

STS 325 - ST: COMPUTATIONAL THINKING FOR THE SOCIAL AND BEHAVIORAL SCIENCES

College of Science and Liberal Arts Department of Humanities and Social Sciences

Semester: Fall 2024 Class Meeting Days: Mondays & Thursdays Class Meeting Time: 8:30 AM - 9:50 AM Class Meeting Location: CKB 215 Instructor: Dr. Yao Sun Office Location: CULM 435A Office Hours: Mondays & Thursdays 10 – 11 am or by appointment Email: yao.sun@njit.edu

I. Welcome!

This is a course designed for you to survey theoretical foundations and technical skills about computational thinking. The course focuses on comprehensively understanding the principles and logic of computational data processing, programming, and problem solving in social and behavioral sciences.

II. Course Prerequisites

ENGL 102 with a grade of C or higher, and one History and Humanities GER 200 level course with a grade of C or higher.

III. Student Learning Outcomes

- Comprehensively understand the theoretical foundations of computational thinking.
- Use computational tools to identify and define the problem, as well as prepare and clean data.
- Be able to conduct exploratory data analysis, build and evaluate statistical models, as well as summarize findings and gain insights with computational techniques.
- Understand the logic of programming and write simple computational programs that demonstrate how computational thinking can go from a thought exercise to a complete solution.
- Approach real-world problems systematically, develop efficient computational solutions, and understand how computational tools can be used in the problem-solving process.

IV. Course Readings and Materials

All required readings will be available in CANVAS at designated time periods throughout the semester.

Supplementary Materials:

- Peter J. Denning and Matti Tedre (2019). Computational Thinking (The MIT Press Essential Knowledge series). The MIT Press.
- Karl Beecher (2017). Computational Thinking: A beginner's guide to problemsolving and programming. Publisher: BCS, The Chartered Institute for IT. ISBN: 9781780173665.
- Paul Curzon and Peter William Mcowan (2017). The Power of Computational Thinking: Games, Magic and Puzzles to Help You Become a Computational Thinker. Publisher: WSPC (EUROPE).
- Thomas Mailund (2021). Introduction to Computational Thinking: Problem Solving, Algorithms, Data Structures, and More. Publisher: Apress. ISBN-10: 1484270762. ISBN-13: 978-1484270769.

V. Grading Scale

This course will adhere to the grading system below.

Grading Scale (%)			
89.5 – 100	A		
86.5 - 89.4	В+		
79.5 – 86.4	В		
75.5 – 79.4	C+		

65.5 – 75.4	С
59.5 - 65.4	D
0-59.4	F

VI. Grade Categories and Weights

Assessment	Percent of Final Grade
Reading Article Presentation & Leading Discussion	30%
Midterm Quiz	25%
Midterm Reading Response Essay	10%
Final Quiz	25%
Final Reading Response Essay	10%

VII. Assessment

- In each Reading Discussion Session, one group will lead the discussion of two chapters (available in Canvas). Discussion leaders are expected to 1) summarize and present the readings using PowerPoint slides, 2) propose two discussion questions for each chapter, and 3) propose a potential research topic relevant to each chapter and explain why this topic will be interesting to study. Discussion of each chapter will last about 40 minutes (30-minute presentation + 10-minute open discussion). Discussion leaders are expected to provide accurate summaries and lead a thought-provoking discussion. Active participation in class discussion is strongly encouraged.
- Midterm and Final Exams will be completely based on the lecture slides and will test students' understanding of fundamental concepts and principles in computational thinking in social sciences. Detailed instructions will be offered.
- Midterm Reading Response Essay (<u>Due Date: 11:59 pm, Sunday, Oct 27</u>) and Final Reading Response Essay (<u>Due Date: 11:59 pm, Sunday, Dec 8</u>) should be at least 300 words in length, not including titles, headers, identifying information etc. Select one chapter from Weeks 3-7 class readings to read and write the Midterm Essay, and select one chapter from Weeks 9-13 class readings to read and write the Final Essay. <u>NOTE: You CANNOT write about the chapter that you present in</u> <u>class. You MUST write about a chapter that another group presents.</u> Paper format, detailed instructions, and a grading rubric will be offered.

VIII. Grade Dissemination

Your grades will be posted to CANVAS. When a rubric is present, the grading will be selfexplanatory. You are responsible for keeping track of your own grades, assignment deadlines, and any missing assignments. Any issue with a grade for a specific assignment or quiz must be addressed within one week of the assignment deadline.

