



INSC 486 - Data Analytics, Fall 2022

Instructor: Prof. Jiangen He (he/him)

Zoom link: <https://tennessee.zoom.us/my/jiangen>

Email: jiangen@utk.edu

Course Mode: In-person classes

Time: TR 02:30PM-03:45PM

Prerequisite: INSC 360 - Programming for Information Professionals



Jiangen He

Class Place: STR-106, 1621 Cumberland Ave

<https://www.google.com/maps/embed?pb=!1m18!1m12!1m3!1d763.8388241377578!2d-83.93093092401423!3d35.95758626363068!2m3!1f0!2f0!3f0!3m2!1i1024!2i768!4f13.1!3m3!1m2!1s0x885c17e004548add%3A0x16a85e7821eddb19!2s1621%20Cumberland%20Ave%2C%20Knoxville%2C%20TN%2037916!5e0!3m2!1sen!2sus!4v1661365260599!5m2!1sen!2sus>

Location for Class

Office: Room 449 Communication Building, 1345 Circle Park Drive

Office hours: Tuesday & Thursday, noon - 2:00 pm EST, via Zoom/in office

SIS Office Information

- 450 Communications Bldg.
- 1345 Circle Park Drive
- Knoxville, TN 37996-0341
- SIS Office: 865.974.2148
- Fax (SIS): 865.974.4667

Course Information

Catalog Description

Concepts, techniques, and tools of data analytics. Collecting, extracting and transforming data. Mining data to discover hidden patterns and knowledge. Investigating application of data analytics in various information environments.

Student Learning Outcomes

Students who complete this course will be able to

- Demonstrate a sophisticated understanding of the principles of data-analytic thinking.
- Use version-control systems and the Jupyter Notebook environment.
- Use flexible tools (NumPy and pandas) to load, clean, transform, merge, and reshape data.
- Conduct data analytics using quantitative methods for various types of data and make appropriate and powerful connections between quantitative analysis and real-world problems.
- Know the exact scopes and possible limitations of each method; and show capability of using data analytics skills to provide constructive guidance in decision making.
- Interpret results of data analytics correctly with detailed and useful information.
- Write an insightful and well-organized report for a real-world case study, including thoughtful and convincing details.

Course Design

- Course materials will delivered on Canvas, including reading materials, slides, etc.
- Submit assignments on **Canvas**. Do not email them to the instructor.
- For technical issues, contact the OIT HelpDesk via phone (865) 974-9900 or online at <http://help.utk.edu/>

Required Text(s)

All readings will be provided by the instructor.

Recommended Readings

- Provost, F., & Fawcett, T. (2013). *Data Science for Business: What you need to know about data mining and data-analytic thinking*. " O'Reilly Media, Inc."

- Downey, A. (2014). *Think stats: exploratory data analysis*. " O'Reilly Media, Inc.". <https://greenteapress.com/wp/think-stats-2e/> (Free book)
- McKinney, W. (2018). *Python for data analysis: Data wrangling with Pandas, NumPy, and IPython*. " O'Reilly Media, Inc."

Communication

Email

I am required to communicate with you through your UTK email address. If you prefer to use another address, consult the [OIT Helpdesk \(Links to an external site.\)](#) to obtain directions for forwarding your UTK email to your preferred address if you do not wish to check both accounts.

Instructor Availability

I am available during weekdays via email. To ensure a quick response, start your message subject line with INSC486. I will reply to your email as soon as I can. I am also happy to speak with you in my office or via zoom during office hours.

Course Outline

Schedule

 Week	 Topic	 Assignments	 Labs
1	<u>Introduction to Data Analytics, Python Basics, IPython, and Jupyter Notebooks</u>		
2	<u>Python Basics and Loading Data</u>		
3	<u>Numpy and Pandas</u>	 Assignment 1	 Lab 1
4	<u>Data Cleaning</u>		 Lab 2
5	<u>Data Manipulation-1</u>	 Assignment 2	 Lab 3
6	<u>Data Manipulation-2</u>		 Lab 4

 Week	 Topic	 Assignments	 Labs
7	<u>Time Series and Visualization</u>	 Assignment 3	 Lab 5
8	<u>Introductory Statistics</u>	 Final Project Proposal	 Lab 6
9	<u>Confidence Intervals</u>	 Assignment 4	 Lab 7
10	<u>Significance Test and Linear Regression</u>		 Lab 8
11	<u>Logistic Regression</u>	 Assignment 5	 Lab 9
12	<u>Introduction to Machine Learning, kNN, and Linear Model</u>	 Final Project Update: 10/05	 Lab 10
13	<u>Linear Model, SVM, Decision Tree, and Cross Validation</u>		 Lab 11
14	<u>Evaluation</u>		 Lab 12
15	<u>Unsupervised Learning and Deep Learning</u>		
16	<u>Untitled</u>	 Final Project Presentation	
17	<u>Final Week</u>	 Final Project Report	

Assignments, Assessments, and Evaluations

Academic Integrity

Students should be familiar with [the Hilltopics Student Handbook](#), and comply with all academic policies. This includes the University of Tennessee Honor Statement and the Academic Integrity Policy.

