University of Rhode Island

Department of Computer Science & Statistics

CSC/DSP 310-003: Programming for Data Science

Syllabus -- Fall 2025

Class meeting: MWF 11:00-11:50 am
Classroom: Ranger Hall 202
Credits: 4

INSTRUCTOR INFORMATION AND CONTACT INFO

Indrani Mandal	E-mail: indrani_mandal@uri.edu
Office hour	MW 12:30-1:30 pm, or by Starfish appointment
Zoom Meeting Link	**Office:** URI AI lab, Library 147

COURSE DESCRIPTION

Data science exists at the intersection of computer science, statistics, and machine learning. That means writing programs to access and manipulate data so that it becomes available for analysis using statistical and machine learning techniques is at the core of data science. Data scientists use their data and analytical ability to find and interpret rich data sources; manage large amounts of data despite hardware, software, and bandwidth constraints; merge data sources; ensure consistency of datasets; create visualizations to aid in understanding data; build mathematical models using the data; and present and communicate the data insights/findings.

This course provides a survey of data science. Topics include data driven programming in Python; data sets, file formats and meta-data; descriptive statistics, data visualization, and foundations of predictive data modeling and machine learning; accessing web data and databases; distributed data management. You will work on weekly substantial programming problems such as accessing data in database and visualize it or build machine learning models of a given data set. For the midterm and the final exam you will undertake either an individual or team based programming project which you will define and implement.

PREREQUISITES

CSC201 or CSC211 or equivalent, or permission of the instructor. Computer Science majors must take as CSC 310; Data Science majors must take as DSP 310.

GOALS

The primary aim of CSC 310 is to introduce you to programming in the context of data science and statistical thinking by providing a survey of the major technologies and techniques that are currently being employed. The objectives of CSC 310 are:

- To provide an introduction to data sets, file formats, and meta-data.
- To provide an introduction to database systems such as MySQL.
- To provide a basic overview of data manipulation, statistical data summary techniques, and visualization.
- To provide an introduction to data modeling techniques, in particular computational techniques are usually referred to as “machine learning”.
- To provide an introduction to high-performance data frame works

COURSE LEARNING OBJECTIVES

By the end of this course, the student will be able to:

- Define key concepts and the interdisciplinary nature of data science, including its relationship with statistics, computer science, and domain knowledge.
- Collect, clean, and manipulate data from various sources using basic programming and data wrangling tools.
- Visualize data effectively using standard libraries and tools to reveal patterns and trends in class activities.
- Perform basic statistical analyses and interpret the results in context.
- Develop simple predictive models and evaluate their performance using appropriate metrics in homework assignments and projects.
- Communicate data insights clearly and ethically through written reports, visualizations, and presentations in asynchronous discussion posts and project reports.
- Discuss ethical considerations and limitations in data science practices in asynchronous discussion posts and project reports.

REQUIRED TEXTS

Python Data Science Handbook, Jake VanderPlas, O'Reilly, 2017.

TECHNOLOGY REQUIREMENTS

To successfully complete this course, you will need access to a computer with reliable, high-speed Internet access and appropriate system and software to support the Brightspace learning platform. Typical technical requirements for users are:

SOFTWARE REQUIREMENT

- Install Python(latest version) on your computer.
- Install Anaconda on your computer
- Setup Google Colab with your Google account

Anaconda System requirements

- Operating system: Windows 8 or newer, 64-bit macOS 10.13+, or Linux, including Ubuntu, RedHat, CentOS 6+, and others.
- If your operating system is older than what is currently supported, you can find older versions of the Anaconda installers in our archive that might work for you. See Using Anaconda on older operating systems for version recommendations.
- System architecture: Windows- 64-bit x86, 32-bit x86; MacOS- 64-bit x86; Linux- 64-bit x86, 64-bit Power8/Power9.
- Minimum 5 GB disk space to download and install.

BRIGHTSPACE HELP

Here is the link to access Brightspace https://brightspace.uri.edu as well as the Brightspace resource page https://web.uri.edu/brightspace/.

COURSE NAVIGATION

The blue navigation bar with white writing across the top of the site provides access to other tools and features of the course site.

- **Course Home** - Takes you to the home page of this course.
- **Content** - Displays the content modules for the course.
- **Assignments** - Monthly reports and presentations to be submitted through Brightspace can be found through this link.
- **Discussions** - Weekly discussion prompts and threads will be found through this link.
- **Grades** - All posted grades can be found through this link.

MAJOR STUDY UNITS

There are 5 major study units. The first unit discusses the process, where you learn about the different phases of the data science pipeline. The second unit focuses on data access and

combination. The third unit focuses on data exploration where data analysis is done through descriptive statistics and visualizations. The fourth unit focuses on building models from data to perform predictive analysis. Multiple models are applied to each dataset for model evaluation. The last part focuses on effective communication of solutions to problems or answers to questions from the four methods mentioned above.

