEEK	Topics	Assigned readings	Assignment or Exam
	Part 1: Introduction to Computational Social Sciences		
1	Introduction	MJS: Preface, Chap. 1; Lazer 2009; Lazer 2020; Buyalskaya et al. 2021	HW 1: 1 easy and 1 medium question
2	Ethics	MJS, Chap. 6; Edelmann et al. 2020; Mann 2016	HW 2: 1 easy and 1 medium question
3	Observing behavior	MJS, Chap. 2; Barton 2013; Conte 2012	HW 3: 1 easy and 1 medium question
4	Asking questions	MJS Chap. 3; Maxwell, 2018; Karpatne 2018	HW 4: 1 easy and 1 medium question
5	Technical Workshop I: Introduction to coding	Invited lecturer	Exam #1

6	Running Experiments	MJS Chap. 4; Centola, 2010	HW 5: 1 easy and 1 medium question
7	Creating mass collaborations	MJS Chap. 5	HW 6: 1 easy and 1 medium question
8	Technical Workshop II: Introduction to visualization	Healy Chap. 1	Exam #2
	Part 2: Models of social theory		
9	Introduction to modeling in the social sciences	PS Chap. 1: Doing violence to reality	HW 7: 1 easy and 1 medium question
10	Modeling individuals	PS Chap. 2: Particles	HW 8: 1 easy and 1 medium question
11	Technical workshop III: Introduction to NetLogo	Invited lecturer	Exam #3
12	Archetypical model I: emergence of housing segregation	PS Chap. 3: The Schelling Chapter	HW 9: 1 easy and 1 medium question
13	Archetypical model II: diffusion of innovation	PS Chap. 4: Contagion	HW 10: 1 easy and 1 medium question
14	The future of computational social science	MJS Chap. 7; PS Chap. 11	Review
15	Course conclusion	Review	Exam #4 (final exam not cumulative)

Required readings

Buyalskaya, Anastasia, Marcos Gallo, and Colin F. Camerer. "The golden age of social science." *Proceedings of the National Academy of Sciences* 118.5 (2021).

Edelmann, Achim, et al. "Computational social science and sociology." *Annual Review of Sociology* 46 (2020): 61-81.

Barton, C. M. "Stories of the past or science of the future? Archaeology and computational social science." *Computational approaches to archaeological spaces* (2013): 151-178.

Conte, R., et al. "Manifesto of computational social science." *The European Physical Journal Special Topics*, 214(1) (2012)" 325-346.

Centola, D. 2010. “The Spread of Behavior in an Online Social Network Experiment.” Science 329(5996): 1194–97.

Healy, Kieran. Data visualization: a practical introduction. Princeton University Press, 2018.

Karpatne, Anuj, et al. "Theory-guided data science: A new paradigm for scientific discovery from data." IEEE Transactions on knowledge and data engineering 29.10 (2017): 2318-2331.

Lazer, David MJ, et al. "Computational social science: Obstacles and opportunities." Science 369.6507 (2020): 1060-1062.

Lazer, D., et al. "Computational Social Science." *Science*, 323 (2009): 721-723.
Mann, Adam. "Core concept: Computational social science." *Proceedings of the National Academy of Sciences* 113.3 (2016): 468-470.

Maxwell, Kate, and Paul Benneworth. "The construction of new scientific norms for solving Grand Challenges." *Palgrave Communications* 4.1 (2018): 1-11.

CarmenCanvas Access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in CarmenCanvas. To ensure that you are able to connect to CarmenCanvas at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device (go.osu.edu/add-device) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Install the Duo Mobile application (go.osu.edu/install-duo) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

Technology Skills Needed for this Course

- Computer and web-browsing skills
- Navigating CarmenCanvas (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat**: go.osu.edu/it
- **Phone:** 614-688-4357 (HELP)
- **Email:** servicedesk@osu.edu

Other Course Policies

Use of Artificial Intelligence

The use of artificial intelligence programs is not allowed in this course without the written permission of the instructor.

Statement on Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/ .

Statement about Disability Services

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are isolating while waiting for a COVID-19 test result, please let me know immediately. Those testing positive for COVID-19 should refer to the Safe and Healthy Buckeyes site for resources. Beyond five days of the required COVID-19 isolation period, I may rely on Student Life Disability Services to establish further reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or http://slds.osu.edu.

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belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting http://ccs.osu.edu or calling 614--292--5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614--292--5766 and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

CSS 2500: Methods and Theory in Computational Social Science I

Course Information

- **Proposed course number:** CSS 2500
- **Course times and location:** Tuesdays and Thursdays 12:45 – 2:05 PM
- **Credit hours:** 3
- **Mode of delivery:** Lecture and lab

Instructor

- **Name:** Brutus Buckey
- **Email:** brutus.1@osu.edu
- **Office location:** The Shoe
- **Office hours:** Tuesdays from 3 – 5 PM

- **Preferred means of communication:** CARMEN messaging. Class-wide communications will be sent through announcements in CarmenCanvas. Please check your notification preferences to be sure you receive these messages.

Course Description

The goal of this course is to introduce students to key formalisms and applied computational, mathematical, and statistical tools used in the field of computational social science, with particular emphasis on how they relate to theory and research questions in the social sciences. Students will be introduced to the scientific method, research design, structured and unstructured data, programming, statistics, modeling social processes, and using algorithms to gain insights about the world. Case studies will draw on data from the social and behavioral sciences, with an emphasis on ethical research practices. Students will begin to learn how to translate social norms, practices and theory into “data generation processes” using simple models and simulations. This is the first course in a 3-course core sequence in CSS methods and theory.

Students are encouraged to take STAT 2450 prior to this class. Many of the tools for data analysis will be applied in this class, often using statistical software and social science datasets. Students will learn basic coding skills and use the tools of statistical analysis to answer questions social science questions.

Course Goals and Learning Outcomes

This course is the introductory class in a sequence of three methods and theory courses in computational social science.

Goals	Outcomes	Proficiencies
1. Ideation: Translation, Theoretical Modeling, Social Theory. Students should be able to articulate and translate a wide array of social theories into theoretical models, in the form of computational or mathematical algorithms.	a. Work with a diverse set of skills for generating and analyzing both theoretical/mathematical and algorithmic/computational models	i) Explain the use and purposes of theoretical models for providing insights into social phenomena [B]
		ii) Explain data generation mechanisms with generative models and simulated data [I]
	b) Explain and communicate the significance and implications of adapted and original CSS models.	i) Explain and use published descriptions and documentation to reproduce existing models and analyses [B]
		ii) Document models clearly, using concise descriptions appropriate to specialists, using discipline-standard formats (e.g., workflows, ODD, UML, mathematical notation) that permit independent replication. [B]
	c) Demonstrate knowledge of how shared values relates to CSS as a interdisciplinary field of study, and within the student's field of study.	i) Explain how computational analyses can produce unintended and negative consequences for individuals, groups, and society (by, e.g., reproducing human biases, institutionalizing biased training data, etc.) and identify practical solutions. [B]
2) Research Design / Learning from Data. Students should understand the diverse approaches to the generation of knowledge in social science and computational disciplines and be able to integrate them in a way that is methodologically sound.	a) Employ logics of inference in experimental and observational studies	i) Use exploratory qualitative and inferential methods to generate research questions and hypotheses [B]
		ii) Recognize and ameliorate sources of bias in research design (e.g., biased data, algorithmic bias, etc.) [B]

3) Computation, Modeling, and Statistical Aptitude. Students should be proficient in computation, modelling, and statistics, be able to connect theoretical models to empirical models, understand the tradeoffs and appropriateness of computational models for varying circumstances, and be able to compare empirical performance across models.	a) Conduct statistical and computational analysis in the most widely used and useful software environments of the day	i) Demonstrate proficiency in relevant statistical and computational environments. [B]
	b) Identify statistical methods and computational algorithms that might usefully be applied to a given problem and assess the pros and cons of each	i) Identify a range of existing statistical models that can serve as tests of social theories [B]
	c) Use comparative model testing, model-based clustering algorithms, and theory-guided data science techniques to compare the explanatory utility of multiple behavioral models.	i) Use and interpret the results of statistical tests for model comparison (e.g. Vuong and Clarke tests, information criteria) [I]
		ii) Ability to develop and implement CSS research designs, models and algorithms that are consistent with responsible and ethical conduct of research. [I]
5) Ethics in Research. The successful student will appreciate and understand both moral and ethical considerations in computational social science research and practice.	a) Design computational social science research projects and methodologies that are compatible with ethical standards of research	vi) Ability to develop and implement CSS research designs, models and algorithms that are consistent with responsible and ethical conduct of research. [I]

How this Course is Organized

The course takes a transdisciplinary, problem-focused approach to questions and datasets that are relevant for computational social scientists, and as such it offers a unique learning environment for students in a variety of thematic fields. The course uses an interactive textbook for statistics and data science that is directly integrated into CARMEN (https://coursekata.org/about). The course combines lectures, interactive self-guided Jupyter notebooks, and a practicum that includes "hands-on" laboratory exercises. Basic computer skills are important but there are no computational prerequisites for the course: the textbook begins with prototypical "Hello world" coding instruction. The instructor will spend time in the beginning of the class to introduce all the software you will need to complete the course, and CourseKata is designed to provide introductory programming skills to enable basic data handling, visualization and statistical modeling. Additional required readings will provide

insights on the application of course topics to the social science, including modeling social theory and ethnical research practices.

Mode of delivery: This is an **in-person class** that meets twice per week. Attendance is required at all class meetings, except in case of an emergency.

Course activities: The course is divided into **weekly modules** with interactive readings, lecture slides, discussions, and lab assignments. A Weekly Schedule will be used to organize all the course activities. It will contain the follow links for each week of the course.

- CourseKata: integrated **readings** and **coding practice**.
    - The CourseKata textbook is integrated into CARMEN and it has interactive features that records student progress. To reinforce your learning, you are required to complete these practice elements independently and they will be graded based on completion. Every week, we will download your progress and assign a grade based on the following scheme: You must complete at least 80% of the elements in the assigned readings to receive completion credit (code blocks, short answers, and Review Questions).
- Exams: there are three (3) in-class exams in the course. These will consist of coding, data analysis, and interpretation that will require students to incorporate the methods and theory learned throughout the semester.
- Laboratories: There are ten (10) labs throughout the semester that provide opportunities to demonstrate mastery of the course learning objectives. Lab instructions, sample data, and code examples will normally be provided as interactive jupyter notebooks. An example lab is included in PDF format at the end of this syllabus.

Pacing: Class will meet twice a week, on Tuesdays and Thursdays.

- Tuesday(s)
    - The instructor will present a **lecture** covering key theoretical concepts from data science and statistics.
    - The **lab assigned the previous week** is due before class on Tuesday.
- Thursday(s)
    - A **practicum** where you will meet with your classmates and instructor. The instructor will provide a short introduction to the laboratory that describe the dataset and learning objectives, and any additional programming commands that may be necessary to complete the laboratory.
    - The assigned **CourseKata readings and coding practice** are due before class on Thursday.

Prerequisites: Math 1116, Math 1130, STAT 2450 (can be taken concurrently), or permission of the instructor.

Credit hours and work expectations: This is a 3 credit-hour course. According to Ohio State bylaws on instruction (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and CarmenCanvas activities, for example), in addition to 6 hours of homework (reading and assignment preparation, for example) in order to receive a resulting grade of C.

How Your Grade is Calculated

Assignment Category	Percentage
CourseKata Progress	35%
Laboratories (10)	35%
Exams (3)	20%
Class participation	10%
Total	**100%**

Late Assignments

Due dates are set to help you stay on pace and to allow timely feedback that will help you complete subsequent assignments. If you are unable to submit your assignments by the assigned due date, please contact the instructor as soon as possible to arrange a plan to complete late submission. Otherwise, late assignments will not be accepted.

Instructor Feedback and Response Time

Remember that you can call 614-688-4357 (HELP) at any time if you have a technical problem.

- **Preferred contact method:** If you have a question, please contact me first through CARMEN messaging. I will reply as quickly as possible.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Grading and feedback:** For assignments submitted before the due date, I will try to provide feedback and grades within **seven days**. Assignments submitted after the due date may have reduced feedback, and grades may take longer to be posted.

Required Equipment and Software

Students will need a Mac or PC capable of running the Chrome browser and a reliable internet connection. You are required to bring your laptop to class. If you need to borrow a device, please see https://it.osu.edu/student-technology-loan-program.

The textbook for this class is integrated into the CARMEN website for this class. There is currently no fee to access CourseKata.

Students are also required to install R and R Studio, which are available for free (https://posit.co/download/rstudio-desktop/).

Grading Scale

Final grades are based on the OSU Standard Scheme. A general guide to how you are doing is: A 93-100; A- 90-92; B+ 87-89; B 83-86; B- 80-82; C+ 77-79; C 73-76; C- 70-72; D+ 67-69; D 60-66; E< 60.

Course Schedule

This is a general overview of the topics covered in the course. Please see the CARMEN site for more details and due dates.

