DS – 100 Basic Foundations of Data Science

Syllabus - Fall 2025| Section – 001
Class Time – T - 1:00 PM – 2:20 PM in FMH 213
F - 1:00 PM – 2:20 PM in CKB 315
Instructor – Ravneet Kaur rk956@njit.edu or ravneet.kaur@njit.edu
Office Hours – Tuesday/Friday (in-person) at 2.30 PM to 3:10 PM (in GITC 2119)
Teaching Assistant - TBD
TA's office hours – TBD

Course Description: Data Science (DS) and artificial intelligence (AI) systems are increasingly being deployed in real-world applications across domains, significantly impacting our daily and social lives. It is critical to ensure that students have a good understanding of the new era of the DS/AI-human-centric world. That will lead to a broader adoption of DS/AI in real-world applications in practice.

This course will provide an insightful understanding of recent data science (DS) and artificial intelligence (AI) developments. Students will learn basic program skills in Python and enable a venture through basic building blocks of data structures, data collection, processing, and generating. Using data visualization tools, students will learn to analyze real-world datasets across domain applications. Students will explore the ethics of AI abstractly and comprehensively, ranging from societal risks, regulations, and responsible technologies in AI. Hands-on labs are developed to align basic knowledge and practical skills in DS/AI. As a result, the course is designed to offer an appropriate entry point into the vibrant world of DS/AI for students with no background in computing so that students can diversify and strengthen their career paths by using DS/AI appropriately and optimally.

No prerequisites are required to enroll.

Learning Goals:

1. Formulate a DS/AI problem regarding quantified, specified inputs and desired outputs in various application domains.

2. Design a precise and complete step-by-step DS/AI solution (algorithm) that produces a desired output from a specified input, including data collection, data processing and analysis, problem formulating, problem-solving, and result understanding.

3. Implement a solution to an algorithmic DS/AI problem using the syntax and semantics of Python.

4. Obtain an essential foundation for recent data science (DS) and artificial intelligence (AI) developments with concrete case studies. Understand DS and AI's potential social benefits and impacts with cutting-edge technologies (DS/AI-Human-Centric).

5. Learn basic data structures used in data science and gain proficiency in Python through programs for data collection, processing, and generating.

6. Understand fundamental components of Ethics in AI and regulations.

7. Understand the development stack and applications of Generative AI, including ChatGPT, Foundation Models, etc.

8. Collaborate effectively in developing a small AI application, especially through teamwork efforts and result analysis.

Pre-requisites: No prerequisites are required to enroll.

Canvas: Additional material and resources will be found on the class website on Canvas.

Schedule: The following is a tentative schedule and is subject to change. Course outline (15-week schedule)

1. Introduction to Data Science (DS) and AI
2. DS/AI-Human-Centric Applications, Technologies, and Social Impacts
3. Introduction to Python Programming: Installation and Jupyter, Anaconda
4. Basic Data Structures: Sets, Functions, Sequences, Matrices, and Graphs
5. Introduction to Python Programming: Basic data structures
6. Introduction to Python Programming: NumPy, Multiarray
7. Introduction to Python Programming: Pandas, series, data frame
8. Data Collection, Data Processing, Data Generation
9. Basic Data Visualization and Analysis
10. Basic Machine Learning: Supervised and Unsupervised Learning Approaches
11. Ethics in AI: Risks, Regulations, and Introduction of Responsible AI
12. Demystifying Generative AI: Applications and Development Stack
    - e.g., ChatGPT, Multimodal Foundation Models in Image, Video, Text Creation, Copilot etc.

13-15. Collaborative Term Projects

Credit: 3

Grade: Final Grades will be based on:
Class participation – 5%
Assignments – 15%
Quizzes – 10%
Term Project – 15%
2 Midterm's – 30% (15% each)
1 Final Exam– 25%

The final letter grades for the semester are based solely on the points you earn, according to Table 2.

Grade	Points
A	90+
B+	84-90
B	78-83
C+	70-77
C	60-69
D	50-59
F	0-49

Table 2: The final letter grade converting table

POLICIES:

Assignments (Homework and Project)

Homework for this class is usually due about one week after being issued. They aim to help you keep up with the material and assess your readiness for the midterm and final.

Homework is due before midnight (11:55 pm) on the due date specified on the schedule. It will be submitted via Canvas electronically. Late homework will be penalized by 10% of the available points (and another 10% will be deducted for every 24-hour period after the original due date) unless there is a reason beyond your control.

Makeup Tests

Requests for make-up tests must be made in advance with the instructor and will only be approved if the reason is beyond your control.

Academic Integrity Policy

The NJIT academic honor code is located at: http://integrity.njit.edu/index.html. This honor code applies in its entirety to this class. Violations will not be tolerated. In addition, students should

familiarize themselves with NJIT's "Best Practices related to Academic Integrity," which is developed and published on the provost's website (on the policies page).

Disabilities

If you have a disability that may require some modification of seating, testing, or any other class requirement; please let the Professor know so that appropriate arrangements can be made. Similarly, let the Professor know if you have any emergency medical information about which to be aware of or if you need special arrangements in the event of building evacuation. See the Professor after class hours or schedule an appointment. Assistance is available from the Office of Student Disability Services (205 Campbell Hall; 973-596-3420). Be sure to complete appropriate paperwork with this office during the first week of class.

If students have health problems, mental problems, or family problems that will affect their performance negatively, they have to inform the Office of Accessibility Resources and Services (OARS) https://www.njit.edu/accessibility/ as soon as they become aware of the problems.

Policy on AI Usage

Student use of artificial intelligence (AI) is permitted in this course for certain assignments and activities. It is not permitted to be used in the discussion of writing. Additionally, when students use AI in this course, the AI must be cited as is shown within the NJIT Library AI citation page for AI. If you have any questions or concerns about AI technology use in this class, please reach out to the instructor prior to submitting any assignments.