COURSE MECHANICS

The course modules begin on Sunday of each week and end on Saturday. In the first week, you will orient yourself to the basic requirements of the course, introduce yourself in the Discussion forum, review the course syllabus.

On Tuesdays the topics will be introduced and group activities will be assigned to deepen your understanding. You will work on interesting problems with your peers and try to solve the problems. On Thursday we will discuss the topic in depth with further lectures or individual labs. During the lab sessions you can ask for help from the instructor and TAs.

CREDITS and ESTIMATED TIME COMMITMENT

This is a 4-credit course that meets in-person twice a week. The requirements for a course with this number of credits include approximately 4 hours of weekly in-class instruction. For each hour of in-class instruction, students will typically spend 2-3 additional hours outside of class for activities such as completing assigned readings, watching videos, studying for exams, completing assignments, etc. Make sure to budget the necessary time in your schedule each week to complete the required work. Workload Calculator(https://cte.rice.edu/workload) developed by Center for Teaching Excellence of Rice University.

STUDENT PERFORMANCE REQUIREMENTS

I cannot assign grades of “Incomplete” except in cases of real emergency.

Grade	A	A-	B+	B	B-
Minimum %	95	90	85	80	75

Grade	C+	C	C-	D+	D
Minimum %	70	65	60	55	50

A grade less than 50% is considered an F(failing grade).

METHODS OF EVALUATION

Student Deliverables	Module	Weight
Assignments and Labs	1-14	50
Midterm Project	6-7	20
Final Project	Exam week	15
Presentation (must be done)	Exam week	5
Attendance, Discussion & class activities	1-14	10

DESCRIPTIONS OF ASSIGNMENTS

- **Assignments and Labs**: There will be labs at the end of every lesson. In a lab you will be partnered with another student. Find your project partner through Brightspace and contact him/her. The labs lead to assignments where each project partner will evaluate the other participants on their degree of involvement in the project. All work should be your own and not generated by AI(like ChatGPT or other generative AI).

- **Midterm Project:** You will have two weeks to complete the Midterm project. This is an individual project and must be completed independently.

- **Final Project**: Students will be allowed to work in groups of two. This work should be cumulative and should reflect all components of the course: accessing and merging data, data cleaning, data exploration with descriptive statistics and visualization, modeling, model evaluation and communication. The selected data must be thoroughly analyzed using the above mentioned methods. A final report should be prepared complete with code and explanation.

- **Presentation:** The final report should be presented to the class on the last day of the semester in class. You will receive feedback from me and the TA which you must incorporate into the final project report.

- **Attendance & class activities:** Attendance will be taken through in-person attendance. Class participation will be measured through your participation in class, response questions throughout the class and in-class activities.

- **Discussion:** Discussion prompts will be posted every other week on ethical issues in data science. We will continue the discussion from class through these forum posts. This is a 4 credit course that only meets for 2.5 hours every week. The remaining 1.5 hours of work per week will be completed asynchronously through the Discussion Forum in Brightspace. All discussion posts should be your original work and not generated by AI(like ChatGPT or other generative AI).

ATTENDANCE AND OTHER CLASS POLICIES

- Regular attendance/participation and engagement is expected for student success. Online participation is evident through posting to a discussion board.
- Class attendance is mandatory.
- Check the website (often)! I will try to keep the website as up-to-date as possible.
- Class promptness, participation, and adequate preparation for each class are expected. If you are absent, it is your responsibility to find out what you missed (e.g. announcements, assignments, new material, etc.)
- **Late assignments** will not be accepted.
- Make-up exams will not be given without a valid excuse, such as illness. If you are unable to attend a scheduled examination due to valid reasons, please inform me. Under such circumstances, you are not to discuss the exam with any other class member until after a make-up exam has been completed.

ETIQUETTE FOR COURSE

- Be polite and respectful of one another.
- Avoid personal attacks. Keep dialogue friendly and supportive, even when you disagree or wish to present a controversial idea or response.
- Contribute constructively and completely to each discussion. Avoid short repetitive "I agree" responses and don't make everyone else do the work.
- Consider carefully what you write. Re-read all e-mail and discussion before posting.
- Cite references. Include web addresses, authors, names of articles, date of publication, etc.
- Keep responses professional and educational.

Viral Illness Precautions Statement

The University is committed to delivering its educational mission while protecting the health and safety of our community. Students who are experiencing symptoms of viral illness should NOT go to class/work. The Centers for Disease Control and Prevention (CDC) recommends that all people who are experiencing viral illness should stay home and away from others until symptoms improve and they are fever free (without medications) for 24 hours. They should take added precautions for the next 5 days.