WEEK(S)	Topics	CoureKata (ABC) Assignments & Assigned readings	Lab Assignment or Exam
	Part 1: Exploring variation in the social sciences		
1-2	Course introduction Role of methods in CSS: Relationship of social theory to methods; modeling social science data generation processes; role of coding in social science theory generation (epistemology).	CK Chapter 1 - Welcome to Data Analysis: A Modeling Approach CK Chapter 2 - Understanding Data in Social Sciences	Lab 1 – Introduction to CourseKata, R, and Jupyter.
3	Examining patterns in data using visualization and numeric summaries. The aesthetics of graphing (what makes good versus bad visualization).	CK Chapter 3 - Examining Distributions Tufte (2001), *The visual display of quantitative information*. Ch. 1: Graphical Excellence.	Lab 2 –Visualization

4-5	Explaining variation in data; simple causal diagrams; data generation processes; research design and stating hypotheses; sampling variation; Role of data science in social science; Ethics in AI.	CK Chapter 4 - Explaining Variation Illia et al. (2023) "Ethical implications of text generation in the age of artificial intelligence" Paff (2022) "Anthropology by Data Science"	Lab 3 – Computational Social Science Discussion Exam #1
	Part 2: Modeling variation in the social sciences		
6	What is a "model"? Types of models; how to think like a modeler; modeling workflows; null models; making predictions with models.	CK Chapter 5 - A Simple model Page (2018) "The model thinker" Chaps 1-2, pp 1-25.	Lab 4 – Summaries and Null Models using Primate intelligence data from Street et al. (2017)
7-8	What is "error"? Modeling error; residuals; probability intuition; the uniform and normal distributions; probability calculations.	Chapter 6 - Quantifying error	Lab 5 – Quantifying Error using Primate intelligence data from Street et al. (2017)
9-10	Multiple models. Explanatory variables; choosing the "best" model; model comparison techniques.	Chapter 7 - Adding an explanatory variable to the model	Lab 6 – Introducing RStudio and adding a grouping variable.
11	Adding quantitative predictors to the null model; regression and correlation; GLM notation; interpreting parameter estimates; correlation vs. causation	Chapter 8 - Digging Deeper into Group Models Chapter 9 - Models with a quantitative explanatory variable	Lab 7 – Quantitative Predictors. Testing assumptions using immigrant skull size data from anthropologist Franz Boas (Gravley 2017) Exam #2
	Part 3: Evaluating Models		
12	Inference and interpreting output. Populations, samples, p-values, visualizing techniques.	Chapter 10 - The Logic of Inference	Lab 8 – P-values using data about hurricanes and veeries and to evaluate data generation processes and causation.
13	Using models for social theory generation. Model selection criteria (F-Statistic);	Chapter 11 - Model Comparison with F	Lab 9 – Building computational workflow for social theory generation.

	simulation and permutation tests; Type I & II error and data generation processes; contrasts; coding analysis workflows for theory building.		
14	Assessing power in ethnographic data. Confidence intervals, simulating, calculating, and interpreting in context of social theory, types of CIs (regression, pairwise).	Chapter 12 - Parameter Estimation and Confidence Intervals	Lab 10 – Confidence Intervals using data from hunter-gatherer societies (Binford 2001).
15	Course conclusion	Chapter 13 – What have we learned?	Exam #3

Required readings

All the required readings are available in CarmenCanvas.

CourseKata Statistics & Data Science. (2023). University of California Los Angeles. https://coursekata.org/

Illia, Laura, Elanor Colleoni, and Stelios Zyglidopoulos. "Ethical implications of text generation in the age of artificial intelligence." *Business Ethics, the Environment & Responsibility* 32.1 (2023): 201-210.

Paff, Stephen. "Anthropology by Data Science." *Annals of Anthropological Practice* 46.1 (2022): 7-18.

Page, S. E. (2018). *The Model Thinker: What you need to know to make data work for you*. Basic Books.

Pedersen, Morten Axel. "Editorial introduction: Towards a machinic anthropology." *Big Data & Society* 10.1 (2023): 20539517231153803.

Tufte, Edward R. *The visual display of quantitative information*. Vol. 2. Cheshire, CT: Graphics press, 2001. Chapter 1: Graphical Excellence.

Social Science Datasets

Labs and lectures will include data from the following sources.

Binford, Lewis R. 2001. Constructing Frames of Reference: An Analytical Method for Archaeological Theory Building Using Ethnographic and Environmental Data Sets University of California Press, Berkeley. Accessible via: https://github.com/benmarwick/binford

Downey, Sean S. Dataset: Q'eqchi' Maya Household survey 2007 & 2018. NSF CAREER: Analyzing the Emergence of a Complex Land Management System (NSF# 1818597). To be provided via CARMEN course website.

Gravlee, Clarence C., Leonard, William W., and Bernard, H. Russell. Franz Boas's Immigrant Study. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2019-09-28. https://doi.org/10.3886/E112086V2

N. Howell, 2000, Demography of the Dobe !Kung, Aldine de Gruyter, New York. Accessible via: https://tspace.library.utoronto.ca/handle/1807/10395

Dryer, Matthew S. & Haspelmath, Martin (Leipzig: Max Planck Institute for Evolutionary Anthropology, 2013) World Atlas of Language Structures; https://www.kaggle.com/datasets/rtatman/world-atlas-of-language-structures

Street SE, Navarrete AF, Reader SM, Laland KN (2017) Coevolution of cultural intelligence, extended life history, sociality, and brain size in primates. PNAS https://doi.org/10.1073/pnas.1620734114

CarmenCanvas Access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in CarmenCanvas. To ensure that you are able to connect to CarmenCanvas at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device (go.osu.edu/add-device) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Install the Duo Mobile application (go.osu.edu/install-duo) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

Technology Skills Needed for this Course

- Computer and web-browsing skills

- Navigating CarmenCanvas (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat**: go.osu.edu/it
- **Phone:** 614-688-4357 (HELP)
- **Email:** servicedesk@osu.edu

Other Course Policies

Use of Artificial Intelligence

The use of artificial intelligence programs is not allowed in this course without the written permission of the instructor.

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If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity.

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CSS 3100: Social Theory-Guided Computational Social Science

Course Information

- **Proposed course number:** CSS 3100
- **Course times and location:** Mondays
- **Credit hours:** 3
- **Mode of delivery:** Lecture and lab

Instructor

- **Name:** Brutus Buckey
- **Email:** brutus.1@osu.edu
- **Office location:** The Shoe
- **Office hours:** Tuesdays from 3 – 5 PM
- **Preferred means of communication:** CARMEN messaging. Class-wide communications will be sent through announcements in CarmenCanvas. Please check your notification preferences to be sure you receive these messages.

Course Description

This course is designed to give students an opportunity to practice combining social science theory with data science methods to conduct research. It will provide upper-level undergraduate students with the opportunity to generate hypotheses based on theories from the social sciences and to then test them by applying computational and statistical tools. The audience for this course is primarily students in the CSS major who have taken prior substantive courses in the social sciences and methodological courses on statistics and data science, and are prepared to apply these methods to social science questions. An emphasis will be on the process of matching theory to the best available methods for testing that theory. The course will review best practices of data science and statistics as applied to social science questions, and ask students to work with data to provide novel insights on related questions. Over the semester, students will practice the union of theory and data across a range of theoretical perspectives and data types, which will set the foundation for future work of this type.

Course Goals and Learning Outcomes

This course has the following integrated learning objectives.

Goals	Outcomes	Proficiencies
1. Ideation: Translation, Theoretical Modeling, Social Theory. Students should be able to articulate and translate a wide array of social theories into theoretical models, in the form of computational or mathematical algorithms.	a. Work with a diverse set of skills for generating and analyzing both theoretical/mathematical and algorithmic / computational models	i) Explain the use and purposes of theoretical models for providing insights into social phenomena [B]
		ii) Articulate social theories in mathematical and algorithmic form [I]
		iv) Explain data generation mechanisms with generative models and simulated data [I]
	b) Use, adapt, and generate social theory to explain outcomes in one or more fields in the behavioral sciences	i) Explain the utility of multiple epistemologies for observed phenomena [B]
		ii) Adapt existing computational and mathematical models for use explaining and analyzing social phenomena. [I]
		ii) Explain how algorithmic or mathematical models complement, extend, or enhance existing or new theoretical social-science theories, frameworks, or approaches. [I]
	e) Demonstrate knowledge of how shared values relates to CSS as an interdisciplinary field of study, and within the student's field of study.	i) Explain how computational analyses can produce unintended and negative consequences for individuals, groups, and society (by, e.g., reproducing human biases, institutionalizing biased training data, etc.) and identify practical solutions. [B]

		ii) Explain how differential access to computational tools can intersect with personal identity, institutions, and social power. [B]
2) Research Design / Learning from Data. Students should understand the diverse approaches to the generation of knowledge in social science and computational disciplines and be able to integrate them in a way that is methodologically sound.	a) Employ logics of inference in experimental and observational studies	i) Use exploratory qualitative and inferential methods to generate research questions and hypotheses [B]
		ii) Use inductive inference, deductive inference, and abductive inference to generate knowledge, and use theory-guided data science to combine different modes of inference [I].
		iii) Match computational algorithms to data problems based on task definition [I]
	c) Design statistical approaches and computational algorithms whose logic conforms to the logic of theoretical models	i) Tailor statistical tests to social-science theories (e.g., be able to construct likelihood functions based on the logic of social theories and find their global maxima). [A]
	b) Explain the elements of effective teamwork and importance of diverse, multidisciplinary teams	i) Recognize indicators of successful teamwork [P]
		ii) Identify and correct threats to team success [P]
		iii) Know how best to leverage diversity in the pursuit of excellence [P]
	c) Explore issues of critical importance to society	i) Conduct both basic and applied social research [P]
		ii) Demonstrate a commitment to producing research that will improve societal welfare [P]

	d) Be able to engage with diverse audiences, participants, and stakeholders	i) Convey knowledge to a variety of groups by, for example, producing evidence-based policy memos, op-eds, articles in policy journals [A]
	e) Be able to develop a dissemination or publication plan that effectively engages diverse collaborators and stakeholders.	i) Communicate scientific findings clearly and succinctly to other academics, policymakers, and the public in tradition forms (peer-reviewed articles) and alternative forms such as social media, white papers, etc.[A]
4) Skilled Collaboration and Interpersonal Skills. Students should be flexible, curious, open-minded and supportive inter- and transdisciplinary team scientists who address critical social problems and can translate knowledge into forms that are readily accessible to diverse audiences.	a) Participate in collaborative projects as a facilitator, team member, or collaborator.	i) Identify potential team members strategically and build a team with purpose [P]
		ii) Instill and nurture trust and commitment among team members [P]
		iii) Promote fruitful disagreement while containing conflict [P]
		iv) Set clear expectations for workload, task ownership, and sharing credit and authorship [P]
		v) Maintain a positive and productive working environment [P]
	e) Be able to develop a dissemination or publication plan that effectively engages diverse collaborators and stakeholders.	i) Communicate scientific findings clearly and succinctly to other academics, policymakers, and the public in tradition forms (peer-reviewed articles) and alternative forms such as social media, white papers, etc.[A]

5) Ethics in Research. The successful student will appreciate and understand both moral and ethical considerations in computational social science research and practice.	a) Design computational social science research projects and methodologies that are compatible with ethical standards of research	i) Accurately describe the general ethical principles that apply to different areas of research, as codified in (for example) the IEEE Code of Ethics, the Data Values and Principles Manifesto at DataPractices.org, the American Political Science Association's Guide to Professional Ethics, etc. [B] (Proficiencies)
		ii) Evaluate the importance of key events in the history of ethical research in science and medicine (e.g, Tuskegee Syphilis Study, the National Research Act, the Belmont Report) to our understanding of ethical and moral computational social science research. [B]
		iii) Explain the specific harms that computational social science research can inflict on individuals and society (e.g., unethical treatment of human subjects, producing algorithms that reproduce inequality, etc.) [B]
		vi) Demonstrate familiarity with human subjects training standards (e.g., Demonstrate ability to prepare a IRB application for 'exempt' computational social science research, and/or identify an application for potential review problems. [I]). [B]
		v) Ability to identify and explain the ethical considerations of data science (e.g., algorithms, hacking, responsible innovation, professional codes of conduct) [B]

How this Course is Organized

This course will use various methods for supporting student success in achieving the above learning outcomes and for assessing the extent to which the course is successful in doing so. The text and lectures will focus on the relationship between social theory and the application of statistical and computational models to assess these theories (Goal 1). An emphasis in the text and lectures will be on taking theories that are often written in prose and translating them to mathematical or statistical models that can then be assessed with data (Goals 1). As students gain familiarity with this practice, homework assignments will require students to practice this skill themselves – take a novel theory and develop a model, using examples with various methodologies (e.g., observational and experimental approaches) (Goal 2). Once students have gained familiarity with this approach through the text and lectures and have had practice implementing it in small-scale ways on homework assignments, students will work in teams to develop their own models that may be tested with real data (Goal 4). Students will come up with an initial idea that they will describe in a short summary and present to the class (Goal 4) for feedback prior to the development of the full project. This will provide students the opportunity to iterate on their project and to provide constructive feedback to classmates as these projects develop. This assignment will require students to develop novel models and, when possible, to test these models against real-world data. As with the examples used in lectures and home works, students are encouraged to select projects that contribute to social science questions of broad societal importance (Goal 5). Finally, students will present their work to one another and to the instructor for feedback prior to writing a summary of their project (Goal 4).

Mode of delivery: Class will meet in person.

Course activities: The course contains the following activities.

1. **Participation**
   Participation in class discussion is an essential aspect of this course and attendance is mandatory. Your contributions to discussions are essential to making the class as valuable for all students as possible. Each week, one or more students will be assigned the role of discussion leader(s) for the class covering that week's readings. How you choose to fulfill this role is up to you, but at the very least you should prepare a brief spoken summary and a series of "talking points" related to the topic for the week.

2. **Homework activities**
   During weeks 2, 3, 4, 5, 8, and 10 you will complete a homework activity which will provide you experience applying statistical and computational tools, approaches, and ideas to social science problems. These are exercises that come directly from the book chapters that are assigned during that week. These homework activities are to be completed individually.

3. **Project proposal**
   You will work in teams of two to develop a project proposal (1000-word maximum) which is due during week 5 of class. Your proposal should address the social science theory that you are investigating and the types(s) of data you would collect and analyze to advance the research in this area. The proposal should be readily understood by non-specialists. The instructor will review and provide critical feedback on these proposals. The following week (week 6), your group will present the topic in class (10 minutes) and we will

discuss the proposal and how it can be improved. Students will be expected to provide feedback on other proposals this week.

4. Peer review

During week 12 you will submit a draft of your final paper (4000-word maximum) for peer review. The final project must (1) briefly review the social science theory that your project is addressing; (2) describe the data collection effort your team completed; (3) describe the data analysis process used; (4) describe the results of the data analysis, using tables and figures as needed; and (5) address how the results of the research fit with the social science theory you are addressing. The draft of your paper is not graded, but submission of a draft is required for full credit on the peer review exercise.

You will then write two peer reviews of the work submitted by your peers. You will spend a lot of your career giving feedback on people's ideas. The goal of your feedback is to be as helpful as possible to the author (not trying to make yourself look smart). In writing your feedback, it is useful to start by summarizing the goals of the proposal as clearly and succinctly as possible. Then describe what you liked about the proposal. Finally, you can make concrete suggestions about how the research described in the proposal can be improved.

5. Final paper

After incorporating feedback from the peer reviews you receive and revising, your final paper is due during finals week. The formatting guidelines are as described as above. In addition, please include a statement of contribution of effort.

