Information Visualization

CIS 6930 (Special Topics in CIS), Section: 27C9
Class Periods: Tuesdays T | Period 7 (1:55 PM - 2:45 PM)
Thursdays | Period 7 - 8 (1:55 PM - 3:50 PM)
Location: McCarty Hall A G186
Academic Term: Fall 2019

Instructor

Eric Ragan
eragan@ufl.edu (please put "Vis Class" in the subject)

Office Hours

Please email to confirm an appointment.
- Schedule in advance: T (2:45pm – 3:45pm)
- Or by appointment

Course Description

This course covers the visual representations that facilitate human understanding of data. Data visualization includes simple charts, complex applications, aesthetic infographics, and interactive tools that allow the exploration, inspection, analysis, and interpretation of data. This course covers the foundational principles of data visualization and provides a hands-on experience in design and evaluation. Topics include abstract data visualization, 3D visualization, infographics, data narratives, principles of visual data encoding, and interaction techniques. **(Credits: 3)**

Course Pre-Requisites / Co-Requisites

The course has no strict pre-requisites. This course involves the use and development of software for data visualization. Students are expected to have experience with computer programming prior to taking this course. Programming courses up to Data Structures and Algorithms should provide satisfactory preparation for this course, but students who are uncertain of the expected level of technical proficiency are encouraged to contact the instructor to discuss specifics. Experience with graphical and visualization tools, frameworks, and libraries (e.g., D3.js, Unity, Processing, OpenGL) is not required, but would be beneficial. Familiarity with concepts of human-computer interaction, aesthetic design, and mathematical functions is also recommended but not required.

Course Objectives

- Apply foundational principles of visual encoding for data visualization
- Recognize and apply existing information visualization designs and tools
- Recognize deceptive information visualizations
- Analyze and assess appropriate visualizations for different data types and analysis goals
- Design and generate a data visualization tool or evaluation in a semester-long group project

Required Textbooks and Software

Textbook
There is no required textbook for the class, but reading assignments will be given from online digital libraries, university resources, or publicly available content.

Computing and Software
- This course involves programming and the use of software applications for creating visualizations. The course requires students to have a computer and to install software necessary for completing assignments, quizzes, and projects.
- The course will use the UF e-Learning / Canvas online course-management system (https://elearning.ufl.edu/).
- Access to online reading may require on-campus or VPN access to the university network to access various digital libraries. Students are responsible for locating and acquiring assigned reading from online sources for given references.
- Some exams, quizzes, assignments, and presentations will require that students have computers with them in class. Students are responsible for making sure they have appropriate power (e.g., stable battery and/or power adapters) for in-class activities as well as any necessary display adapters needed for presentations. Students are encouraged to test connection configurations prior to class to avoid negative effects to the presentation.
- Some exams, quizzes, and assignments may be administered using the university's online software applications. Students may be required to install additional software (e.g., Respondus LockDown Browser) to complete these activities.

Recommended Materials

The below textbooks are recommended but not required:
- Munzner, Tamara. Visualization Analysis and Design. CRC Press. 2014.
- Tufte, Edward R. The visual display of quantitative information. Second Edition. 1983.

Attendance Policy, Class Expectations, and Make-Up Policy

Class attendance is expected. Class regularly involves graded activities that require attendance and participation in order to earn credit. If a student is sick or will be absent for a significant period of time, please contact the instructor to work out a way to catch up. Providing the instructor with advanced notice (at least 2 weeks) is expected. Any graded class activities missed (e.g., quizzes, exams, presentations, homework submissions) during unapproved absences cannot be made up without the instructor's prior approval and a valid excuse. Students are responsible for knowledge of concepts and assignment requirements presented during any missed class periods whether excused or unexcused. Excused absences must be in compliance with university policies in the Graduate Catalog (http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance) and require appropriate documentation.

For make-up assignments, students must contact the professor **before the due date** with appropriate requests to be considered by the instructor for extension and/or makeup assignments. If approved, an additional amount of time to make up late assignments may be given equal to the time lost due to the unforeseen circumstance.

