INSC 592: Introduction to Data Analytics and Visualization

COURSE INFORMATION

INSC 592: Introduction to Data Analytics and Visualization, Spring 2025
University of Tennessee, Knoxville

Class Meetings: We meet at 6:30 PM every Thursday on Zoom: https://tennessee.zoom.us/j/7539920689. The first session will be on Jan 23, 2025.

I will also have office hour from 1:00-2:30 PM ET every Tuesday. You can make reservation at this site. And if you successfully reserve, we will meet using the same Zoom link above.

Faculty Contact Information
- Kai Li (he/him/his)
- Assistant Professor
- kli16@utk.edu
- 442 Communications Bldg
- Office Hours: By request

SIS Office Information
- 450 Communications Bldg.
- SIS Office: 865-974-2148
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COURSE DESCRIPTION

Catalog Description
The following major topics will be covered by this course:
- Concepts of big data and data analytics in settings such as academia, organizations, the sciences, and on the web.
- Basic concepts and process of data analytics, and data mining techniques and skills.
- Designing effective information visualizations.

Prerequisite: INSC 584.

Student Learning Outcomes
Upon satisfactory completion of the course, the student will:
- understand the needs and importance of data analytics in various contexts;

- understand the lifecycle and tasks for completing a research project using data;
- practice data wrangling (data preprocessing);
- conduct exploratory analysis and visualization;
- conduct text and sentiment analysis;
- develop and evaluate models.

Course Design

This course is designed to build knowledge of data science including data management, applied research, statistical methods, and computational skills. Big data and analytics are about real- world applications in various contexts to support decision-making.

Required Texts

We are going to rely on a series of open textbooks as the basic reading materials. Specifically, we are going to rely on the following three books:

- [R for Data Science](#) (R4DS)
- [Introduction to Statistics for the Social Sciences](#) (I3S)
- [Modern data visualization with R](#) (DataVis with R)
- [Text Mining for Social Scientists](#) (TM2S)
- Data collection: key debates and methods in social research (DC): Our library has this book [here](#).

Some of the books may not work for everyone, as they are based on R (we will talk about this in the beginning of class). So, if you prefer another tool (say, Python or even Excel), I hope the books still contains concepts that are useful for you and/or you can find another alternative textbook based on Python.

COMMUNICATION

Email

The best way to reach me is by email (kli16@utk.edu). You are welcome to make appointments to meet with me in person or via Zoom, especially if the office hour does not work for you.

I am required to communicate with you through your UTK email address. If you prefer to use another address, consult the [OIT Helpdesk](#) to obtain directions for forwarding your UTK mail to your preferred address if you don't wish to check both accounts.

COMPUTING REQUIREMENTS AND RESOURCES

Requirements

You must have adequate computing skills, including but not limited to use of word processing, Web browsers, e-mail, listservs, Canvas, and Zoom software. You must learn

how to submit your assignments using Canvas. The [Office of Information Technology (OIT)](#) provides training classes in using varied technologies for students at no charge (advance registration is required).

You must obtain a UT email account and subscribe to the SIS student listserv to insure you're made aware of course-related information. In addition, you must have the PowerPoint Reader or the regular PowerPoint software installed on your computer in order to download the lecture notes from Canvas.

Technical Support
For assistance with technical and computing issues, contact the OIT HelpDesk by phone at (865) 974-9900, using the [Contact Form](#), or at the [Walk-in HelpDesk](#),.

ADDITIONAL POLICIES AND POINTS OF INFORMATION

Disabilities that may Impede Learning
Any student who feels s/he may need an accommodation based on the impact of a disability should contact [Student Disability Services](#) in 2227 Dunford Hall at 865-974-6087, or by video relay at 865-622-6566 to coordinate reasonable academic accommodations.

Civility
Civility is genuine respect and regard for others: politeness, consideration, tact, good manners, graciousness, cordiality, affability, amiability and courteousness. Civility enhances academic freedom and integrity, and is a prerequisite to the free exchange of ideas and knowledge in the learning community. Our community consists of students, faculty, staff, alumni, and campus visitors. Community members affect each other's well-being and have a shared interest in creating and sustaining an environment where all community members and their points of view are valued and respected. Affirming the value of each member of the university community, the campus asks that all its members adhere to the principles of civility and community adopted by the campus: http://civility.utk.edu/.

CCI Diversity Statement
The College of Communication and Information recognizes that a college diverse in its people, curricula, scholarship, research, and creative activities expands opportunities for intellectual inquiry and engagement, helps students develop critical thinking skills, and prepares students for social and civic responsibilities. All members of the College benefit from diversity and the quality of learning, research, scholarship and creative activities is enhanced by a climate of inclusion, understanding and appreciation of differences and the full range of human experience. As a result, the College is committed to diversity and equal opportunity and it recognizes that it must represent the diversity inherent in American society. The College is acutely aware that diversity and fairness are foundations that unite the College's faculty, staff, students, and the larger communication and information community.