Pacing: Class will meet twice a week, once per week on Mondays for 2 hours and 50 minutes. Having a single large block of time will allow for detailed discussions, hands-on activities, and workshops. Attendance is required at all class meetings, except in case of an emergency.

Prerequisites: This course is intended to provide a foundation of the application of computational and statistical models specifically to social science questions, particularly working with a team to accomplish a research goal that necessitates the application of these tools. As such, this course should be taken after or alongside Methods and Theory in Computational Social Science I (CSS 2500 is a pre- or co-requisite).

Credit hours and work expectations: This is a 3 credit-hour course. According to Ohio State bylaws on instruction (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and CarmenCanvas activities, for example), in addition to 6 hours of homework (reading and assignment preparation, for example) in order to receive a resulting grade of C.

How Your Grade is Calculated

Assignment Category	Percentage
1. Participation	10%
2. Homework activities (6)	20%
3. Project proposal	20%
4. Paper draft + peer reviews (2)	10%
5. Final paper	40%
Total	**100%**

Late Assignments

Due dates are set to help you stay on pace and to allow timely feedback that will help you complete subsequent assignments. If you are unable to submit your assignments by the assigned due date, please contact the instructor as soon as possible to arrange a plan to complete late submission. Otherwise, late assignments will not be accepted.

Instructor Feedback and Response Time

Remember that you can call 614-688-4357 (HELP) at any time if you have a technical problem.

- **Preferred contact method:** If you have a question, please contact me first through CARMEN messaging. I will reply as quickly as possible.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Grading and feedback:** For assignments submitted before the due date, I will try to provide feedback and grades within **seven days**. Assignments submitted after the due date may have reduced feedback, and grades may take longer to be posted.

Required Equipment and Software

Students will need a Mac or PC capable of running the Chrome browser and a reliable internet connection. You are required to bring your laptop to class. If you need to borrow a device, please see https://it.osu.edu/student-technology-loan-program.

Grading Scale

Final grades are based on the OSU Standard Scheme. A general guide to how you are doing is: A 93-100; A- 90-92; B+ 87-89; B 83-86; B- 80-82; C+ 77-79; C 73-76; C- 70-72; D+ 67-69; D 60-66; E< 60.

Course Schedule

This is a general overview of the topics covered in the course. Please see the CARMEN site for more details and due dates.

WEEK	Topics	Assigned readings	Assignment or Exam
1	**Introduction and Logistics**	Thinking Clearly with Data: Preface, Chapter 1;	
2	**Correlation and Causation**	Thinking Clearly with Data: Preface, Chapters 2 & 3;	Homework 1: Exercises at the end of Chapter 2 & 3
3	**Establishing relationships between variables**	Thinking Clearly with Data: Chapters 4 & 5	Homework 2: Exercises at the end of Chapter 4 & 5
4	**Describing relationships**	Thinking Clearly with Data: Chapters 6, 7 & 8	Homework 3: Exercises at the end of Chapters 6, 7 & 8
5	**Establishing Causality I**	Thinking Clearly with Data: Chapters 9 & 10	Homework 4: Exercises at the end of Chapter 9 & 10; Project proposal due
6	**Student project presentations**		
7	**Workshop 1 – data collection**	*This week in-class time will be dedicated to spending time collecting data for the final project.*	
8	**Establishing Causality II**	Thinking Clearly with Data: Chapters 11 & 12;	Homework 5: Exercises at the end of Chapter 11 & 12
9	**Workshop 2 – data analysis**	*This week in-class time will be dedicated to spending time analyzing data for the final project.*	
10	**Establishing Causality III**	Thinking Clearly with Data: Chapters 13 & 14;	
11	**Workshop 3 – presenting results lab**	*This week in-class time will be dedicated to spending time creating presentations of results (visualization, table creation, writing) for the final project. The instructor will lead a session showing examples of*	

		effective presentations of these types and working with teams on presenting their own results.	
12	**Week 12: Student team meetings with the instructor**	*In lieu of a course meeting, this week student teams will meet with the instructor for individual feedback on student projects. Teams are required to schedule a meeting with the instructor to give an update on progress and to ask any questions and get feedback on next steps. This flexibility also gives students additional time to work together as they prepare for the in-class presentation of their project in Week 14 and begin to prepare the final paper.*	
13	**Translating science to practice**	Thinking Clearly with Data: Chapters 15, 16 & 17;	Final paper draft due for peer review
14	**Week 14: Student team presentations**		
15	**Course conclusion**		**Final paper is due**

Required readings

de Mesquita, E. B., & Fowler, A. (2021). Thinking clearly with data: A guide to quantitative reasoning and analysis. Princeton University Press. (DMF)

CarmenCanvas Access

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- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device (go.osu.edu/add-device) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Install the Duo Mobile application (go.osu.edu/install-duo) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

Technology Skills Needed for this Course

- Computer and web-browsing skills
- Navigating CarmenCanvas (go.osu.edu/canvasstudent)

- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat**: go.osu.edu/it
- **Phone:** 614-688-4357 (HELP)
- **Email:** servicedesk@osu.edu

Other Course Policies

Use of Artificial Intelligence

The use of artificial intelligence programs is not allowed in this course without the written permission of the instructor.

Statement on Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/ .

Statement about Disability Services

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are isolating while waiting for a COVID-19 test result, please let me know immediately. Those testing positive for COVID-19 should refer to the Safe and Healthy Buckeyes site for resources. Beyond five days of the required COVID-19 isolation period, I may rely on Student Life Disability Services to establish further reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or http://slds.osu.edu.

Statement on religious accommodation

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting http://ccs.osu.edu or calling 614--292--5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614--292--5766 and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

CSS 3500: Methods and Theory in Computational Social Science II

Course Information

- **Course times and location:** Class meets Tuesday/Thursday from 11:00AM to 12:20PM each week in room 245 of Townshend Hall.
- **Credit hours:** 3
- **Mode of delivery:** Flipped

Instructor

- **Name:** Brutus Buckeye
- **Email:** buckeye.1@osu.edu
- **Office location:** The Shoe
- **Office hours:** Tuesdays from 3-5PM
- **Preferred means of communication:**
    - My preferred method of communication for questions is **email.**
    - My class-wide communications will be sent through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to be sure you receive these messages.

Course Prerequisites

CSS 2500 or equivalence.

Course Description

The goal of this course is to continue developing an understanding of key formalisms and applied computational, mathematical, and statistical tools used in the field of computational social science, with particular emphasis on how they relate to "big questions" and theory in the social sciences. Students will build on their foundational understanding of the scientific method, research design, structured and unstructured data, programming, statistics, modeling social processes, and using algorithms to gain insights about the world. This course focuses on non-linear outcomes and processes and introduces students to nested data structures and corresponding methodological issues. Case studies will draw on data from the social and behavioral sciences, with an emphasis on ethical research practices. Students will continue translating social norms, practices and theory into "data generation processes" using models and simulations. This is the second course in a 3-course core sequence in CSS methods and theory. This course is waived for Statistics minors.

Course Goals and Learning Outcomes

This course is the second class in a sequence of three methods and theory courses in computational social science.

Goals	Outcomes	Proficiencies
1. Ideation: Translation, Theoretical Modeling, Social Theory. Students should be able to articulate and translate a wide array of social theories into theoretical models, in the form of computational or mathematical algorithms.	a. Work with a diverse set of skills for generating and analyzing both theoretical/mathematical and algorithmic/computational models	i) Explain the use and purposes of theoretical models for providing insights into social phenomena [B]
		iv) Explain data generation mechanisms with generative models and simulated data [I]
	c) Construct novel computational or mathematical models based on new and existing social theory	ii) Adapt existing computational and mathematical models for use explaining and analyzing social phenomena. [I]
	d) Explain and communicate the significance and implications of adapted and original CSS models.	i) Explain and use published descriptions and documentation to reproduce existing models and analyses [B]
		iii) Document models clearly, using concise descriptions appropriate to specialists, using discipline-standard formats (e.g., workflows, ODD, UML, mathematical notation) that permit independent replication. [B]
2) Research Design / Learning from Data. Students should understand the diverse approaches to the generation of knowledge in social science and	b) Recognize and address threats to inference in experimental and observational studies	i) Match modeling assumptions with the generative dynamics of the system in question using principles of parsimony and/or maximum entropy. [A]

computational disciplines and be able to integrate them in a way that is methodologically sound.		
3) Computation, Modeling, and Statistical Aptitude. Students should be proficient in computation, modelling, and statistics, be able to connect theoretical models to empirical models, understand the tradeoffs and appropriateness of computational models for varying circumstances, and be able to compare empirical performance across models.	a) Conduct statistical and computational analysis in the most widely used and useful software environments of the day	i) Demonstrate proficiency in relevant statistical and computational environments. [B]
		ii) Be able to visualize data and model outputs using cutting-edge statistical and computational environments. [I]
	b) Identify statistical methods and computational algorithms that might usefully be applied to a given problem and assess the pros and cons of each	i) Identify a range of existing statistical models that can serve as tests of social theories [B]
		ii) Identify and collect data that is useful for evaluating social theories [B]
	e) Use comparative model testing, model-based clustering algorithms, and theory-guided data science techniques to compare the explanatory utility of multiple behavioral models.	i) Use and interpret the results of statistical tests for model comparison (e.g. Vuong and Clarke tests, information criteria) [I]
4) Skilled Collaboration and Interpersonal Skills. Students should be	a) Participate in collaborative projects as a facilitator, team	i) Identify potential team members strategically and build a team with purpose [P]

flexible, curious, open-minded and supportive inter- and transdisciplinary team scientists who address critical social problems and can translate knowledge into forms that are readily accessible to diverse audiences.	member, or collaborator.	
		ii) Instill and nurture trust and commitment among team members [P]
		iii) Promote fruitful disagreement while containing conflict [P]
		iv) Set clear expectations for workload, task ownership, and sharing credit and authorship [P]
		v) Maintain a positive and productive working environment [P]
	c) Explore issues of critical importance to society	i) Conduct both basic and applied social research [P]
5) Ethics in Research. The successful student will appreciate and understand both moral and ethical considerations in computational social science research and practice.	a) Design computational social science research projects and methodologies that are compatible with ethical standards of research	vi) Ability to develop and implement CSS research designs, models and algorithms that are consistent with responsible and ethical conduct of research. [I]

Credit hours and work expectations: This is a 3 credit-hour course. According to Ohio State bylaws on instruction (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of [C] average.

Course Materials and Technology

Required Materials

Required books:

Melamed, David and Long Doan. 2024. *Applications of Regression for Categorical Outcomes Using R.* Boca Rotan: CRC Press.[1]

Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables.* Thousand Oaks, CA: Sage.

Required Equipment

- **Computer:** current Mac (MacOS) or PC (Windows 10) with high-speed internet connection
- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

If you do not have access to the technology you need to succeed in this class, review options for technology and internet access at go.osu.edu/student-tech-access.

CarmenCanvas Access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device (go.osu.edu/add-device) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Install the Duo Mobile application (go.osu.edu/install-duo) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

[1] Have a look at this website before purchasing this book: https://github.com/dmmelamed/catregs/tree/main/Book

Technology Skills Needed for This Course

- Basic computer and web-browsing skills
- Navigating CarmenCanvas (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat**: go.osu.edu/it
- **Phone:** 614-688-4357 (HELP)
- **Email:** servicedesk@osu.edu

Grading

How Your Grade is Calculated

Assignment Category	Points
Homework Assignments	400
Data Analysis Project	100
Total	500

Descriptions of Major Course Assignments

Homework: For each topic we discuss, there will be a homework assignment. Homework will be handed out before we discuss each topic and will be due one week after we conclude discussing the topic. Homework assignments will ask students to evaluate theories or theoretical ideas by mapping data generating processes to observed data.

Data Analysis Project: The final course project is an analysis of secondary data that I will provide. You will be given data and asked to analyze those data using the best practices of computational social science. Specifically, you will be asked to clean the data, describe the data, and fit a series of appropriate regression models that follow from social science theory. Students may work in groups of up to three students. A detailed rubric for this assignment will be provided.

Instructor Response Time

I am providing the following list to give you an idea of my intended availability throughout the course. Remember that you can call 614-688-4357 (HELP) at any time if you have a technical problem.

- **Preferred contact method:** If you have a question, please contact me first through my Ohio State email address. I will reply to emails within **48 hours on days when class is in session at the university**.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Discussion board:** I will check and reply to messages in the discussion boards weekly (at least).

Grading Scale

93–100: A, 90–92.9: A-, 87–89.9: B+, 83–86.9: B, 80–82.9: B-, 77–79.9: C+, 73–76.9: C
70–72.9: C-, 67–69.9: D+, 60–66.9: D, Below 60: E

Week	Topic: Readings
1	Introduction to the course
2	Review of OLS regression; using statistics to evaluate social theory; matching data generating processes to modeling. Melamed and Doan, Chapter 3 Long, Chapter 2 Lundberg, Ian, Rebecca Johnson, and Brandon Stewart. 2021. "What is your estimand? Defining the target quantity connects statistical evidence to theory." *American Sociological Review*. 86(3): 532-565.
3	Modeling Social Processes with Binary Outcomes, part I; deriving hypotheses and matching derivations to model outputs. Melamed and Doan, Chapter 5 Long, Chapter 3
4	Modeling Social Processes with Binary Outcomes, part II – moderation and squared terms; non-linear modeling and data generating processes Melamed and Doan, Chapter 6 Ai, Chunrong, and Edward C. Norton. 2003. "Interaction terms in logit and probit models." *Economics Letters* 80(1): 123-29.
5	Modeling Ordinal Social Processes Melamed and Doan, Chapter 7 Long, Chapter 5
6	Modeling Nominal Social Processes Melamed and Doan, Chapter 8 Long, Chapter 6
7	Count Outcomes, Part I. Data generating processes derived from Criminological theory. Melamed and Doan, Chapter 9 (pp 145-160) Long, Chapter 8 (pp 217-241)
8	Count Outcomes, Part II. Data generating processes derived from Criminological Theory Melamed and Doan, Chapter 9 (pp161-184)

	Long, Chapter 8 (pp 242-250)
9	Alternative-Specific Outcomes; Data generating processes giving rise to social mobility. Melamed and Doan, Chapter 10 Long, Chapter 6 (pp 178-182) Logan, John. 1983. "A Multivariate Model for Mobility Processes." *American Journal of Sociology* 89(2): 324-49.
10	Missing Data; Threats to inference; Types of Missing Data; Sample Selection and Disadvantaged Groups. Melamed and Doan, Chapter 11 (pp 208-214)
11	Random Effects, Part I; Clustered Data Structures in the Social Sciences; Data Generation of Nested Social Processes. Chapter 3, "Statistical Treatment of Clustered Data" in: Snijders, Tom A.B. and Roel J. Bosker. 2012. *Multilevel Analysis*. Thousand Oaks, CA: Sage. Chapter 2, "An Introduction to Multilevel Data Structure." In: Finch, W. Holmes, Jocelyn Bolin, and Ken Kelley. 2019. *Multilevel Modeling Using R*. Boca Rotan, FL: CRC Press.
12	Random Effects, Part II. Evaluating multilevel social theory with estimands. Chapter 4, "The Random Intercept Model" in: Snijders, Tom A.B. and Roel J. Bosker. 2012. *Multilevel Analysis*. Thousand Oaks, CA: Sage. Chapter 3, "Fitting Two-Level Models in R." In: Finch, W. Holmes, Jocelyn Bolin, and Ken Kelley. 2019. *Multilevel Modeling Using R*. Boca Rotan, FL: CRC Press.
13	Overview of Causal Analysis with Observational Data; Threats to validity with observational social data and approaches to minimize them. Imbens, Guido W. 2024. "Causal Inference in the Social Sciences." *Annual Review of Statistics and Its Application.*
14	Workshopping student projects
15	Workshopping student projects

Other Course Policies

Use of Artificial Intelligence

The use of artificial intelligence programs is not allowed in this course without the written permission of the instructor.