The Honor Statement reads: “An essential feature of the University of Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. ‘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.” For more information, see the Honor Statement on the Academic Policies and Procedures page of the current [catalog](#) for student and faculty responsibilities.

The Academic Integrity policy reads: “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.” For additional information, see [the Student Code of Conduct](#).

Late Assignments

Late work will be deducted 5% per twenty-four hour period that elapses after the due date. If foreseen or unforeseen circumstances prevent you from completing an assignment on time, you may request an extension. Extensions must be requested in advance of the due date. If the situation warrants an extension, we will determine a new due date for the essay based on your individual circumstances.

Plagiarism

Plagiarism in any of its forms is intolerable, and attention to matters of documentation in all 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. Resources are available through the University Libraries, including a [Citing Sources guide](#).

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

Breakdown

This table provides a brief summary of assignment by name, due date, point value and percentage of final grade. A brief description of each assignment follows the table.

Breakdown

<u>Aa</u> Title	<u>#</u> Point Value	<u>#</u> Percentage of Final Grade
<u>Assignment 1</u>	100	10%
<u>Assignment 2</u>	100	10%
<u>Assignment 3</u>	100	10%
<u>Assignment 4</u>	100	10%
<u>Assignment 5</u>	100	10%
<u>Final Project Proposal</u>	50	5%
<u>Final Project Update</u>	50	5%
<u>Final Project Presentation</u>	50	5%
<u>Final Project Report</u>	150	15%
<u>Labs</u>	150	15%
<u>Attendance</u>	50	5%
<u>TOTAL</u>	1000	100%

Attendance and Participation

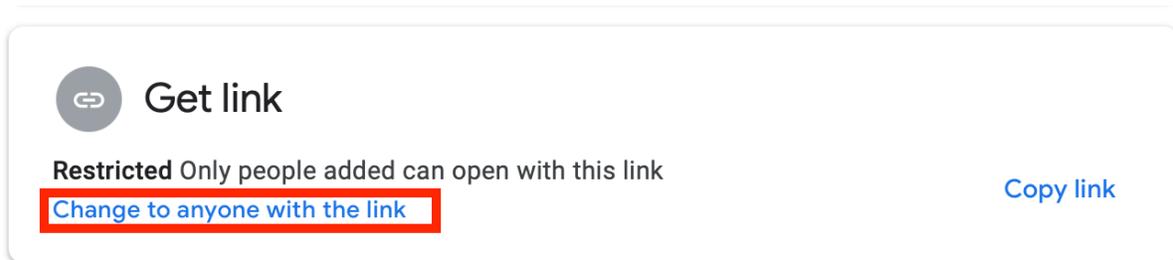
You are expected to attend all classes and actively participate. Regular attendance is considered mandatory. Each student is allowed three absences from class for the entire semester without direct penalty to his or her grade. You will lose 1 point per miss after you missed three classes. **If a student misses 30% (8 classes) or more of the total classes, the instructor may issue a failing grade for lack of participation.**

Preparing Assignments

Specific instructions on how to prepare assignments will be given at the time they are assigned.

Submitting Assignments

Unless otherwise specified, all assignments should be submitted by providing a Colab notebook link. Make sure you have changed the notebook to "anyone with the link can view" before submitting your link.



Grading Scale

Semester grades will be assigned according to the following scale:

Grading Scale

<u>Aa</u> Letter	<u>☰</u> Points	<u>☰</u> Performance
<u>A</u>	93-100	Superior performance (4 quality points)
<u>A-</u>	90-92.99	Intermediate superior performance (3.7 quality points)
<u>B+</u>	88-89.99	Very good performance (3.3 quality points)
<u>B</u>	83-87.99	Good performance (3.0 quality points)
<u>B-</u>	80-82.99	Intermediate good performance (2.7 quality points)