Incompletes will be granted for only the most extreme circumstances, e.g., medical or family reasons. To be considered for an incomplete, the student **must** 1) let the professor know at in advance that they are seeking an incomplete, and 2) provide documentation to support the request.

Classroom Expectations

To be courteous to your fellow students, please:

- Turn all cell phone ringers to silent and step outside to take calls.

- Turn off all audible notifications on laptops and phones.
- Refrain from texting during class.
- Use laptops only for taking notes, looking up relevant information (no Facebook, YouTube, Twitter, etc.), and when appropriate for in-class activities or assessments.

Evaluation of Grades

Grading will be based on a weighted total of different graded components.

Evaluation Weights	
Project:	40%
Homework:	20%
Exams:	20%
Quizzes and participation:	19%
Research participation:	1%

Grades for specific assignments will be periodically posted to the UF eLearning system. While the system will show individual assignment scores, please note that total scores may account for component weights, future, or missed assignments. Exercise caution when inferring your overall grade in the course from preliminary online postings.

Grading Policy

Course grades will be calculated based on a combination of weighted scores for different graded components. The final grade (after applying weights) will be truncated to the nearest whole number to determine the letter grade (for example, a final score of 89.9 will be interpreted as 89).

Percent	Grade
92 - 100	A
90 - 91	A-
88 - 89	B+
82 – 87	B
80 - 81	B-
78 - 79	C+
72 – 77	C
70 - 71	C-
68 - 69	D+
62 - 67	D
60 - 61	D-
0 - 59	E

Grade point equivalents and more information on UF grading policy may be found at:
http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades

Graduate students need an overall GPA of 3.00 truncated and a 3.00 truncated GPA in their major (and in the minor, if a minor is declared) at graduation. For more information on grades and grading policies, please visit: http://gradcatalog.ufl.edu/content.php?catoid=4&navoid=907#grades

Graded Components

Project (40% of final grade)

Students will work in teams to complete a semester-long project involving the design, creation, and evaluation of data visualizations. Projects will provide students with opportunities to prototype creative visualizations and gain experience with research methods. More detail on possible project concepts and expectations will be given in class. Early in the semester, teams will decide on project goals and develop an execution plan to be approved or revised by the instructor, and students will be expected to provide status updates and demonstrations throughout the class. Preliminary project components will be due throughout the semester in accordance with the class schedule. Final project deliverables will include:

(1) A brief oral presentation of the project goals and accomplishments
(2) A live online demonstration of the project software/outcomes
(3) A brief video (maximum 3 minutes) demonstrating the visualization, design, and novelty of the work
(4) A report document explaining the project's purpose, the rationale for the visualization approach, the visualization, and the results of any evaluation.
(5) A document summarizing each team member's contributions to the project

For all but the last of the listed deliverables, each team is expected to work together to produce a single deliverable. For example, each team will submit one document and create one video (rather than multiple individual submissions). However, every student is expected to submit a separate summary of contributions explaining how each team member contributed to the project.

Homework (20% of final grade)

Homework assignments will be described as the course progresses. Unless otherwise stated, homework must be submitted before class time on the given deadline to be eligible for full credit. Students can submit an assignment one day late to earn up to 50% of the assignment total.

Exams (20% of final grade)

Up to two exams will be administered in class (a midterm exam and a final exam). The formats of these exams will be described prior to exam days. Exams may require students to have a laptop computer and use

Quizzes and participation (19% of final grade)

Class participation is expected, and failure to attend classes or participate in class discussions will result in lost participation points. Occasional daily attendance checks or participation points will be valued the same as quizzes. On some days, short quizzes or assignments will be administered in class. Specific dates or details about quiz and in-class assignments are not guaranteed to be announced ahead of time. Quizzes are designed to be short, and each usually consists of a couple questions or exercises. A time limit will be provided for each quiz (typically, five minutes). Students must be present at the start of the quiz to be eligible to participate; otherwise, a score of zero will be earned.