Statement on Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/ .

Statement about Disability Services

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If you are isolating while waiting for a COVID-19 test result, please let me know immediately. Those testing positive for COVID-19 should refer to the Safe and Healthy Buckeyes site for resources. Beyond five days of the required COVID-19 isolation period, I may rely on Student Life Disability Services to establish further reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or http://slds.osu.edu.

Statement on religious accommodation

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held

religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

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If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting http://ccs.osu.edu or calling 614-292--5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

CSS 4500: Advanced Computational Social Science Toolbox

Course Information

- **Proposed course number:** CSS 4500
- **Course times and location:** Tuesdays and Thursdays 9:55-11:35
- **Credit hours:** 3
- **Mode of delivery:** Lecture and Lab

Instructor

- **Name:** Brutus Buckeye
- **Email:** brutus.1@osu.edu
- **Office location:** The Oval
- **Office hours:** Wednesdays from 3 – 5 PM
- **Preferred means of communication:** Email. Class-wide communications will be sent through announcements in CarmenCanvas. Please check your notification preferences to be sure you receive these messages.

Course description

This course will provide students with experience with advanced computation, simulation, and analytics with emphasis on applications to theory and data in the computational social sciences. Students will explore practical ways to create data mining and machine learning workflows suitable for social science data and for modeling and simulating more complex social theory and behavioral data generation processes. The course will provide students with practical context for applications and technical intuition and expertise with advanced computational methods to foster interdisciplinary collaboration with technical experts (e.g., in machine learning) and social theorists (e.g., in political science).. Prereq: CSS 3500 or STAT 3302.

Course Learning Outcomes

Goals	Outcomes	Proficiencies
1. Ideation: Translation, Theoretical Modeling, Social Theory. Students should be able to articulate and translate a wide array of social theories into theoretical models, in the form of computational or mathematical algorithms.		
	Construct computational or mathematical models based on new and existing social theory	Explain the limitations of existing computational or mathematical models for social phenomena
		Adapt existing computational and mathematical models for use explaining and analyzing social phenomena.
	Explain and communicate the significance and implications of adapted and original CSS models.	
		Document models clearly, using concise descriptions appropriate to specialists, using discipline-standard formats (e.g., workflows, ODD, UML, mathematical notation) that permit independent replication.
	Demonstrate knowledge of how shared values relates to CSS as a interdisciplinary field of study, and within the student's field of study.	Explain how computational analyses can produce unintended and negative consequences for individuals, groups, and society (by, e.g., reproducing human biases, institutionalizing biased training data, etc.) and identify practical solutions.
2) Research Design / Learning from Data. Students should understand the diverse approaches to the generation of knowledge in social science and computational disciplines and be able to integrate them in a way that is methodologically sound.	Employ logics of inference in experimental and observational studies	

		Use inductive inference, deductive inference, and abductive inference to generate knowledge, and use theory-guided data science to combine different modes of inference.
	Recognize and address threats to inference in experimental and observational studies	Match modeling assumptions with the generative dynamics of the system in question using principles of parsimony and/or maximum entropy.
		Recognize and ameliorate sources of bias in research design (e.g., biased data, algorithmic bias, etc.)
		Identify and apply statistical approaches for resolving threats to inference (e.g., missing data, confounding, etc.)
	Be able to construct an overall strategy for integrating different components of a study (data gathering, cleaning, inference, testing, etc.) to address a research problem	Decompose, evaluate, and repair existing research designs.
3) Computation, Modeling, and Statistical Aptitude. Students should be proficient in computation, modelling, and statistics, be able to connect theoretical models to empirical models, understand the tradeoffs and appropriateness of computational models for varying circumstances, and	Conduct statistical and computational analysis in the most widely used and useful software environments of the day	Demonstrate proficiency in relevant statistical and computational environments.

be able to compare empirical performance across models.		
		Be able to visualize data and model outputs using cutting-edge statistical and computational environments. [I]
	Identify statistical methods and computational algorithms that might usefully be applied to a given problem and assess the pros and cons of each	
		Identify and collect data that is useful for evaluating social theories
		Match computational algorithms to data problems based on task definition
	Design statistical approaches and computational algorithms whose logic conforms to the logic of theoretical models	Tailor statistical tests to social-science theories (e.g., be able to construct likelihood functions based on the logic of social theories and find their global maxima).
		Identify and use key attributes, processes, and patterns in study systems to construct generative computational models (agent-based, multi-agent, cellular automata, etc.).
	Use theory-guided computational social science techniques to regularize data-science models based on consistency with theory.	Develop appropriate priors for statistical models that are guided by theoretical models [I]
		Develop machine learning optimization criteria that are regularized by theoretical constraints.
		Develop plan for sharing research materials (results, models, code, data)

	Use comparative model testing, model-based clustering algorithms, and theory-guided data science techniques to compare the explanatory utility of multiple behavioral models.	
		Integrate statistical inference and model-based clustering algorithms to identify multiple data-generating processes (e.g., flexible mixture models) [A]
Skilled Collaboration and Interpersonal Skills. Students should be flexible, curious, open-minded and supportive inter- and transdisciplinary team scientists who address critical social problems and can translate knowledge into forms that are readily accessible to diverse audiences in the private and non-profit sectors, Government and the Academy.		
	Explore issues of critical importance to society	Conduct both basic and applied social research [P]

Course Materials

Required

- Weisberg, S. (2005). *Applied linear regression* (Vol. 528). John Wiley & Sons. (https://www.stat.purdue.edu/~qfsong/teaching/525/book/Weisberg-Applied-Linear-Regression-Wiley.pdf)
- Forsyth, D. (2019). *Applied machine learning*. Cham: Springer International Publishing. (https://link.springer.com/book/10.1007/978-3-030-18114-7?page=1#toc)
- This class requires the free statistical software packages called R (The R Project for Statistical Computing; http://www.r-project.org/) and RStudio (http://rstudio.org).
- This class also requires Python, available here:

How your Grade is Calculated

ASSIGNMENT CATEGORY	PERCENTAGE
In-Class Quizzes	20%
Exam 1	15%

Exam 2	15%
Homework	20%
Project	15%
Final Exam	15%
Total	**100%**

Instructor Feedback and Response Time

I am providing the following list to give you an idea of my availability throughout the course.

- **Grading and feedback:** For large weekly assignments, you can generally expect feedback within **7 days**.
- **Email:** I will reply to emails within **24 hours on days when class is in session at the university**.
- **Discussion board:** I will check and reply to messages in the discussion boards every **24 hours on school days**.

Academic Integrity

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct **http://studentlife.osu.edu/csc/**.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.
If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.
Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct web page (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)

Copyright Policy

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Title IX Policy

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at http://titleix.osu.edu or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu

Diversity Statement

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Land Acknowledgement

We would like to acknowledge the land that The Ohio State University occupies is the ancestral and contemporary territory of the Shawnee, Potawatomi, Delaware, Miami, Peoria, Seneca, Wyandotte, Ojibwe and Cherokee peoples. Specifically, the university resides on land ceded in the 1795 Treaty of Greeneville and the forced removal of tribes through the Indian Removal Act of 1830. I/We want to honor the resiliency of these tribal nations and recognize the historical contexts that has and continues to affect the Indigenous peoples of this land. More information on OSU's land acknowledgement can be found at https://mcc.osu.edu/about-us/land-acknowledgement

Mental Health Statement

As a student you may experience a range of issues that can cause barriers to learn, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may

lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-2925766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 6142925766 and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

Accessibility and Accommodations

Requesting accommodations

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are isolating while waiting for a COVID-19 test result, please let me know immediately. Those testing positive for COVID-19 should refer to the **Safe and Healthy Buckeyes site** for resources. Beyond five days of the required COVID-19 isolation period, I may rely on Student Life Disability Services to establish further reasonable accommodations. You can connect with them at **slds@osu.edu**; 614-292-3307; or **slds.osu.edu**.

Religious accommodations

It is Ohio State's policy to reasonably accommodate the sincerely held religious beliefs and practices of all students. The policy permits a student to be absent for up to three days each academic semester for reasons of faith or religious or spiritual belief.

Students planning to use religious beliefs or practices accommodations for course requirements must inform the instructor in writing no later than 14 days after the course begins. The instructor is then responsible for scheduling an alternative time and date for the course requirement, which may be before or after the original time and date of the course requirement. These alternative accommodations will remain confidential. It is the student's responsibility to ensure that all course assignments are completed.

Course Schedule and Topics

Week	Dates	Topics
1		**Introduce machine learning as compared with "standard" statistics? (bias-variance tradeoff, data snooping, cross-validation, test sets) and examples in social science**
2		**Catchup; Linear algebra basics, e.g., column spaces, projections, orthogonality**
3		**"catchup continued;" introduce gradient descent**
4		**Multiple regression refresher; polynomial regression; diagnostic plots**
5		**Review of logistic regression and GLMs; Poisson and negative binomial regression, e.g., modeling crime data**
6		**Fixed and random effects models, e.g., longitudinal language acquisition**
7		**Fixed and random effects models with more complex random effect structures**
8		**Supervised classification problems; k-nearest neighbors**
9		**Naive Bayes; support vector machines**
10		**Decision trees and random forests for social classification, e.g., land use classification, identifying heterogeneous treatment effects**
11		**Tuning and prediction with random forests**
12		**Unsupervised classification problems; dimension reduction and principal components analysis, e.g., big data analysis, remote sensing**

13		**Clustering algorithms; hierarchical clustering, agglomerative methods, k-means, e.g., positional analysis, segmentation analysis**
14		**Neural networks**
13		**Cross-validation and prediction error;**
14		**Regularized regression, e.g. predicting**
15		**Applications and wrapping up**

Sample data sets and readings

Atari, M., Xue, M. J., Park, P. S., Blasi, D., & Henrich, J. (2023). Which humans?

CSS 4900: Capstone in Computational Social Science

Course Information

- **Proposed course number:** CSS 4900
- **Course times and location:** Tuesdays and Thursdays 12:45 – 2:05 PM
- **Credit hours:** 3
- **Mode of delivery:** Seminar

Instructor

- **Name:** Brutus Buckeye
- **Email:** brutus.1@osu.edu
- **Office location:** The Shoe
- **Office hours:** Tuesdays from 3 – 5 PM
- **Preferred means of communication:** CARMEN messaging. Class-wide communications will be sent through announcements in CarmenCanvas. Please check your notification preferences to be sure you receive these messages.

Course Description

In this course, students work together in small teams to solve a translational problem using computational social science methods. Teams will choose from a set of possible translational problems, and work together to conceptualize a research project, if necessary, obtain, process and clean relevant data, and then implement computational methods to identify solutions. Students will gain experience working on a team science project while putting the tools they have acquired in the major to use. The audience for this course is primarily students in the CSS major who have completed the statistics sequence, the social theory core, and Introduction to CSS. The course will review some principles of effective team science before teams select their translational problems. Once problems have been selected, the instructor will work with teams to overcome any hurdles in the research process. Over the semester, students will work interdependently with other computational social scientists to implement a research project from start to finish.

Course Goals and Learning Outcomes

This course has the following integrated learning objectives.