<u>Aa</u> Letter	<u>☰</u> Points	<u>☰</u> Performance
<u>C+</u>	78- 79.99	Fair performance (2.3 quality points)
<u>C</u>	73- 77.99	Satisfactory performance (2.0 quality points)
<u>C-</u>	70- 72.99	Unsatisfactory performance (1.7 quality points)
<u>D+</u>	68- 69.99	Unsatisfactory performance (1.3 quality points)
<u>D</u>	63- 67.99	Unsatisfactory performance (1.0 quality points)
<u>D-</u>	60- 62.99	Unsatisfactory performance (0.7 quality points)
<u>F</u>	0- 59.99	Failure performance (0.0 quality points)
<u>S</u>		Satisfactory; only assigned for C or better work when a course is taken on an S/NC grading basis. Carries no point value.
<u>NC</u>		No Credit; indicates a failure to complete a course satisfactorily, and is only assigned for C- or worse work when a course is taken on a S/NC grading basis. Carries no point value.
<u>I</u>		Under extraordinary circumstances and at the discretion of the instructor, the grade of I (Incomplete) may be awarded to students who have satisfactorily completed a substantial portion of the course but cannot complete the course for reasons beyond their control. An I carries no quality points. If the I grade is not removed within one calendar year or upon graduation, it shall be changed to an F and count as a failure in the computation of the grade point average.
<u>W</u>		Indicates student has officially withdrawn from the course or the university. Carries no point value.

Incompletes

Based on adopted University of Tennessee-Knoxville 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 insure 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.



Computing Requirements and Resources

Requirements

- You must have adequate computing skills, including but not limited to the use of word processing, Web browsers, e-mail, listservs, and Canvas software.
- You must obtain a UT email account. In addition, you must have the PowerPoint Reader or the regular PowerPoint software installed on your computer to download the lecture notes from Canvas.

Technical Support

The [Office of Information Technology \(OIT\)](#) ([Links to an external site.](#)) provides training classes in using varied technologies for students at no charge (advance registration is required).

Software

- **Google account for using Colab**
- GitHub account (Optional)



Campus syllabus

Dear Student,

*The purpose of this **Campus Syllabus** is to provide you with important information that applies to all UTK courses. Please observe the following policies and familiarize yourself with the university resources listed below. At UT, we are committed to providing you with a high-quality learning experience. I want to wish you the best for a successful and productive semester.*

Dr. John Zomchick, Provost and Senior Vice Chancellor

ACADEMIC INTEGRITY

Each student is responsible for their personal integrity in academic life and for adhering to UT's Honor Statement. The Honor Statement reads: "An essential feature of the University of

Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. 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.”

YOUR ROLE IN IMPROVING THE COURSE THROUGH ASSESSMENT

At UT, it is our collective responsibility to improve the state of teaching and learning. During the semester you may be requested to assess aspects of this course either during class or at the completion of the class. You are encouraged to respond to these various forms of assessment as a means of continuing to improve the quality of the UT learning experience.

STUDENTS WITH DISABILITIES – <http://sds.utk.edu>

Any student who feels they may need an accommodation based on the impact of a disability should contact Student Disabilities Services in Dunford Hall, at 865-974-6087, or by video relay at, 865-622-6566, to coordinate reasonable academic accommodations.

ACCESSIBILITY POLICY AND TRAINING – <http://accessibility.utk.edu>

WELLNESS – <http://counselingcenter.utk.edu/> and <http://wellness.utk.edu/>

The Student Counseling Center is the university’s primary facility for personal counseling, psychotherapy, and psychological outreach and consultation services. **The Center for Health Education and Wellness** manages *974-HELP*, the distressed student protocol, case management, the *Sexual Assault Response Team*, and the *Threat Assessment Task Force*.

EMERGENCY ALERT SYSTEM – <http://safety.utk.edu/>

The University of Tennessee is committed to providing a safe environment to learn and work. When you are alerted to an emergency, please take appropriate action. Learn more about what to do in an emergency and sign up for [UT Alerts](#). Check the emergency posters near exits and elevators for building specific information. In the event of an emergency, the course schedule

and assignments may be subject to change. If changes to graded activities are required, reasonable adjustments will be made, and you will be responsible for meeting revised deadlines.

COVID-19 GUIDELINES

CDC guidance recognizes the changing dynamics of living in a world with COVID-19. It rates COVID-19 community levels as low, medium, and high, with recommendations at each level about the use of masks and other precautions. At all levels of community spread, staying up-to-date with vaccination is the best way to protect yourself from serious illness and to limit the spread of COVID-19. Wearing a mask is always an option for any individual who chooses to do so, and the CDC recommends that those with high risk of severe illness talk with their health care providers. If you are sick, please stay in, avoid being around others as much as possible, and contact your health care provider for any symptoms that are worsening, moderate to severe, or concerning to you. For more information about vaccination or to self-report an illness and receive support, visit <http://studenthealth.utk.edu/CommunityHealth>. For more information about COVID-19, visit <http://studenthealth.utk.edu/covid-19>.

Additional Policies and Points of Information

Disability Services

Any student who feels they may need an accommodation based on the impact of a disability should contact Student Disability Services in Dunford Hall at 865-974-6087, or by video relay at 865-622-6566, to coordinate reasonable academic accommodations.

University Civility Statement

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. For more information, see the UT Principles of Civility and Community.

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.

Disclaimer

The instructor reserves the right to revise, alter or amend this syllabus as necessary. Students will be notified in writing / email of any such changes.