Academic Honesty

Students are expected to be honest in all academic work. A student's name on any written work, quiz or exam shall be regarded as assurance that the work is the result of the student's own independent thought and study. Work should be stated in the student's own words, properly

attributed to its source. Students have an obligation to know how to quote, paraphrase, summarize, cite and reference the work of others with integrity.

Cheating and plagiarism are serious academic offenses, which are dealt with firmly by the College and University. Scholastic integrity presumes that students are honest in all academic work. **Cheating** is the failure to give credit for work not done independently (i.e., submitting a paper written by someone other than yourself), unauthorized communication during an examination, or the claiming of credit for work not done (i.e., falsifying information).

Plagiarism is the failure to give credit for another person's written or oral statement, thereby falsely presuming that such work is originally and solely your own. **Any AI generated(like ChatGPT) program fragments or discussion post submission will be considered as plagiarism.** If you use ChatGPT or similar generative AI program you must cite the source.

If you have any doubt about what constitutes plagiarism, visit the following website: https://honorcouncil.georgetown.edu/whatisplagiarism, the URI Student Handbook, and University Manual sections on plagiarism and cheating at http://web.uri.edu/studentconduct/student-handbook/.

Students are expected to be honest in all academic work. A student's name on any written work, quiz or exam shall be regarded as assurance that the work is the result of the student's own independent thought and study.

- Using material, directly or paraphrasing, from published sources (print or electronic) without appropriate citation;
- Claiming disproportionate credit for work not done independently;
- Unauthorized use of another's work or preparing work for another student;
- Taking an exam for another student;
- Altering or attempting to alter grades;
- The use of notes or electronic devices to gain an unauthorized advantage during exams;
- Fabricating or falsifying facts, data or references;
- Facilitating or aiding another's academic dishonesty;
- Submitting the same paper for more than one course without prior approval from the Instructor.

For certain assignments, you can choose to utilize AI tools to assist you. When you do, it is crucial to clearly document which tool you used, the prompts or questions you provided, and how you used the AI-generated output. This is similar to collaborating with a peer, where it's important to communicate each contribution to the project. However, you must also critically review and refine the AI's output to ensure the final work accurately reflects your own understanding and meets the academic standards expected by the university. Failure to properly document or cite use of AI will be considered a violation of the university's Academic Requirements in the University Manual (see 8.27.10 – 8.27.22).

Excused Absences

Absences due to serious illness or traumatic loss, religious observances, military service, or participation in a university-sanctioned event are considered excused absences. Students are responsible for work missed during an excused absence but will not be penalized by grading or assignment/exam make-up policies. Students should notify faculty in advance of absences due to religious observance or university sanctioned events, and as soon as possible for other absences See University Manual sections 8.51.11- 8.51.16 for details.

Mental Health and Wellness

We understand that college comes with challenges and stress associated with your courses, job/family responsibilities and personal life. URI offers students a range of services to support your mental health and wellbeing, including the URI Counseling Center, TELUS Health Student Support App, URI Health Services, the Wellness Resource Center, the Psychological Consultation Center, the URI Couple and Family Therapy Clinic, and Well-being Coaching.

Land Acknowledgement

The University of Rhode Island land acknowledgment is a statement written by members of the University community in close partnership with members of the Narragansett Tribe. The statement recognizes and pays tribute to the people who lived on and stewarded the land on which the University now resides. The statement seeks to show gratitude and respect to Indigenous people and cultures and build community with the Narragansett Nation and other Native American tribes.

University of Rhode Island Land Acknowledgment

> *The University of Rhode Island occupies the traditional stomping ground of the Narragansett Nation and the Niantic People. We honor and respect the enduring and continuing relationship between the Indigenous people and this land by teaching and learning more about their history and present-day communities, and by becoming stewards of the land we, too, inhabit.*

Anti-Bias Syllabus Statement

We respect the rights and dignity of each individual and group. We reject prejudice and intolerance, and we work to understand differences. We believe that equity and inclusion are critical components for campus community members to thrive. If you experience or witness a bias incident, you are encouraged to submit a report to the URI Bias Resource Team at Bias

Resource Team. There you will also find people and resources to help.

Rhody Outpost Basic Needs Pantry

Food insecurity affects up to 30% of college students. That means you might not have enough food to get through a day or week, you don't have money to purchase groceries or personal products, or you are primarily eating foods that don't provide a lot of nutrition because they're all you can afford. This can all impact your academic success.