Goals	Outcomes	Proficiencies
1. Ideation: Translation, Theoretical Modeling, Social Theory. Students should be able to articulate and translate a wide array of social theories into theoretical models, in the form of computational or mathematical algorithms.	a. Work with a diverse set of skills for generating and analyzing both	i) Explain the use and purposes of theoretical models for providing insights into social phenomena [B]
		ii) Articulate social theories in mathematical and algorithmic form [I]
		iii) Co-create models in teams with diverse skillsets [A]
	c) Construct novel computational or mathematical models based on new and existing social theory	i) Explain the limitations of existing computational or mathematical models for social phenomena [I]
		ii) Adapt existing computational and mathematical models for use explaining and analyzing social phenomena. [I]
		iii) Construct novel computational or mathematical models based on new and existing social theory [A]
	d) Explain and communicate the significance and implications of adapted	ii) Explain how algorithmic or mathematical models complement, extend, or enhance existing or new theoretical social-science

	and original CSS models.	theories, frameworks, or approaches. [I]
	e) Demonstrate knowledge of how shared values relates to CSS as a interdisciplinary field of study, and within the student's field of study.	i) Explain how computational analyses can produce unintended and negative consequences for individuals, groups, and society (by, e.g., reproducing human biases, institutionalizing biased training data, etc.) and identify practical solutions. [B]
		ii) Explain how differential access to computational tools can intersect with personal identity, institutions, and social power. [B]
2) Research Design / Learning from Data. Students should understand the diverse approaches to the generation of knowledge in social science and computational disciplines and be able to integrate them in a way that is methodologically sound.	a) Employ logics of inference in experimental and observational studies	i) Use exploratory qualitative and inferential methods to generate research questions and hypotheses [B]
	b) Recognize and address threats to inference in experimental and observational studies	ii) Recognize and ameliorate sources of bias in research design (e.g., biased data, algorithmic bias, etc.) [B]
	c) Be able to construct an overall strategy for integrating different components of a study (data gathering, cleaning, inference, testing, etc.) to address a research problem	i) Decompose, evaluate, and repair existing research designs. [I]
3) Computation, Modeling, and Statistical Aptitude.	a) Conduct statistical and computational	i) Demonstrate proficiency in relevant statistical and

Students should be proficient in computation, modelling, and statistics, be able to connect theoretical models to empirical models, understand the tradeoffs and appropriateness of computational models for varying circumstances, and be able to compare empirical performance across models.	analysis in the most widely used and useful software environments of the day	computational environments. [B]
	b) Identify statistical methods and computational algorithms that might usefully be applied to a given problem and assess the pros and cons of each	i) Identify a range of existing statistical models that can serve as tests of social theories [B]
		ii) Identify and collect data that is useful for evaluating social theories [B]
4) Skilled Collaboration and Interpersonal Skills. Students should be flexible, curious, open-minded and supportive inter- and transdisciplinary team scientists who address critical social problems and can translate knowledge into forms that are readily accessible to diverse audiences.	a) Participate in collaborative projects as a facilitator, team member, or collaborator.	i) Identify potential team members strategically and build a team with purpose [P]
		ii) Instill and nurture trust and commitment among team members [P]

		iii) Promote fruitful disagreement while containing conflict [P]
		iv) Set clear expectations for workload, task ownership, and sharing credit and authorship [P]
		v) Maintain a positive and productive working environment [P]
	b) Explain the elements of effective teamwork and importance of diverse, multidisciplinary teams	i) Recognize indicators of successful teamwork [P]
		ii) Identify and correct threats to team success [P]
		iii) Know how best to leverage diversity in the pursuit of excellence [P]
	c) Explore issues of critical importance to society	i) Conduct both basic and applied social research [P]
		ii) Demonstrate a commitment to producing research that will improve societal welfare [P]
	d) Be able to engage with diverse audiences, participants, and stakeholders	i) Convey knowledge to a variety of groups by, for example, producing evidence-based policy memos, op-eds, articles in policy journals [A]
	e) Be able to develop a dissemination or publication plan that effectively engages diverse collaborators and stakeholders	i) Communicate scientific findings clearly and succinctly to other academics, policymakers, and the public in tradition forms (peer-reviewed articles) and alternative forms such as social media, white papers, etc.[A]
5) Ethics in Research. The successful student will appreciate and understand	a) Design computational social science research projects and	vi) Ability to develop and implement CSS research designs, models and algorithms

both moral and ethical considerations in computational social science research and practice.	methodologies that are compatible with ethical standards of research	that are consistent with responsible and ethical conduct of research. [I]

How this Course is Organized

The course takes an transdisciplinary, problem-focused approach …

Mode of delivery: This is an **in-person class** that meets once per week. Attendance is required at all class meetings, except in case of an emergency. Having a single large block of time will allow for detailed discussions, hands-on activities, and workshops.

Course activities: The course is divided into **weekly modules** with interactive readings, lecture slides, discussions, and lab assignments. A Weekly Schedule will be used to organize all the course activities. It will contain the follow links for each week of the course.

- Textbook:
- Exams: there are three (3) in-class exams in the course. These will consist of coding, data analysis, and interpretation that will require students to incorporate the methods and theory learned throughout the semester.
- Laboratories: There are ten (10) labs throughout the semester that provide opportunities to demonstrate mastery of the course learning objectives. Lab instructions, sample data, and code examples will normally be provided as interactive jupyter notebooks. An example lab is included in PDF format at the end of this syllabus.

Pacing: Class will meet twice a week, on Tuesdays and Thursdays.

- Tuesday(s)
    - The instructor will present a **lecture** covering key theoretical concepts from data science and statistics.
    - The **lab assigned the previous week** is due before class on Tuesday.
- Thursday(s)
    - A **practicum** where you will meet with your clsassmates and instructor. The instructor will provide a short introduction to the laboratory that explains the dataset and learning objectives, and a any additional programming commands that may be necessary to complete the laboratory.

Prerequisites: This capstone course is one of the final degree requirements for the BS in CSS. It is intended for advanced students in the CSS major. Students should have Junior or Senior standing to take this course. Students should also have completed all intermediate statistical training and have taken at least one course in formal theorizing prior to enrolling.

Credit hours and work expectations: This is a 3 credit-hour course. According to Ohio State bylaws on instruction (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and CarmenCanvas activities, for example), in addition to 6 hours of homework (reading and assignment preparation, for example) in order to receive a resulting grade of C.

How Your Grade is Calculated

Assignment Category	Percentage
1. Participation	30%
2. Project proposal	20%
3. Empirical evaluation	20%
4. Final presentation	20%
Total	**100%**

1. Participation: Participation in class discussion is an essential aspect of this course and attendance is mandatory. Your contributions to discussions are essential to making the class as valuable for all students as possible. We will workshop each group's project in class and feedback to other groups is an important component of your participation.

2. Project proposal: You will work in teams to develop a project proposal presentation which is due during week 6 of class. Students will select a translational problem, develop a potential empirical solution to that problem, and pitch it to the class. Students will be expected to provide feedback on other proposals this week.

3. Empirical Evaluation: In between the project proposal and the project presentation, groups will be generating data and analyzing it. Students will be required to keep lab notes documenting their decisions in the research process. These lab notes will be submitted along with a written summary of your empirical results. Feedback will be Reviewer-style comments that you should address to the best of your ability before finalizing the group project.

4. Final Presentation: During week 14 you will present your results. The final project must engage with some sort of evidence (synthetic is acceptable, but real-world data is encouraged) to address your group's translational problem. Final presentations should (1) review the practical problem that is being addressed, (2) review extant theory and research on the topic, (3) describe data used to inform your solution, and (4) discuss the implications of results.

Late Assignments

Due dates are set to help you stay on pace and to allow timely feedback that will help you complete subsequent assignments. If you are unable to submit your assignments by the assigned due date, please contact the instructor as soon as possible to arrange a plan to complete late submission. Otherwise, late assignments will not be accepted.

Instructor Feedback and Response Time

Remember that you can call 614-688-4357 (HELP) at any time if you have a technical problem.

- **Preferred contact method:** If you have a question, please contact me first through CARMEN messaging. I will reply as quickly as possible.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Grading and feedback:** For assignments submitted before the due date, I will try to provide feedback and grades within **seven days**. Assignments submitted after the due date may have reduced feedback, and grades may take longer to be posted.

Required Equipment and Software

Students will need a Mac or PC capable of running the Chrome browser and a reliable internet connection. You are required to bring your laptop to class. If you need to borrow a device, please see https://it.osu.edu/student-technology-loan-program.

Grading Scale

Final grades are based on the following grading scheme: A 93-100; A- 90-92; B+ 87-89; B 83-86; B- 80-82; C+ 77-79; C 73-76; C- 70-72; D+ 67-69; D 60-66; E< 60.

Course Schedule

This is a general overview of the topics covered in the course. Please see the CARMEN site for more details and due dates.

WEEK	Topics	Assigned readings	Assignment or Exam
1	Week 1: Introduction and Logistics	Readings: Team science inventories and assessments. Chapter 1	
2	Week 2: Team composition	Readings: Science to Inform Team Science. Chapter 2	Assignment: Students will prepare their CVs and job application letters and do peer evaluations.
3	Week 3: Team effectiveness	Readings: Research on Team effectiveness. Chapter 3	
4	Week 4: Team Assembly	Readings: Team Assembly and Professional Development. Chapters 4 and 5	
5	Week 5: Leadership	Readings: Team Science Leadership. Chapter 6	Project proposal due
6	Week 6: Student project presentations	Present an overview of your problem to the class to workshop	
7	Week 7: Workshop 1 – data collection	This week in-class time will be dedicated to spending time collecting data for the final project.	
8	Week 8: Problem Solving	We will workshop issues related to your project in class	
9	Week 9: Problem Solving	We will workshop issues related to your project in class	
10	Week 10: Data Analysis	We will discuss methods of evaluation relevant to each group	
11	Week 11: Data Analysis	We will discuss methods of evaluation relevant to each group	
12	Week 12: Translational lessons	We will discuss problems and pitfalls associated with moving from empirical results to policy proscriptions	
13	Week 13: Student team presentations		
14	Week 14: Student team presentations		
15	Course conclusion		

Required readings

Cooke, Nancy J. and Margaret L. Hilton. 2015. “Enhancing the Effectiveness of Team Science.” *National Academies Press* Washington DC.

CarmenCanvas Access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in CarmenCanvas. To ensure that you are able to connect to CarmenCanvas at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device (go.osu.edu/add-device) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Install the Duo Mobile application (go.osu.edu/install-duo) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

Technology Skills Needed for this Course

- Computer and web-browsing skills
- Navigating CarmenCanvas (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat**: go.osu.edu/it
- **Phone:** 614-688-4357 (HELP)
- **Email:** servicedesk@osu.edu

Other Course Policies

Use of Artificial Intelligence

The use of artificial intelligence programs is not allowed in this course without the written permission of the instructor.

Statement on Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/ .

Statement about Disability Services

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are isolating while waiting for a COVID-19 test result, please let me know immediately. Those testing positive for COVID-19 should refer to the Safe and Healthy Buckeyes site for resources. Beyond five days of the required COVID-19 isolation period, I may rely on Student Life Disability Services to establish further reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or http://slds.osu.edu.

Statement on religious accommodation

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual

belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting http://ccs.osu.edu or calling 614--292--5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614--292--5766 and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

Computational Social Science Major Advising Sheet: Track A

47-50 credit hours

Student Information

Name: _____ Name.#: _____ OSU ID: _____

Prerequisite – *1 course, 5 credit hours* ***Notes: not counted towards major hours. This is the prerequisite for STAT 2450. Other CSS major courses may be taken before MATH 1151.***

Course	Term	Credit Hours	Notes
MATH 1151: Calculus I		5	

Core Courses – *7 courses, 17 credit hours*

Course	Term	Credit Hours	Notes
CSS 2100: Core Concepts in CSS		3	
STAT 2450: Intro to Statistical Analysis I		3	
CSS 3100: Social Theory-Guided CSS		3	
CSS 4500: Advanced Computational Social Science Toolbox		3	
CSS 4900: CSS Capstone		3	
STAT 5731: Introduction to R for Data Science I		1	
STAT 5732: Introduction to R for Data Science II		1	

Electives – *2 courses, 6 credit hours*

Course	Term	Credit Hours	Notes

Choose 2 From Approved List:

- COMM 2540: Introduction to Communication Technology
- INTSTDS 3702: Herding Cyber Cats - Information Security Management
- PHILOS 2332.01: Engineering Ethics for a Diverse and Just World
- SOCIOL 3302: Technology and Global Society

CSS Methods – *2 courses, 6 credit hours*

Course	Term	Credit Hours	Notes
CSS 2550: Methods and Theory in Computational Social Science I		3	
CSS 3500: Methods and Theory in Computational Social Science II		3	

Formalizing Theory – *2 courses, 6 credit hours*

Course	Term	Credit Hours	Notes

Choose 2 From Approved List:

- ANTH 5505: Wicked Science (move here instead of the list of CSS Electives)
- COMM 4665: Human Communication in Social Networks
- ECON 2202: Principles of Macroeconomics
- ECON 2001: Principles of Microeconomics
- ECON 4001.01: Intermediate Microeconomics
- GEOG 2200: Mapping our World
- GEOG 5210: Fundamentals of GIS
- POLITSC 4553: Game Theory for Political Scientists
- POLITSC 3500: Political Games - Rational Choice Theory and the Study of Politics
- SOCIOL 4650: Social Networks
- SOCIOL 5463: Advanced Social Stratification

Required Social Science Minor – *4-6 courses, 12-15 credit hours* ***Note: not counted towards major hours****

Course	Term	Credit Hours	Notes

Students must complete a minor from a participating department. Choose from the Approved Social Science Minor List:

- Anthropology

- Economics
- Geography
- Political Science
- Psychology
- Sociology
- Communication
- Linguistics

Additional Information:

- All cross-listed course options, regardless of department of offering, are approved to count towards the major or required minor.
- Single majors and dual degree students may not overlap any GE requirements.
- Double majors may overlap up to 12 credit hours of GEs and/or double major coursework provided each major has 18 unique credit hours. Advisor approval required.
- No more than 6 credit hours of research credit (5998) may be used to fulfill major requirements.
- No more than one half of the credit hours in the major (23 credit hours) can be transfer credit.
- Minimum C- required in all major classes. Minimum 2.0 major GPA required. No more than 3 credit hours of courses graded S/U.
- Unique circumstances may warrant a petition to the CSS Faculty Advisory Committee to alter requirements.

Notes

Computational Social Science Major Advising Sheet: Track B

48 credit hours

Student Information

Name: _____ Name.#: _____ OSU ID:_____

Prerequisites – *4 courses, 17 credit hours* ***Notes: not counted towards major hours. These are the Math prerequisites for STAT courses required for the CSS major and Statistics minor. Other CSS courses may be taken before the following prerequisites.***

Course	Term	Credit Hours	Notes
MATH 1151: Calculus I		5	*Pre-rec for STAT 2450 & 3201*
MATH 1152: Calculus II		5	*Pre-rec for STAT 3201*
MATH 2153: Calculus III		4	*Pre-rec for MATH 2568*
MATH 2568: Linear Algebra		3	*Pre/co-rec for STAT 3301*

Core Courses – *7 courses, 17 credit hours*

Course	Term	Credit Hours	Notes
CSS 2100: Core Concepts in CSS		3	
STAT 2450: Intro to Statistical Analysis I		3	
CSS 3100: Social Theory-Guided CSS		3	
CSS 4500: Advanced Computational Social Science Toolbox		3	
CSS 4900: CSS Capstone		3	
STAT 5731: Introduction to R for Data Science I		1	
STAT 5732: Introduction to R for Data Science II		1	

Electives – *2 courses, 6 credit hours*

Course	Term	Credit Hours	Notes

Choose 2 From Approved List:

- COMM 2540: Introduction to Communication Technology
- INTSTDS 3702: Herding Cyber Cats: Information Security Management

- PHILOS 2332.01: Engineering Ethics for a Diverse and Just World
- SOCIOL 3302: Technology and Global Society

CSS Methods – *2 courses, 6 credit hours*

Course	Term	Credit Hours	Notes
CSS 2550: Methods and Theory in Computational Social Science I		3	
CSS 3500: Methods and Theory in Computational Social Science II		3	

Required Statistics Minor – *4 courses, 13 credit hours* ***Note: not counted towards major hours***

Course	Term	Credit Hours	Notes
STAT 3201: Introduction to Probability for Data Analytics		3	
STAT 3202: Introduction to Statistical Inference for Data Analytics		4	
STAT 3301: Statistical Modeling for Discovery I		3	
STAT		3	

Students must complete a minor in Statistics:

The Statistics minor encompasses 13 credit hours. Pre-requisites for the minor total a minimum of 17 additional credit hours, provided students do not have prior credit for any of the Math Calculus sequence.

