DS 6390 Visualization of Information

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Office Hours: by appointment

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Course Description:
This course introduces principles and practices of information visualization, including visual design theory and creative coding. Desktop and web approaches will be explored using popular visualization tools, programming languages, and graphics coding libraries, including Excel, Tableau, Processing, HTML/CSS, JavaScript, P5.js, D3.js, and Three.js.

Course Requirements:
This course includes programming assignments, presentations, and critiques. Plan a minimum of three hours of outside preparation for each hour of class. The due date for all assigned materials will be announced in advance. It is the student's responsibility to have all assignments ready on time. In addition, it is the student's responsibility to make up any missed work or locate lecture notes due to absence.

Method of Presentation:
Recorded lectures introduce the primary course content, with project concepts and specifications. This course is NOT designed as a traditional "sage on the stage" lecture. Live sessions are used to present student projects and discuss concepts and project issues, work collaboratively, and ask questions. Students need to come to the live sessions prepared to use this time effectively.

Method of Evaluation:
Evaluation is based on critiques of projects. Attendance and participation in class are also factored in.

Required Software:
Excel, Tableau, Processing/Java, P5.js, D3.js, Three.js, IDE (e.g., Visual Studio Code, Sublime, etc.)

Recommended Software:
Three.js, Babylon.js

Materials:
Sketchbook/journal, camera (phone is fine)

Assignments/Grading:

All assignments are due 12 hours before the live session.

Assignment	Scale	Weight
Participation and Attendance	0–100	10%
Introduction to Data Visualization	0–100	0%
Principles of Design	0–100	5%
Excel	0–100	7%
Tableau	0–100	7%
Rolling Up Sleeves	0–100	7%
Code Immersion	0–100	7%
Arrays and Memory	0–100	7%
Midterm Presentations	0–100	10%
Untangling the Web	0–100	7%
Transitioning to Media Rich Web	0–100	7%
JavaScript Deep Dive	0–100	7%
D3, Part I	0–100	7%
D3, Part II	0–100	7%
D3, Part III	0–100	7%
Final Presentations	0–100	10%

Course Topics:

1. **Introduction to Data Visualization and Creative Coding**
2. **Principles of Design**
3. **Excel**
4. **Tableau**
5. **Rolling Up Your Sleeves**
6. **Code Immersion**
7. **Arrays and Memory**
8. **Untangling the Web**
9. **Transitioning to the Interactive, Media-Rich Web**
10. **JavaScript Deep Dive**
11. **D3, Part I**
12. **D3, Part II**
13. **D3, Part III**
14. **Project Presentations**

Optional Content:

15. **Imaging**
16. **Curves**
17. Object-Oriented Programming
18. **More OOP**
19. **Inheritance**
20. **Generative Systems**
21. **Polymorphism**

Learning Objectives:

After successful completion of this course, you should be able to:

1.0—DEMONSTRATE COMPETENCY IN CONCEPTUALIZATION, DESIGN, AND IMPLEMENTATION OF DATA VISUALIZATIONS

- 1.1 Follow a detailed process for analyzing a program's requirements
- 1.2 Analyze a visual design in terms of formal aesthetic principles
- 1.3 Use a graphical process to design a solution to a problem
- 1.4 Design, code, and document a visualization project

2.0—DEMONSTRATE COMPETENCY IN FUNDAMENTAL PROGRAMMING THEORY

- 2.1 Understand primitive and reference variables
- 2.2 Create parameterized functions
- 2.3 Locate and explain syntax errors in a program
- 2.4 Use techniques for debugging programs
- 2.5 Understand how to compile and execute a program

3.0—DEMONSTRATE COMPETENCY IN OBJECT-ORIENTED PROGRAMMING

- 3.1 Create programmer-defined objects
- 3.2 Use existing class libraries to develop collections of objects
- 3.3 Use composition in a programming project
- 3.4 Use inheritance in a programming project
- 3.5 Explain the ideas behind polymorphism
- 3.6 Explain the ideas behind object reusability and modularity

4.0—DEMONSTRATE COMPETENCY IN WEB-BASED PROGRAMMING

- 4.1 Create a simple website using HTML and CSS
- 4.2 Use JavaScript to make a webpage more dynamic
- 4.3 Understand principles of graphics coding on the Web
- 4.4 Use JavaScript to create a visualization
- 4.5 Create data visualizations with the popular JavaScript graphics libraries P5.JS and D3.js

Attendance Policy:

Students are expected to attend all class sessions. If a student is absent from class on the due date of any assignment, they are expected to make alternative arrangements to assure that the assignment is turned in on time.

Academic Honesty and Misconduct—The Honor Code

All code you create in this course MUST be your own or clearly stated otherwise—NO EXCEPTIONS.