IX. Course Schedule

Schedule	Modules	Mondays	Thursdays
		(Lecture Sessions)	(Discussion Sessions,
			2 chapters per session)
Week 1	Introduction & Syllabus Overview		Reading Discussion
(Sep 5)			Setup
Week 2	Introducing Computational Thinking	Session 1	How to Succeed with
(Sep 9 & 12)	(Foundations and Pillars)		Computational Tools
Week 3	Dealing with Data I	Session 2	Session 1
(Sep 16 & 19)	(Introduction to Data Analysis w/ R)		
Week 4	Dealing with Data II	Session 3	Session 2
(Sep 23 & 26)	(Data Wrangling/Pre-processing)		
Week 5	Dealing with Data III	Session 4	Session 3
(Sep 30 & Oct 3)	(Exploratory Data Analysis)		
Week 6	Dealing with Data IV	Session 5	Session 4
(Oct 7 & 10)	(Model Development)		
Week 7	Dealing with Data V	Session 6	Session 5
(Oct 14 & 17)	(Model Evaluation)		
Week 8	Midterm Week	Midterm Quiz	Midterm Reading
(Oct 21 & 24)		(In-class)	Response Essay
			(Due: Sunday, Oct 27)
Week 9	Understanding Algorithms 1	Session 7	Session 6
(Oct 28 & 31)	(Fundamental Operations)		
Week 10	Understanding Algorithms 2	Session 8	Session 7
(Nov 4 & 7)	(Analyzing&Developing Approaches)		
Week 11	Applied Computational Thinking	Session 9	Session 8
(Nov 11 & 14)	(Python Basics)		
Week 12	Real-World Computational Thinking 1	Session 10	Session 9
(Nov 18 & 21)	(Examples and Case Studies)		
Week 13	Real-World Computational Thinking 2	Session 11	Session 10
(Nov 25 & 26)	(Modeling the Real World)		
Week 14	Final Week	Final Quiz	Final Reading
(Dec 2 & 5)		(In-class)	Response Essay
			(Due: Sunday, Dec 8)
Week 15 (Dec 9)	Q & A for Quizzes and Essays		
Remarks			

*Note: The Course Schedule is subject to revision

X. Course Policies

Late Work Policy: There is no make-up for the midterm and final exams. Essays turned in late will be assessed a penalty: a half-letter grade if it is one day late, and a full-letter grade for 2-7 days late. Papers will not be accepted if overdue by more than seven days. No extension permitted. Plan early!

Grades of "Incomplete": The current university policy concerning incomplete grades will be followed in this course. An Incomplete grade ("I") is exceptional and granted at the

instructor's discretion only when students are unable to complete course requirements due to illness or other circumstances beyond their control. In other words, an "I" grade may be awarded to a student only when a small portion of the student's work is incomplete and only when the student is otherwise earning a passing grade. The course instructor and student must complete and sign the "I" Grade Contract Form that describes the work to be completed, the date it is due, and the grade the student would earn factoring in a zero for all incomplete assignments. The time limit for removing the "I" is to be set by the instructor, and it will not exceed one semester from the original date grades were due for this course. An "I" grade not cleared within one semester (including summer sessions) will revert to the grade noted on the contract (an "IF" in most cases).

XI. Technology and Media

Canvas: This course will use CANVAS to distribute course materials and grades. If you need help learning how to perform various tasks related to this course or other courses being offered in Canvas, please view the following videos or consult the Canvas help guides. You may also contact IST Department at 973-596-2900 or ServiceDesk@njit.edu.

Laptop Usage: Students are encouraged to use laptop only for learning purposes.

Classroom Devices/Student Recording: Tape recorders are not allowed.

Phone Usage: Phones should be on silent mode. Students are NOT encouraged to check messages or surf the Internet during class. It is preferred that students not take photos/video/audio recordings of the lectures.

XII. University Policies & Resources

Attendance Policy: Students are expected to attend every class, arrive on time, and actively participate in class. Students are allowed <u>one</u> unexcused absence. Every unexcused absence after the "freebie" will cause your participation score to drop a full letter grade. Excused absences will be accommodated on a case-by-case basis.

Academic Integrity Policy: The essential quality of this Policy is that each student shall demonstrate honesty and integrity in the completion of all assignments and in the participation of the learning process. Adherence to the University policy on Academic Integrity promotes the level of integrity required within the university and professional communities and assures students that their work is being judged fairly with the work of others. This Policy defines those behaviors which violate the principles of academic integrity, describes a range of appropriate sanctions for offenses, and identifies a method for promoting the principle of academic integrity on campus.

Accessibility Resources & Service Accommodations: The Office of Accessibility Resources and Services works in partnership with administrators, faculty and staff to provide

reasonable accommodations and support services for undergraduate, graduate, doctoral, and visiting students with disabilities who have provided our office with medical documentation to receive services. We strive to promote an inclusive environment that encompasses advocacy and access to all campus resources.

End of Semester Student Evaluations: All classes at NJIT make use of an online system for students to provide feedback to the University regarding the course. These surveys will be made available at the end of the semester, and the University will notify you by email when the response window opens. Your participation is highly encouraged and valued.

Office of Academic Advising (OAA): The Office of Academic Advising (OAA) was established in order to assist in the advisement of students who are undecided in their major, transitioning into another major at NJIT, and those students who need additional support to graduate successfully and in a timely manner. OAA is a place where students will get intentional and intrusive advising, by a supportive academic advisor that will enable them to grow developmentally and give them the motivation they need to complete their degree.

The Writing Center: The Writing Center is a free resource which offers on-site tutoring. The center provides one-on-one and group tutoring sessions to students from all disciplines, during the fall and spring semesters. During Center hours, tutors are available to work with students on any aspect of their writing, from generating ideas and developing arguments, to working through drafts to their completion and revising effectively.