<u>Required courses (10 credit hours):</u>

- STAT 3201: Introduction to Probability for Data Analytics (3 credit hours)
    - Prerequisites:
        - MATH 1151: Calculus I (5 credit hours)
        - MATH 1152: Calculus II (5 credit hours)
- STAT 3202: Introduction to Statistical Inference for Data Analytics (4 credit hours)
    - Prerequisite:
        - STAT 3201
- STAT 3301: Statistical Modeling for Discovery I (3 credit hours)
    - Prerequisites:
        - STAT 3202; or STAT 4202 and STAT 5730
    - Prerequisites or Corequisite:
        - MATH 2568 - Linear Algebra (3 credit hours)
            - MATH 2568 has an additional prerequisite of MATH 2153 – Calculus III (4 credit hours)

<u>Elective courses (3 credit hours; choose 1):</u>

- STAT 3302: Statistical Modeling for Discovery II (3 credit hours)
    - Prerequisites:
        - STAT 3301 and MATH 2568
- STAT 3303: Bayesian Analysis and Statistical Decision Making (3 credit hours)
    - Prerequisites:

        - STAT 3301 or
        - STAT 4202 and STAT 5731 and STAT 5732
- STAT 3410: Principles of Data Collection and Analysis (3 credit hours)
    - Prerequisites:
        - STAT 3200 or
        - STAT 4202 and STAT 5731 and STAT 5732
- STAT 5510: Statistical Foundations of Survey Research
    - Prerequisites:
        - GE Data Analysis course

Social Science Cluster Sequence – *4 courses, minimum 12 credit hours*

Course	Term	Credit Hours	Notes

Choose at least 4 courses, worth a minimum of 12 credit hours, from a single selected cluster. All courses are 3 credit hours unless designated otherwise:

Sociocultural anthropology

- ANTHROP 2202(H): Introduction to Cultural Anthropology
- ANTHROP 3027: Disasters and Health
- ANTHROP 4525: History of Anthropological Theory
- ANTHROP 5626: More: Culture and Economic Life
- ANTHROP 5627: Migrants and Refugees
- ANTHROP 5650: Research Design and Ethnographic Methods

Medical anthropology

- ANTROP 3302: Introduction to Medical Anthropology
- ANTHROP 4706: Chronic Illness, Injury, and Disability in Modern History
- ANTHROP 5600: Evolutionary Medicine
- ANTHROP 5601: The Anthropology of Sex, Drugs, and HIV
- ANTHROP 5602: Women's Health in Global Perspective

Socio-ecological systems

- ANTHROP 3050: Social and Ecological Systems: From Problems to Prospects
- ANTHROP 3411: Human Ecological Adaptations
- ANTHROP 3604: Introduction to the Methods of Archaeological Science
- ANTHROP 3623: Environmental Anthropology
- ANTHROP 5505: Wicked Science
- ANTHROP 5610: Ethnobotany
- ANTHROP 5620: Hunters and Gatherers

Archaeology

- ANTHROP 2201(H): Introduction to Archaeology
- ANTHROP 3401: Fundamentals of Archaeology

- ANTHROP 4597.03H: Models of Sustainability and Resilience: Lessons from the Past
- ANTHROP 5603: Strategy of Archaeological Field Research
- ANTHROP 5604: Archaeology Lab Methods
- ANTHROP 5651: Spatial Analysis for Anthropologists

Biological and forensic anthropology
- ANTHROP 2200(H): Introduction to Biological Anthropology
- ANTHROP 2210: Race, Ethnicity, Gender Diversity, and Human Biology
- ANTHROP 3300: Human Origins
- ANTHROP 3301: Human Biological Diversity and Health
- ANTHROP 3305: Introduction to Forensic Anthropology
- ANTHROP 5642: Growth and Development
- ANTHROP 5641: Primate Behavior
- ANTHROP 5645: Life History Evolution, Aging, and Senescence

General Psychology
Note: select only one course from each bullet, up to 12 credit hours total
- PSYCH 3313: Behavioral Neuroscience ***or*** PSYCH 3513: Cognitive Neuroscience
- PSYCH 3310: Sensation & Perception ***or*** PSYCH 3312: Learning & Memory
- PSYCH 3331: Abnormal Psychology ***or*** PSYCH 3335: Psychology of Adjustment
- PSYCH 3340: Lifespan Development ***or*** PSYCH 3550: Psychology of Childhood ***or*** 3551: Psychology of Adolescence
- PSYCH 3325: Social Psychology ***or*** PSYCH 3375: Stereotyping & Prejudice

Clinical Psychology
- PSYCH 2303: Positive Psychology
- PSYCH 2333: Human Sexuality
- PSYCH 2376: Interpersonal Relationships
- PSYCH 3331: Abnormal Psychology
- PSYCH 3530: Psychology of Personality
- PSYCH 3335: Psychology of Adjustment

Developmental Psychology
- PSYCH 2303: Positive Psychology
- PSYCH 2333: Human Sexuality
- PSYCH 3335: Psychology of Adjustment
- PSYCH 3340: Lifespan Development
- PSYCH 3530: Psychology of Personality
- PSYCH 3550: Psychology of Childhood
- PSYCH 3551: Psychology of Adolescence

Organization & Performance Psychology
- PSYCH 2311: Psychology of Motivation
- PSYCH 2420: Psychology Applied to Sport
- PSYCH 2462: Psychology of Creativity
- PSYCH 3325: Introduction to Social Psychology
- PSYCH 3522: Organizational Psychology

Social & Personality Psychology
- PSYCH 2376: Interpersonal Relationships
- PSYCH 3325: Introduction to Social Psychology

- PSYCH 3375: Stereotyping & Prejudice
- PSYCH 3530: Psychology of Personality
- PSYCH 3900: A Practical Guide to Ruling the World

Note on Economics clusters: ECON 2001.02 is a pre-requisite for all 4000-level ECON courses. It may be waived by instructors for CSS students.

Empirical methods in economics

- ECON 2001.02: Principles of Microeconomics
- ECON 2002.02: Principles of Macroeconomics
- ECON 4001.02: Intermediate Microeconomics
- ECON 4410: Data Management and Econometric Analysis
- ECON 5410: Econometrics I
- ECON 5420: Econometrics II
- ECON 4002.02: Intermediate Macroeconomic Theory

Applied microeconomics

Required courses in this cluster:

- ECON 2001.02: Principles of Microeconomics
- ECON 4001.02 Intermediate Microeconomic Theory

Choose two from:

- ECON 5700 Industrial Organization
- ECON 5860 Health Economics
- ECON 5850 Labor Economics
- ECON 5001 Game Theory

Macroeconomics

- ECON 4001.02 Intermediate Microeconomic Theory
- ECON 4002.02 Intermediate Macroeconomic Theory
- ECON 4200 Money and Banking
- ECON 5660 Financial Aspects of International Trade

Criminology and criminal law

- SOCIOL 2209: Introduction to Criminal Justice
- SOCIOL 2309: Introduction to Law & Society
- SOCIOL 3410(H): Criminology
- SOCIOL 4462: Advanced Social Stratification
- SOCIOL 4507: The Criminal Justice System
- SOCIOL 4509: Sociology of Law
- SOCIOL 4511: Juvenile Delinquency
- SOCIOL 4611: Jails, Prisons, and Community Corrections
- SOCIOL 5525: Global Criminology

Social Inequality

- SOCIOL 2320: Sociology of Education
- SOCIOL 2367.01H: The Political Elite and Interest Groups
- SOCIOL 2367.02: Urban Social Problems
- SOCIOL 3200: Sociology of Immigration
- SOCIOL 3306: Sociology of Poverty
- SOCIOL 3380: Race and Ethnic Relations in America
- SOCIOL 3464: Work, Employment & Society
- SOCIOL 4462: Advanced Social Stratification

- SOCIOL 4635: Gender and Society
- SOCIOL 4655: Sociology of Sport
- SOCIOL 5605: Sociology of Sexuality

Population dynamics and wellness

- SOCIOL 2202: Social Problems
- SOCIOL 2290: Sociology of Death & Dying
- SOCIOL 3200: Sociology of Immigration
- SOCIOL 3630: Medical Sociology
- SOCIOL 4462: Advanced Social Stratification
- SOCIOL 4629: Health Disparities in Social Context
- SOCIOL 5450: The Sociology of Global Health & Illness

American Democracy and Law

- POLITSC 2150: Voters and Elections
- POLITSC 3115: Introduction to the Policy Process
- POLITSC 4110: American Presidency
- POLITSC 4115: Bureaucracy and Public Policy
- POLITSC 4120: U.S. Congress
- POLITSC 4130: Law and Politics
- POLITSC 4135: American Constitutional Law

International Conflict and Cooperation

- POLITSC 2300: American Foreign Policy
- POLITSC 3240: Political Violence
- POLITSC 4300: Theories of International Relations
- POLITSC 4310: Security Policy
- POLITSC 4315: International Security and the Causes of War
- POLITSC 4320: Strategies for War and Peace
- POLITSC 4330: Global Governance
- POLITSC 4318: United Nations System

Political Economy and Development

- POLITSC 3220: Politics of the Developing World
- POLITSC 3280: Politics of Markets
- POLITSC 3460: Global Justice
- POLITSC 4250: African Politics
- POLITSC 4282: Politics of Income Inequality
- POLITSC 4332: Politics of Globalization
- POLITSC 4940: Politics of Immigration

Computational Spatial Data Analytics in Geography

- GEOG 2200.01: Mapping our World
- GEOG 4103: Introductory Spatial Data Analysis (Prerec: MATH 1116; 1151 accepted for CSS students)
- GEOG 5103: Intermediate Spatial Data Analysis (Prerec: GEOG 4103)
- GEOG 5200: Cartography and Map Design
- GEOG 5201: GeoVisualization (Prerec: GEOG 5200)
- GEOG 5210: Fundamentals of Geographic Information Systems
- GEOG 5212: Geospatial Databases for GIS (Prerec: GEOG 5210)

Human Connections

- GEOG 2100: Human Geography
- GEOG 2400.01 ***or*** GEOG 2400.02: Economic and Social Geography
- GEOG 2500: Cities and their Global Spaces
- GEOG 3597.01: World Urbanization
- GEOG 3600: Space, Power and Political Geography
- GEOG 3701: The Making of the Modern World
- GEOG 3801: Political Ecology

Earth, Environment, and Sustainability

- GEOG 2800: Our global environment
- GEOG 3497.03: Environmental Citizenship
- GEOG 3800: Geographical Perspectives on Environment and Society
- GEOG 3900: Global Climate Change: Causes and Consequences
- ENR 2000: Natural Resources Data Analysis
- ENR 2100: Introduction to Environmental Sciences
- ENR 2501: Introduction to Sustainability
- ENR 3400: Psychology of Environmental Problems

Communication Technology

- COMM 2540: Introduction to Communication Technology
- COMM 2511: Visual Communication Design
- COMM 3165: Evaluation and Usability Testing
- COMM 3545: Human Computer Interaction & User Experience
- COMM 3554: Social Implications of Communication Technology
- COMM 3558: Social Media
- COMM 4511: User-Centered Communication Design
- COMM 4555: Computer Interface and Human Identity
- COMM 4556: Information Tech and Organizational
- COMM 4557: Communication Network Infrastructure
- COMM 4738: Health Communication and New Media

Health, Environment, Risk, and Science Communication

- COMM 2596: An Introduction to Health, Environment, Risk, & Science Communication
- COMM 3340: Principles of Environmental Campaigns
- COMM 4240: Science Communication
- COMM 3332: Risk Communication
- COMM 3333: Crisis Communication
- COMM 4736: Health Communication in Interpersonal Contexts
- COMM 4737: Health Communication in Mass Mediated Contexts
- COMM 4738: Health Communication and New Media

Media and Society

- COMM 3440: Mass Communication and Society
- COMM 3402: Crime and the News Media
- COMM 3404H: Media Law & Ethics
- COMM 3413: Media Entertainment
- COMM 3414: Sports Media Relations
- COMM 3466: Communication and Popular Culture
- COMM 4240: Science Communication
- COMM 4401: Mass Communication and Youth
- COMM 4814: Political Communication

- COMM 4820: Public Opinion and Communication

Organizational Communication
- COMM 3325: Introduction to Organizational Communication
- COMM 3330: Communication and Conflict Management
- COMM 3331: Communication and Decision Making
- COMM 3628: Contemporary Persuasion Theory
- COMM 3668: Intercultural Communication
- COMM 4556: Information Technology and Organizational Communication
- COMM 4557: Communication Network Infrastructure
- COMM 4635: Communication Dynamics in Groups
- COMM 4665: Human Communication in Social Networks

Media Production and Analysis
- COMM 2223: Lantern Practicum
- COMM 2321: Writing for Strategic Communication
- COMM 3403: Sports Journalism
- COMM 3405: Introduction to Lantern TV
- COMM 3413: Media Entertainment
- COMM 3414: Sports Media Relations
- COMM 3554: Social Implications of Communication Technology

Psycholinguistics
- LING 2000(H): Introduction to Linguistics
- LING 3701(H) / PSYCH 3371: Language and the Mind
- LING 5701: Psycholinguistics I
- LING 5702: Cognitive Models of Language
- LING 5612 / PSYCH 5612 / PHILOS 5830 / CSE 5531: Introduction to Cognitive Science

Sociolinguistics
- LING 2000(H): Introduction to Linguistics
- LING 3601: Language, Race, and Ethnicity in the U.S.
- LING 3605: Language and Social Justice
- LING 3606: Language, Gender, and Sexuality
- LING 4602: Language and Belonging in the U.S. (4 credit)
- LING 5601: Introduction to Sociolinguistics
- LING 5602: Quantitative Sociolinguistics

***Note**: If a selected cluster cannot be completed in a reasonable timeframe due to fluctuations in individual departmental course offerings, students may work with their academic and faculty advisors to select alternative courses. Additionally, if a student has compelling interest in selecting approved courses outside a predetermined cluster, they may work with their academic and faculty advisors to select alternative courses.**

Additional Information:
- All cross-listed course options, regardless of department of offering, are approved to count towards the major or required minor.
- Single majors and dual degree students may not overlap any GE requirements.
- Double majors may overlap up to 12 credit hours of GEs and/or double major coursework provided each major has 18 unique credit hours. Advisor approval required.
- No more than 6 credit hours of research credit (5998) may be used to fulfill major requirements.
- No more than one half of the credit hours in the major (23 credit hours) can be transfer credit.