Instructor Status as a Title IX Mandatory Reporter

University of Tennessee faculty are committed to supporting our students and upholding gender equity laws as outlined by Title IX. Please be aware that if you choose to confide in a faculty member regarding an issue of sexual misconduct, dating violence, or stalking, we are obligated to inform the University's Title IX Coordinator, who can assist you in connecting with all possible resources both on- and off-campus. If you would like to speak with someone confidentially, the Student Counseling Center (865-974-2196) and the Student Health Center (865-974-3135) are both confidential resources.
For additional resources and information, visit titleix.utk.edu.

ASSIGNMENTS, ASSESSMENTS, AND EVALUATIONS

Academic Integrity

Students should be familiar and maintain their *Academic Integrity* described in https://hilltopics.utk.edu/academics/, p. 15 as: "*Study, preparation and presentation should involve at all times the student's own work, unless it has been clearly specified that work is to be a team effort. Academic honesty requires that the student present his or her own work in all academic projects, including tests, papers, homework, and class presentation. When incorporating the work of other scholars and writers into a project, the student must accurately cite the source of that work.*"

Students should abide by the **Honor Statement** (https://hilltopics.utk.edu/student-code-of-conduct/ Section X. Honor Statement)
 "*As a student of the University, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.*"

Plagiarism

Plagiarism in any of its several forms is intolerable, and attention to matters of documentation in <u>all</u> written work is expected and required. Inadvertence, alleged lack of understanding, or avowed ignorance of the various types of plagiarism are not acceptable excuses.

Specific examples of plagiarism are:
1. Copying without proper documentation (quotation marks and a citation) written or spoken words, phrases, or sentences from any source;
2. Summarizing without proper documentation (usually a citation) ideas from another source (unless such information is recognized as common knowledge);
3. Borrowing facts, statistics, graphs, pictorial representations, or phrases without acknowledging the source (unless such information is recognized as common knowledge);
4. Collaborating on a graded assignment without the instructor's approval;

5. Submitting work, either in whole or in part, created by a professional service and used without attribution (e.g., paper, speech, bibliography, or photograph).

Students who may be unsure of the nature of plagiarism should consult the instructor or a guide for writing research reports. (Additional resources are available at http://www.lib.utk.edu/instruction/plagiarism.)

Infractions of academic integrity are penalized according to the severity of the infraction but may include a course grade of "F."

Assignments and Grading
Student work is assigned a grade based on quality of thought and writing style, thoroughness of research and of references, appropriateness of length, and originality. Only exceptional work will receive an "A" grade. Papers that are received after the due date will be assigned a lower grade than would otherwise be received. All sources must be cited, quotations must be in quotation marks and attributed correctly. Not doing so constitutes plagiarism.

Preparation of Written Work
- All assignments must be word processed and include your name, the course number, assignment number, and date
- Please use APA style for in-line citations and references
- All sources must be properly cited, and quotations must be formatted and attributed correctly

Due Dates and Late Assignments
Assignments should be submitted to the "assignments" area of Canvas and are due at 11:59 p.m. EST on the due date listed on the syllabus. If your assignment is not ready by the deadline:
- You must send me an email informing me that your assignment will be late
- After submitting your assignment to Canvas, send me an email informing me that your assignment has been submitted
- 10% will be deducted for the first 24 hours of being late; 30% for the first week

Incompletes
Based on adopted University of Tennessee-Knoxville and SIS policy, a grade of "I" (Incomplete) is reserved for emergencies that prevent the student from completing the course on time. Incompletes are granted only under "the most unusual of circumstances" and solely at the discretion of the instructor. Plan your semester's course of study carefully to ensure sufficient time to complete the required work.

For students who simply "disappear" without contacting the instructor and without completing the required form, an "F" is submitted.

Assigning Grades

Please note that I do not assign letter grades for individual assignments, but will mark your paper with my comments and provide a point score based on the possible points earned for that assignment. Your final grade will be based on total points earned/total possible points over the course of the semester.

I will generally use 90% as the mean point for each graded assignment.