All work undertaken and submitted in the course is governed by the University's Honor Code. The relevant section of the Code, taken from the Preamble of the Honor Council's Constitution:

Intellectual integrity and academic honesty are fundamental to the processes of learning and of evaluating academic performance, and maintaining them is the responsibility of all members of an educational institution. High personal standards of honesty and integrity are a goal of education in all the disciplines of the University. Students must share the responsibility for creating and maintaining an atmosphere of honesty and integrity. Students should be aware that personal experience in completing assigned work is essential to learning. Permitting others to prepare their work, using published or unpublished summaries as a substitute for studying required materials, or giving or receiving unauthorized assistance in the preparation of work to be submitted are directly contrary to the honest process of learning. Students who are aware that others in a course are cheating or otherwise acting dishonestly have the responsibility to inform the professor and/or bring an accusation to the Honor Council.

A violation of the Honor Code may result in an "F" for the course, and the student may be taken before the Honor Council. If you are unclear about this policy, either in general or in its specific application, please see the instructor. The Honor Code is in the SMU Student handbook and may be viewed online at:
https://www.smu.edu/StudentAffairs/officeofthedeanofstudents/StudentHandbook

Title IX and Disability Accommodations

Disability Accommodations	Students who need academic accommodations for a disability must first register with Disability Accommodations & Success Strategies (DASS). Students can call 214-768-1470 or visit http://www.smu.edu/Provost/SASP/DASS to begin the process. Once they are registered and approved, students then submit a DASS Accommodation Letter through the electronic portal, *DASS Link,* and then communicate directly with each of their instructors to make appropriate arrangements. Please note that accommodations are not retroactive, but rather require advance notice in order to implement.
Sexual Harassment	All forms of sexual harassment, including sexual assault, dating violence, domestic violence and stalking, are violations of SMU's Title IX Sexual Harassment Policy and may also violate Texas law. Students who wish to file a complaint or to receive more information about the grievance process may contact Samantha Thomas, SMU's Title IX Coordinator, at accessequity@smu.edu or 214-768-3601. Please note that faculty are mandatory reporters. If students notify faculty of sexual harassment, faculty must report it to the Title IX Coordinator. For more information about sexual harassment, including resources available to assist students, please visit www.smu.edu/sexualmisconduct.
Pregnant and Parenting Students	Under Title IX, students who are pregnant or parenting may request academic adjustments by contacting Elsie Johnson (elsiej@smu.edu) in the Office of the Dean of Students, or by calling 214-768-4564. Students seeking assistance must schedule an appointment with their professors as early as possible, present a letter from the Office of the Dean of Students, and make appropriate arrangements. Please note that academic adjustments are not retroactive and, when feasible, require advance notice to implement.

SMU Requirements

Religious Observance	Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. Click here for a list of holidays.
COVID-19 and Other Medical-Related Absences	Students who test positive for COVID-19 and need to isolate, or who are notified of potential exposure, must follow SMU's Contact Tracing Protocol. To ensure academic continuity and avoid any course penalties, students should follow the same procedures described by their instructors as they would for any other medical-related absence in order to be provided with appropriate modifications to assignments, deadlines, and exams.
Excused Absences for University Extracurricular Activities	Students participating in an officially sanctioned, scheduled university extracurricular activity should be given the opportunity to make up class assignments or other graded assignments that were missed as a result of their participation. It is the responsibility of the student to make arrangements for make-up work with the instructor prior to any missed scheduled examinations or other missed assignments. (See 2020-2021 SMU Undergraduate Catalog under "Enrollment and Academic Records/Excused Absences.")

Final Exams	Final course examinations shall be given in all courses where appropriate, and some form of final assessment is essential. Final exams and assessments must be administered as specified in the official examination schedule. Exams cannot be administered or due during the last week of classes or during the Reading Period. Syllabi must state clearly the form of the final exam or assessment, and the due date and time must match the official SMU exam schedule. Final exams are not required to be provided online.

Student Support

Student Academic Success Programs	Students needing assistance with writing assignments for SMU courses may schedule an appointment with the Writing Center through Canvas. Students who would like support for subject-specific tutoring or success strategies should contact SASP, Loyd All Sports Center, Suite 202; 214-768-3648; https://www.smu.edu/sasp.
Caring Community Connections Program	CCC is a resource for anyone in the SMU community to refer students of concern to the Office of the Dean of Students. The online referral form can be found at smu.edu/deanofstudentsccc. After a referral form is submitted, students will be contacted to discuss the concern, strategize options, and be connected to appropriate resources. Anyone who is unclear about what steps to take if they have concerns about students should either consult the CCC site or contact the Office of the Dean of Students at 214-768-4564.

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Optional language

Campus Carry Law	In accordance with Texas Senate Bill 11, also known as the 'campus carry' law, and following consultation with entire University community, SMU chooses to remain a weapons-free campus. Specifically, SMU prohibits possession of weapons (either openly or in a concealed manner) on campus. For more information, please see: http://www.smu.edu/BusinessFinance/Police/Weapons_Policy.