- Minimum C- required in all major classes. Minimum 2.0 major GPA required. No more than 3 credit hours of courses graded S/U.
- Unique circumstances may warrant a petition to the CSS Faculty Advisory Committee to alter requirements.

Notes:

CSS-BS Sample 4-Year Plan (Track A)

CSS Major with Minor in Sociology

Note: major coursework can be completed in 3 years for students who add the major in year 2

Year One

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
MATH 1151: Calc I	5	Pre-Rec/GE Foundation*	STAT 2450: Intro to Statistical Analysis I	3	Core
ASC 1100.XX: Survey	1	College Requirement	GENED 1201: GE Launch Seminar	1	GE Bookend
CSS 2100: Core concepts in CSS	3	Core	CSS 3100: Social Theory Guided Data Science	3	Core
SOCIOL 1101: Introduction to Sociology	3	Pre-Rec/GE Foundation*	World Language 1101	4	College Requirement
Writing & Information Literacy GE	3	GE Foundation	Nautral Science GE	4	GE Foundation
Total CH per semester	**15**		**Total CH per semester**	**15**	

*Cannot demand students take this for GE Foundation, but this course may be used to fulfill this requirement

Year Two

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
Phil 2332.01: Engineering Ethics for a Diverse and Just World	3	CSS Elective	STAT 5731 & STAT 5732**	2	Core
CSS 2500: Data Science for CSS I	3	Track A (CSS Skillset)	CSS 3500: Data Science for CSS II	3	Track A (CSS Skillset)
World Language 1102	4	College Requirement	World Language 1103	4	College Requirement
Race, Ethnicity & Gender Diversity GE	3	GE Foundation	SOCIOL 3487: Research Methods in Sociology	3	Track A (SBS Minor)
SOCIOL 2463: Social Stratification: Race, Class, and Gender	3	Track A (SBS Minor)	Literary, Visual & Performing Arts GE	3	GE Foundation
Total CH per semester	**16**		**Total CH per semester**	**15**	

**STAT 5731 & 5732 are each 7-week session courses at 1-CH per course

Year Three

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
GEOG 2200: Mapping our World	3	Track A (CSS Skillset)	ANTH 5505: Wicked Science	3	Track A (CSS Skillset)
SOCIOL 2309: Law & Society	3	Track A (SBS Minor)	CSS 4500: Advanced CSS Toolbox	3	Core
SOCIOL 2202: Social Problems & Public Policy	3	Track A (SBS Minor)	SOCIOL 4000S: Social Science Business Collaborative	3	Track A (SBS Minor)
Historical & Cultural Studies GE	3	GE Foundation	Citizenship for a Diverse & Just World GE	3	GE Theme
IntStds 3702: Herding Cyber Cats: Information Security Management	3	CSS Elective	Theme GE	3	GE Theme
Total CH per semester	**15**		**Total CH per semester**	**15**	

Year Four

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
CSS 4900: CSS Capstone	3	Core	CSS 4999: Undergrad Research***	3	CSS Elective or Full time status
Citizenship for a Diverse & Just World GE	3	GE Theme	Theme GE	3	GE Theme
Elective	3	Full-time Status	GENED 4001: Reflection Seminar	1	GE Bookend
Elective	3	Full-time Status	Elective	3	Full-time Status
Elective	3	Full-time Status	Elective	3	Full-time Status
			Elective	2	Full-time Status
Total CH per semester	**15**		**Total CH per semester**	**15**	

***CSS 4999 can be used to replace the final advanced research elective by students pursuing formal research distinction

CSS-BS Sample 4-Year Plan (Track B)

CSS Major with Minor in Statistics & Cluster in Media & Society

Note: major coursework can be completed in 3 years for students who add the major in year 2

Year One

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
MATH 1151: Calc I	5	Pre-Rec/GE Foundation*	MATH 1152: Calc II	5	Track B/Stats Minor Pre-Rec
ASC 1100.XX: Survey	1	College Requirement	GENED 1201: GE Launch Seminar	1	GE Bookend
CSS 2100: Core concepts in CSS	3	Core	CSS 3100: Social Theory Guided Data Science	3	Core
SOCIOL 1101: Introduction to Sociology	3	Pre-Rec/GE Foundation*	World Language 1101	4	College Requirement
Writing & Information Literacy GE	3	GE Foundation	Nautral Science GE	4	GE Foundation
Total CH per semester	**15**		**Total CH per semester**	**17**	

**Cannot demand students take this for GE Foundation, but this course may be used to fulfill this requirement*

Year Two

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
Phil 2332.01: Engineering Ethics for a Diverse and Just World	3	CSS Elective	STAT 5731 & STAT 5732**	2	Core
MATH 2153: Calc III	4	Track B/ Stats Minor Pre-Rec	MATH 2568: Linear Algebra	3	Track B Stats Minor Pre-Rec
World Language 1102	4	College Requirement	World Language 1103	4	College Requirement
Race, Ethnicity & Gender Diversity GE	3	GE Foundation	STAT 3201: Introduction to Probability for Data Analytics	3	Track B Stats Minor
STAT 2450: Intro to Statistical Analysis I	3	Core	Literary, Visual & Performing Arts GE	3	GE Foundation
Total CH per semester	**17**		**Total CH per semester**	**15**	

*** STAT 5731 & 5732 are each 7-week session courses at 1-CH per course*

Year Three

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
STAT 3202: Introduction to Statistical Inference for Data Analytics	4	Track B Stats Minor	COMM 4240: Science Communication	3	Track B Social Science Cluster
COMM 3440: Mass Communication & Society	3	Track B Social Science Cluster	CSS 4500: Advanced CSS Toolbox	3	Core
COMM 3404: Media Law & Ethics	3	Track B Social Science Cluster	COMM 4820: Public Opinion & Communication	3	Track B Social Science Cluster
Historical & Cultural Studies GE	3	GE Foundation	Citizenship for a Diverse & Just World GE	3	GE Theme
IntStds 3702: Herding Cyber Cats: Information Security Management	3	CSS Elective	Theme GE	3	GE Theme
Total CH per semester	**16**		**Total CH per semester**	**15**	

Year Four

AU			SP		
Course	**Hours**	**Rationale**	**Course**	**Hours**	**Rationale**
CSS 4900: CSS Capstone	3	Core	CSS 4999: Undergrad Research*	3	CSS Elective or Full time status
Citizenship for a Diverse & Just World GE	3	GE Theme	Theme GE	3	GE Theme
STAT 3301: Statistical Modeling for Discovery I	3	Track B Stats Minor	GENED 4001: Reflection Seminar	1	GE Bookend
Elective	3	Full-time Status	STAT 3302: Statistical Modeling for Discovery II	3	Track B Stats Minor
Elective	3	Full-time Status	Elective	3	Full-time Status
			Elective	2	Full-time Status
Total CH per semester	**15**		**Total CH per semester**	**15**	

Additional Notes: all MATH courses are offered in SU terms as well

STAT 3201, 3202 are offered AU&SP only

STAT 3301 is AU only

STAT 3302 is SP only

Students are 9-CH away from Math minor with this plan

*CSS 4999 can be used to replace the final advanced research elective by students pursuing formal research distinction

CSS Program Requirements

CSS BS Degree

CSS Major + Required Minor (47-50 total credits)

- Students are **required to minor** in either a participating social science discipline or Statistics
- Major credits are earned from CSS core courses, elective courses, and social science training courses selected based on track (A/B) (35 credits)
- CSS double major also possible

CSS Core Courses (17 cr.)

CSS 2100, STAT 2450, CSS 3100, CSS 4500, CSS 4900, STAT 5731 & STAT 5732 are required for all declared majors.

Elective Courses (6 cr.)

Required for all declared majors.
Choose two from an approved list.

Students choose:

Social Science Minor (Track A)

Social Science Minor (12-15 cr.)*

Students must complete a minor from a participating department (Anthropology, Communication, Economics, Geography, Linguistics, Political Science, Psychology, Sociology).

CSS Methods (6 cr.)

CSS 2500 and CSS 3500
Math prerequisite: Calculus I

Formal Theorizing (6 cr.)

Choose two from an approved list.

* These credits count exclusively in the selected minor and do not apply to the CSS major.

Statistics (Track B)

Stats Minor (13 cr.)**

While students are required to minor, these credits count exclusively towards the minor.

Math prerequisites (Stats): Calculus I-III, Linear Algebra

Social Science Training (12 cr.)

Choose four courses from approved list, in one of the 26 pre-packaged clusters. E.g., Medical Anthropology cluster:
ANTROP 3302: Intro Med Anthro
ANTHROP 4706: Illness in History
ANTHROP 5600: Evolut. Medicine
ANTHROP 5601: Anthro of Sex, Drugs, and HIV
ANTHROP 5602: Women's Health

**13-CH count does not include Math pre-recs

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

186 University Hall
230 North Oval Mall
Columbus, Ohio 43210

8 May 2024

RE: Proposal for new Computational Social Science degree

Dear Colleagues and Curricular Committee Members,

On behalf of the College of Arts and Sciences, I am pleased to present a proposal for an undergraduate major in Computational Social Science. The major, leading to a Bachelor of Science, will provide students with a transdisciplinary curriculum that encourages theory-driven problem-solving, creative thinking, and team science. The program leverages existing courses and curricular structures already present at OSU and prepares students for jobs that require a combination of theoretical and domain knowledge in the social sciences, quantitative research and analytics, and up-to-date computational skills.

The demand for professionals with transdisciplinary training in computational social science has never been greater. Industry, Government, the non-profit sector, and the Academy alike all demand computationally literate professionals. Undergraduate majors in Computational Social Science are rare nationally, and we believe it is an area of growth for the College and for the University. We hope you agree that the program we constructed will expand the career prospects of our undergraduates, strengthen the overall quality of the College of Arts and Sciences, and enhance the reputation of OSU. Thank you for your consideration.

Sincerely,

Sean S. Downey, ASC-CSS Committee Chair

Members of the ASC-CSS Committee (SU 2023 – SP 2024)
Sean S. Downey (Associate Professor, Department of Anthropology)
Rob Bond (Associate Professor, School of Communication)
David Melamed (Professor, Department of Sociology)
Tom Metzger (Assistant Professor of Teaching Practice, Department of Statistics)
Jackson Stotlar (Business Operations Consultant, College of Arts and Sciences)

THE OHIO STATE UNIVERSITY

Office of Undergraduate Education

385 Student Academic Services Building
281 W. Lane Avenue
Columbus, OH 43210

614-292-2872 Phone
614-292-5587 Fax

sae.osu.edu

May 5, 2024

Dr. Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
Columbus OH, 43210-1106

Dear Dr. Downey,

The Office of Undergraduate Education is pleased to support the proposed Computational Social Science B.S. in the College of Arts and Sciences at Ohio State. Currently, student demand for majors that focus on computational thinking significantly exceeds the capacity of our existing degree programs. This imbalance between demand and supply is a contributing factor in increasing time to degree as well as student debt for some undergraduates. Nationwide trends suggest that student demand for degrees in computational thinking will continue to increase. Given these factors, the Office of Undergraduate Education strongly supports the expansion of degree pathways in computational thinking at Ohio State.

Sincerely,

Norman W. Jones
Vice Provost and Dean for Undergraduate Education

College of Arts and Sciences

THE OHIO STATE UNIVERSITY

186 University Hall
230 North Oval Mall
Columbus, OH 43210

614-292-1667 Phone

artsandsciences.osu.edu

April 29, 2024

Dear Curriculum Committee,

We submit this letter in support of the proposal for an undergraduate Bachelor of Science major in Computational Social Science (CSS). The proposed curriculum is informed by, and contributes to, the University's Academic Plan. A hallmark feature of this plan is accelerating student success, which requires that programs engage in curricular innovations to align with modern-day challenges, to promote interdisciplinary training, and to prepare students for the modern workforce. The CSS major aligns with these aspirations and promises to bring distinction to The Ohio State University. Only a few CSS programs exist nationally, although many colleges or divisions of social science are moving in this direction. At Ohio State, we are ahead of the curve and can serve as a model for others to emulate.

The College of Arts and Sciences has a critical mass of faculty working in computational social science. These faculty were recruited because of their research distinction, and they are eager to train CSS majors in computational social science so that they can be viable candidates for top graduate programs and to succeed in the workforce, where these skills are in high demand.

The proposed curriculum is unique in that it is genuinely interdisciplinary. The social sciences at Ohio State have a long tradition of collaboration. Importantly, the CSS curriculum is not merely a collection of courses that touch on a similar topic. It represents a genuine effort to integrate disciplinary expertise and social theory with computational approaches that are used across the social sciences, such as network analysis and agent-based modeling.

Computational social science will soon be a feature of highly ranked colleges and universities. We are uniquely positioned at OSU to serve as a model for advancing this curriculum. As such, the major would serve our students and bring distinction to the university.

Sincerely,

David Horn
Dean

Ryan King
Divisional Dean, Social and Behavioral Sciences

THE OHIO STATE UNIVERSITY

College of Arts and Sciences
Department of Political Science

2140 Derby Hall
154 North Oval Mall
Columbus, OH 43210

614-292-1146 Phone
Caldeira.1@osu.edu

April 29th, 2024

Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
Columbus OH, 43210-1106

Dear Professor Downey:

My colleagues and I in the Department of Political Science whole heartedly support your proposal for a B.S. in Computational Social Science in the College of Arts and Sciences. This new major will make Ohio State one of the national leaders in integrating the methods, models, and analytics of computational science to the social sciences (with University of North Carolina, University of California Davis, and the University of Illinois). We are committed to providing classes in this curriculum and we see the holder of the Timashev Chair, for which we are currently recruiting, as a mainstay in the new major. I am very happy to report that nearly a third of my colleagues have expressed interest in the Computational Science B.S.