Research participation (1% of final grade)

This course encourages participation in research in human-computer interaction in order to promote awareness of and exposure to different active research projects involving human and technology at the University of Florida. Students can participate in an approved research study (> 0 credits) related or relevant to human-computer interaction to receive credit for the research participation component of the grade. Students may participate in an additional (1 credit) study for an additional 1%. The studies do not need to be directly related to information visualization.

Participation must be completed during the semester, and only approved studies registered through the CISE Department's SONA system (https://ufl-cise.sona-systems.com) are eligible. Students will need to (1) create an account in the system, (2) select the correct course name and number for this class, and (3) schedule and participate in an approved study to receive credit.

Participation in research studies is optional, but the 1% "research participation" component of this class grade is mandatory. Students who do not want to participate in a research study may opt for an alternative paper review assignment if they notify the instructor before the first exam.

Extra Assignments (extra credit)

Opportunities to earn extra credit are not promised other than the additional research participation opportunity. On rare occasions, the instructor may opt to offer supplemental on-topic assignments for extra credit. Details will be determined per assignment and must be agreed upon by both the instructor and the student prior to completion, and prior to the last day of classes (i.e., before reading day or exam week).

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Plagiarism (misrepresenting others' ideas as your own) is a serious violation of the honesty policy. Any time writing, ideas, or code is taken from another person or source without acknowledgement, this is

considered plagiarism. This includes copying text from papers or from shared student notes—even when adjusting some words or language. Many cases of plagiarism can be avoided simply by providing a citation to give appropriate credit to the original source of the content for each idea from another place.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:
- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Campus Resources

The University of Florida offers a variety of services available for all students. Please take advantage of the services that are here for your benefit, support, and safety.

Health and Wellness

U Matter, We Care:
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. https://www.crc.ufl.edu/.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints*: http://www.distance.ufl.edu/student-complaint-process.

Course Schedule

The below schedule is tentative and may change (notice will be given if changes are made).

Tuesday	Thursday
Aug. 20 Syllabus and overview	Aug. 22 Foundations, basic charts, and applications Paper summary overview, project overview
Aug. 27 Perception, deception, and junk Storytelling and infographics	Aug. 29 Evaluation approach overview Project introduction **HW Exercise:** Cereal
Sep. 3 D3.js **HW Papers**: Overview	Sep. 5 D3.js **HW Exercise**: D3 #1
Sep. 10 D3.js Project development	Sep. 12 Multidimensional data **Project**: Project plan (one per team)
Sep. 17 Interaction **HW Papers**: Narrative and embellishment	Sep. 19 Graphs and networks **HW Exercise**: D3 #2
Sep. 24 Hierarchical data **HW Papers**: Space and time	Sep. 26 Time **Project:** Project literature (everyone submits)
Oct. 1 Overflow and review **HW Papers**: Humans and sensemaking	Oct. 3 ** **Midterm Exam**
Oct. 8 Project development and informal review	Oct. 10 ** **Project early review and demo**
Oct.15 3D visualization and volume **HW Papers**: SciVis	Oct. 17 Design critique and challenge **HW Exercise:** IRB training
Oct. 22 * Special topics **Project:** Preliminary report (one per team)	Oct. 24 * Project development and informal review
Oct. 29 Text and documents **HW Papers**: Text	Oct. 31 Big data overview
Nov. 5 Statistical graphics **HW Exercise:** Movies 1	Nov. 7 ** **Project review and demos**
Nov. 12 Maps and space **HW Papers**: Explainable analytics	Nov. 14 Design critique and classification
Nov. 19 Review **HW Exercise:** Movies 2	Nov. 21 ** **Project presentations**
Nov. 26 ****Project presentations**	Nov. 28 **No class**
Dec. 3 ****All final project deliverables due**	Dec. 5 **No class**
Final Exam Final Exam: Wednesday, December 11, 2019, 10:00 AM - 12:00 PM	