Evaluation

Semester grades will be assigned according to the following scale:

A	93≤	(4 quality points per semester hour) superior performance.
A-	90-92.99	(3.7 quality points per semester credit hour) intermediate grade performance.
B+	88-89.99	(3.5 quality points per semester hour) better than satisfactory performance.
B	83-87.99	(3 quality points per semester hour) satisfactory performance.
B-	80-82.99	(2.7 quality points per semester credit hour) intermediate grade performance.
C+	78-79.99	(2.5 quality points per semester hour) less than satisfactory performance.
C	70-77.99	(2 quality points per semester hour) performance well below the standard expected of graduate students.
D	60-69.99	(1 quality point per semester hour) clearly unsatisfactory performance and cannot be used to satisfy degree requirements.
F	59.99≥	(no quality points) extremely unsatisfactory performance and cannot be used to satisfy degree requirements.
I		(no quality points) a temporary grade indicating that the student has performed satisfactorily in the course but, due to unforeseen circumstances, has been unable to finish all requirements. An I is not given to enable a student to do additional work to raise a deficient grade. The instructor, in consultation with the student, decides the terms for the removal of the I, including the time limit for removal. If the I is not removed within one calendar year, the grade will be changed to an F. The course will not be counted in the cumulative grade point average until a final grade is assigned. No student may graduate with an I on the record.
S/NC		(carries credit hours, but no quality points) S is equivalent to a grade of B or better, and NC means no credit earned. A grade of Satisfactory/No Credit is allowed only where indicated in the course description in the *Graduate Catalog*. The number of Satisfactory/No Credit courses in a student's program is limited to one-fourth of the total credit hours required.
P/NP		(carries credit hours, but no quality points) P indicates progress toward completion of a thesis or dissertation. NP indicates no progress or inadequate progress.
W		(carries no credit hours or quality points) indicates that the student officially withdrew from the course.

Course Evaluation

You will be invited to evaluate the course at the end of the term. Please participate in this valuable process. I also invite your comments throughout the course and read all comments, suggestions, and recommendations.

There will also be a mid-term evaluation for you to send any feedback to improve the course.

MSIS Program Outcomes

It is our vision to provide a quality educational program, and for students to have the very best educational experience possible. By the end of their time in the MSIS program, each student should be able to:

1. Describe and discuss the processes of creation, organization, distribution, storage, access, retrieval, management, use, and preservation of information.
2. Describe and discuss the nature of leadership and management in the information professions and the importance of participation in the global information society.
3. Apply the general principles, values, and ethical standards of providing information services in a variety of settings and for diverse populations.
4. Comply with the changing responsibilities of the information professional in a culturally diverse and networked global society.
5. Identify critical professional issues in a variety of organizational, cultural, societal, disciplinary, transdisciplinary, and historical contexts.
6. Analyze and apply standards or policies related to the processes of creation, organization, distribution, storage, access, retrieval, management, use or preservation of information.
7. Explain the changing nature of information, information needs, and information behavior.
8. Assess and implement information technologies, systems, sources, and services that serve users effectively and efficiently.
9. Analyze research and apply it to information practice.

Assignments: Descriptions, Due Dates, and Program Outcomes for SLC

This table provides a brief summary of assignment names and total points. More information will be offered on Canvas.

Assignment	Points
Assignment 1: Data scientists – tasks and skill sets	15
Assignment 2: Structured data analysis	15
Final project	50
Participation and discussion	20

DISCLAIMER

Please be aware revisions may be made to this syllabus over the course of the semester, and as such, the content contained in this document may be subject to change.

COURSE SCHEDULE/OUTLINE/ASSIGNMENTS/UNITS OF INSTRUCTION

All weekly materials will be made available on CANVAS two weeks ahead of the schedule. **This schedule may be changed in the future.** **Please follow the instructions in the CANVAS folders, which contain all links to and files of the reading materials.**

Date	Topic	Readings
Week 1 1/23	Welcome & Introduction	R4DS Chapter 1; Anderson
Week 2 1/30	Data Science; Introduction to tools	Kelleher & Tierney Chapters 1-3
Week 3 2/6	Data & Statistics	I3S Chapters 1-2
Week 4 2/13	Data collection and database	DC Chapters 1
Week 5 2/20	Data processing	R4DS Chapter 5; SKIM R4DS Chapters 9-16
Week 6 2/27	Statistical methods (I)	R4DS Chapters 7 and 23
Week 7 3/6	Statistical methods (II)	Data Literacy
Week 8 3/13	Statistical reporting	
Week 9 3/20	Spring break (no class)	
Week 10 3/27	Text analysis (I)	TM2S Chapter 1
Week 11 4/3	Text analysis (II)	TM2S Chapters 2-3
Week 12 4/10	Data visualization	R4DS Chapter 3; DataVis with R Chapter 3
Week 13 4/17	Spring recess (no class)	
Week 14 4/24	Final project presentation (I)	
Week 15 5/1	Final project presentation (II)	