Sincerely yours,

Gregory Caldeira

GREGORY A. CALDEIRA
Chair
Distinguished University Professor,
Dreher Chair in Political Communication and Policy Thinking,
Professor of Law

THE OHIO STATE UNIVERSITY

Department of Geography
College of Arts and Sciences

1036 Derby Hall
154 North Oval Mall
Columbus, Ohio 43210
www.geography.osu.edu

Dr. Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
Columbus OH, 43210-1106

April 11, 2024

Dear Dr. Downey,

The Department of Geography is very pleased to support the proposed Computational Social Science B.S. in the College of Arts and Sciences at Ohio State. From our perspective, this proposed degree promises a transformative shift in how students study and understand social phenomena, integrating computational methods, models, and data analytics with established social science practices. We expect students in this degree to have an enhanced understanding of complex social systems, the methodological 'chops' to process and analyze large-scale social science-relevant data, as well as cutting edge predictive skills with respect to social trends and human behavior.

We are happy to be involved in terms of contributing classes and, if needed, instructional support.

Sincerely,

Mat Coleman

Professor and Chair, Department of Geography, College of Social and Behavioral Sciences
http://u.osu.edu/coleman.373/

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

Department of Anthropology
4034 Smith Laboratory
174 West 18th Ave.
Columbus, OH 43210-1106

614-292-4149 Phone
614-292-4155 Fax

anthropology.osu.edu

April 12, 2024

Members of the Curriculum Committee:

The Department of Anthropology's Undergraduate Studies Committee is pleased to provide concurrence for Professor Sean Downey's proposal for a new B.S. in Computational Social Science. We are enthusiastic about the proposal and look forward to our Department's participation in this new interdisciplinary major.

Sincerely,

Debbie Guatelli-Steinberg, Ph.D.
Professor and Chair of the Undergraduate Studies Committee

W. Scott McGraw, Ph.D.
Professor and Chair, Department of Anthropology

THE OHIO STATE UNIVERSITY

Duane T. Wegener, Ph.D.

College of Arts and Sciences Distinguished Professor of Psychology
Chair, Department of Psychology
225A Psychology Building
1835 Neil Avenue
Columbus, OH 43210

Phone: 614- 292-3038
E-mail: wegener.1@osu.edu

May 1, 2024

To whom it may concern,

On behalf of the Department of Psychology at Ohio State University I am writing to support the proposed Computational Social Science (CSS) major.

In the department, we look forward to contributing to the major in various ways. We have faculty who could potentially offer core courses in such a major. We also have a number of psychology courses that include computational aspects, such that they would be of interest to potential students who might want to focus on the computational aspects of psychology. This could either take the form of CSS electives or as a minor in Psychology as part of Track A in the proposed CSS major.

We eagerly anticipate the launch of the CSS major. We are confident that this cross-campus collaboration would benefit students and facilitate their career development.

I hope you will view the proposal favorably. If you have any questions or I could provide any additional information, please feel free to email me at wegener.1@osu.edu.

Sincerely,

Duane T. Wegener, Ph.D.
College of Arts and Sciences Distinguished Professor of Psychology
Chair, Department of Psychology
Ohio State University

Department of Sociology

College of Social and Behavioral Sciences
238 Townshend Hall
1885 Neil Ave. Mall
Columbus, OH 43210

Phone (614) 292-6681
Fax (614) 292-6687
http://sociology.osu.edu

April 12, 2024

Curriculum committee,

The department of sociology offers concurrence for the proposed Computational Science Degree.

The program is well-positioned to leverage new and exciting data as a way of understanding human behavior.

Sincerely,

Douglas B. Downey
Professor of Sociology

THE OHIO STATE UNIVERSITY

School of Communication

Derby Hall
154 North Oval Mall
Columbus, OH 43210
614-292-3400 Phone
www.comm.ohio-state.edu

Dr. Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
Columbus OH, 43210-1106

May 1, 2024

Dear Dr. Downey,

The School of Communication enthusiastically endorses the proposed Computational Social Science B.S. program within the College of Arts and Sciences at Ohio State University. The program aims to equip students with the capacity to seamlessly integrate computational methods, models, and data analytics into established social science theory and practices. Graduates of this program will have a distinctive skill set and valuable perspectives that can enhance both their future academic pursuits and their professional careers.

We are happy to have our some of courses included in the social science sequences and to have our communication technology and media and society minors listed as options within the program.

Sincerely,

R. Kelly Garrett
Professor and Director
School of Communication

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

Department of Linguistics

100 Oxley Hall
1712 Neil Avenue
Columbus, OH 43210

614-292-4052 Phone
614-292-8833 Fax

linguistics.osu.edu

April 26, 2024

Prof. Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
CAMPUS

Dear Prof. Downey,

The Linguistics Undergraduate Curriculum Committee has reviewed the concurrence request for the proposed major in Computational Social Science. Linguistics is happy to support this CSS major. In our assessement, this new major will provide valuable and forward-looking training that is not currently available at OSU. The new major will also complement the strengths of the Linguistics program. Linguistics expects to be a collaborating department in the CSS major in the ways outlined in the proposal.

We wish the CSS program much success with this new major.

Sincerely,

William Schuler
Professor and Interim Chair
Department of Linguistics
The Ohio State University
schuler@ling.osu.edu

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

Department of Economics

410 Arps Hall
1945 North High Street
Columbus, OH 43210-1172

614-292-6701 Phone
614-292-3906 Fax

Economics.osu.edu

April 24, 2024

Dr. Sean S. Downey
Department of Anthropology
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
Columbus OH, 43210-1106

Dear Dr. Downey,

The Department of Economics is very pleased to support the proposed Computational Social Science B.S. in the College of Arts and Sciences at Ohio State. From our perspective, this proposed degree promises a transformative shift in how students study and understand social phenomena, integrating computational methods, models, and data analytics with established social science practices. We expect students in this degree to have an enhanced understanding of complex social systems, the tools to process and analyze large-scale social science-relevant data, as well as cutting edge predictive skills with respect to social trends and human behavior. We are happy to be involved in terms of contributing classes.

Sincerely,

Huanxing Yang
Professor and Chair
Department of Economics

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

Department of Statistics

404B Cockins Hall
1958 Neil Ave.
Columbus, OH 43201

614-247-2585 Phone

kaizar.1@osu.edu
stat.osu.edu

April 11, 2025

Computational Social Sciences (CSS) major committee:

On behalf of the Department of Statistics, we thank the Computational Social Sciences (CSS) major committee for sharing their thoughtful and detailed proposal for the new major. We found the major proposal overall to be an interesting idea and structure, and see value and potential in the proposed CSS major. We are glad to see that the major includes a foundational course in Statistics. The Department of Statistics has a strong track-record of curricular collaboration both by providing specialized coursework (as in our collaborations with undergraduate majors related to the biological sciences, engineering, and business) and by partnering in other programs (as in our work with the data analytics undergraduate major, the Masters of Translational Data Analytics [MTDA] and Certificate in Practice of Data Analytics [CPDA]).

As your CSS proposal suggests, and as discussed previously with Divisional Dean Ryan King, the Department of Statistics will participate in the program as a Collaborating Unit. We also appreciate that interested Statistics faculty can participate in the program as co-directors, affiliated faculty, and CSS course instructors. The Department welcomes the opportunity to partner with other collaborating units in faculty searches that could potentially include joint appointments.

We find that the learning objectives and schedule of topics for the newly proposed courses CSS 2500, CSS 3100, CSS 3500 and CSS 4500 include substantial core statistical content that align with the expertise of our faculty. As such, the Department of Statistics reserves the right to develop courses that focus on these topics but have a target audience that is different from or broader than computational social sciences.

With this condition of potential similar course development, the Department of Statistics is pleased to grant concurrence for the CSS BS proposal. We again would like to emphasize that we see value and potential in the proposed CSS major. We appreciate the opportunity to engage with students across

disciplines, and hope that we can also enrich the proposed CSS program and help to guarantee its long-term success.

Sincerely,

Eloise E. Kaizar
Professor and Chair
Department of Statistics

The following is the email correspondence requested on April 11, 2024, to Computer Science & Engineering for concurrence on the CSS program. Computer Science & Engineering did not respond to the request for concurrence, therefore concurrence was assumed.

Tuesday, April 29, 2025 at 8:37:42 AM Eastern Daylight Time

Subject: Computational Social Science major proposal (concurrence review)
Date: Thursday, April 11, 2024 at 12:51:25 PM Eastern Daylight Time
From: Downey, Sean
To: Arora, Anish
Attachments: image001.png, ASC-ComputationalSocialScienceBS-proprosal.10Apr2024-CIRCULATE.pdf

Dear Anish,

I am writing to share with you our proposal for a new major in Computational Social Science and to ask for concurrence review and a letter of support from the Department of Computer Science and Engineering. I realize that we did not get a chance to discuss CSS this semester, but I am confident that this new curriculum aligns well with the CS curriculum based on my previous work with Eric during the reverse course-design process. Given his earlier input and your note regarding CSS during your SOC town hall in January, we incorporated the CS minor as an option for CSS students. I am happy to pick up this thread whenever it is convenient. We have a longstanding goal of submitting to the ASC curriculum committee in early May, so in the interim, I would be grateful if you could provide us with a brief letter of support by Friday, 26 April. I realize that it is a very busy moment at the end of the semester, so please keep me apprised if you need more time and we can plan accordingly.

Please feel free to reach out if you have any questions.

Sincerely,

Sean Downey
ASC-CSS Program Chair

THE OHIO STATE UNIVERSITY

Sean S. Downey | He/Him/His/Dr.
Associate Professor, Department of Anthropology
Core Faculty, Sustainability Institute
Leadership Team, Translational Data Analytics
Review Editor, Human Ecology (Springer)
The Ohio State University
4034 Smith Laboratory
174 W. 18th Avenue
Columbus OH, 43210-1106

Recent paper: **An intermediate level of disturbance with customary agricultural practices increases species diversity in Maya community forests in Belize** in *Communications Earth and Environment*.

Website: https://u.osu.edu/
HEALMOD: http://healmod.osu.edu
Office: 614-688-3904
Mobile: 240-392-0220
Zoom: http://go.osu.edu/zoom-downey

Computational Social Science Curriculum Map

Goal	Outcome	Relevant course(s)	Assessment course(s)
Goal 1: Social Theory. Students will learn about theoretical camps in the social sciences. Students will apply social theory to interpret and explain patterns in social science data and to generate testable hypotheses that can be supported or falsified.			
a)	**Critical theorizing**. Describe and critique social science theory as presented in published studies and/or lectures.	CSS 2500, CSS 3500	CSS 3500
b)	**Theory development**. Adapt existing social theories or frameworks to address new cases, contexts, or ideas while maintaining their overall coherence and logic.	Minor or Social Science Training Courses	Minor program
c)	**Theory building**. Explain how algorithmic or mathematical models complement, extend, or enhance existing or new theoretical social-science theories, frameworks, or approaches.	Electives (Social theory, Advanced methods), CSS 3100, CSS 4900	CSS 3100 CSS 4900
d)	**Theory modeling**. Create or apply computational approaches to represent and test theoretical relationships.	CSS 4500 and Advanced Methods Electives	CSS 4500
		Relevant course(s)	**Assessment course(s)**
Goal 2: Computational Modeling and Analysis: Students will learn about the data generation process and acquire skills for developing mathematical and algorithmic expressions of social theory. Students will learn how to analyze data using computational methods.			
	Computational platforms. Conduct statistical and computational analyses by using current tools and technologies for data generation, collection, and processing.	CSS 2500, CSS 3100, CSS 3500	CSS 3500

	Software proficiency. Demonstrate proficiency in relevant statistical and computational environments.	CSS 3500, CSS 4500, Advanced methods electives	CSS 3500 CSS 4500
	Comprehension of computational approaches. Understand and be able to reproduce computational models and analyses described in published work.	CSS 3500, CSS 4500 and Advanced Methods Electives	CSS 3500 CSS 4500
		Relevant course(s)	**Assessment course(s)**
Goal 3: Research Design: Students will learn to develop analytic strategies for answering social science questions using computational methods. This entails knowledge of data collection, cleaning, testing, and inference.			
a)	**Distinguishing methodologies.** Explain the pros and cons of various computational approaches when addressing specific research questions in the social sciences.	CSS 4500, CSS 4900 (capstone)	CSS 4500 CSS 4900
b)	**Experimental modeling**. Create experiments that generate data suitable for computational analyses that inform research questions in the social sciences.	CSS 2100, CSS 2500, CSS 3100, CSS 4900, Minor or Social Science Training Courses	CSS 3100 CSS 4900
c)	**Questions from data**. Use exploratory qualitative and inferential methods to generate research questions and hypotheses.	CSS 3100, CSS 4500	CSS 4500
d)	**Interpreting findings**. Explain the significance of findings discovered through computational methods, including proper inferences and limitations of the data.	CSS 2500, CSS 3500	CSS 3500
e)	**Research ethics**. Design computational social science research projects and methodologies that are compatible with ethical standards of research.	CSS 2100, CSS 3100	CSS 3100
		Relevant course(s)	**Assessment course(s)**
Goal 4: Interdisciplinary Collaboration: Student will work effectively as part of a team			

and understand disciplinary and transdisciplinary approaches to social science research.			
a)	**Data visualization.** Communicate social science data and results of statistical analyses by presenting them in accessible forms to a variety of audiences.	CSS 3500, CSS 4500, Advanced methods electives	CSS 3500 CSS 4500
b)	**Technical communication.** Communicate scientific findings to professional and public stakeholders, including academics, policymakers, and public audiences.	CSS 3100, CSS 4900, CSS 3100	CSS 4900
c)	**Professional engagement.** Gain familiarity with the CSS job market and best practices for networking and displaying professionalism.	CSS 4900	CSS 4900
d)	**Collaborative research design.** Co-create computational models by collaborating with teams with diverse disciplinary interests.	CSS 4900	CSS 4900
e)	**Translational ethics.** Demonstrate knowledge of ethics and shared values as related to CSS, particularly when working in industry or with industry partners.	CSS 2100, Minor or Social Science Training Courses, CSS 3100, CSS 4900	CSS 2100 CSS 4900