Rhody Outpost provides URI students who are food insecure with emergency food services and resources. The Outpost is housed at the Dining Services Warehouse at 10 Tootell Road, between Flagg Road and West Alumni Avenue. We are open every Monday and Wednesday from 3-5pm. Any student in need should fill out an intake form. Eligible students may visit the Outpost up to three times each month.

If you have questions about food or housing insecurity, contact Barbara Sweeney, Coordinator of Food Security Outreach, at barbara_sweeney@uri.edu, or 401-874-5633.

Disability, Access, and Inclusion Statement

Your access in this course is important. Please send me your Disability, Access, and Inclusion (DAI) accommodation letter early in the semester so that we have adequate time to discuss and arrange your approved academic accommodations. If you have not yet established services through DAI, please contact them to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom. DAI can be reached by calling: 401-874-2098, visiting: Disability, Access, and Inclusion – formerly Disability Services for Students (DSS), or emailing: dai@etal.uri.edu.

Nondiscrimination Statement

The University of Rhode Island is committed to maintaining an educational and working environment free from discrimination, harassment, and sexual violence. Consistent with this commitment, the University prohibits all forms of illegal discrimination, harassment, and sexual misconduct in all University programs and activities. The University prohibits students, employees, Affiliates, volunteers, visitors, service recipients, program participants, and contractors from engaging in sexual misconduct or illegal discrimination (including discriminatory harassment) based on an individual's protected status. Learn more by visiting Discrimination – Office of Equal Opportunity.

Anti-Discrimination Resources

Several offices provide support to help faculty comply with the University's commitment to maintain an educational and working environment free from discrimination, and to uphold our collective obligation as a community to foster an inclusive, people-centered culture.

Office of Equal Opportunity (OEO).

The Office of Equal Opportunity (OEO) leads institutional civil rights compliance efforts and supports the belief that all individuals have a right to enjoy equal opportunity in employment and equal access to all university programs, services, and activities, without regard to their protected status. OEO's primary focus areas include: anti-discrimination, affirmative action, equal opportunity, Americans with Disabilities Act (ADA) and Rehabilitation Act Compliance, education & training, and language access. OEO is available to address inquiries from faculty, staff, students, and service recipients and to work with departments to promote compliance with the university's Policy on Nondiscrimination, Policy on Language Access, the University's Language Access Plan, and applicable civil rights laws and regulations.

Title IX.

Any student, faculty, or staff member with questions or concerns about the Policy on Sexual Misconduct or who believes that they have been the victim of sex discrimination, sexual harassment, or sexual violence, as defined under Title IX, is encouraged to contact the University's Title IX Coordinator. Matters involving employees that do not meet the burden of proof under Title IX are forwarded to the Office of Equal Opportunity and the Office of Human Resources. The Title IX Office, in collaboration with the Dean of Students, provides support for and ensures enforcement of the University's Policy on Sexual Misconduct. The Title IX Coordinator also provides support to pregnant and parenting students, in collaboration with the Dean of Students, and to pregnant and parenting employees, in collaboration with the Office of Human Resources. Faculty with questions or concerns about potential sex-based discrimination or sex-based harassment violations, or departments seeking training, should contact the Title IX Coordinator at tixc@etal.uri.edu. More information is available at: Know your Title IX – Sexual Violence Prevention and Response.

Providing equal access for students with disabilities

Every qualified student with a disability has the right to equal access to educational programs, services, activities, and facilities. Documentation-supported accommodations are communicated to faculty through a letter from Disability, Access and Inclusion (DAI), delivered by the student. Faculty are required by law to provide these accommodations and are encouraged to review the information on the DAI website. The Academic Testing Center is available to support testing accommodation needs. Students seeking accommodations in their roles as internal payroll employees should contact the Office of Human Resources. This includes Graduate Assistants and Graduate Research Assistants. Students seeking accommodations in their roles as Federal Work-Study recipients should contact the Office of Human Resources and their placement supervisor. Testing accommodations are administered by the Academic Testing Center and must be coordinated by the faculty. Visit ADA Compliance – Office of Equal Opportunity for a list of ADA Liaisons at the University of Rhode Island.

Disability, Access, and Inclusion Drop-In Hours

Questions about student DAI accommodations? DAI staff are available each weekday from 2-4pm in their webex room, or call 874-2098. **DAI leadership also provides special Faculty WebEx Drop-in Hours, for the first month of the Fall and Spring semesters on Mondays from 11AM-1PM and Wednesdays from 8-10AM.** Please also reach out to us at dai@uri.edu if you would like to discuss a **Workshop** for your department or colleagues, we can work with you to tailor this to your individual needs and interests.

COURSE SCHEDULE

Please find the Course Schedule In Brightspace under the Start Here module.