INTRODUCTION TO MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE
21:198:349 (3 credits)

COURSE DESCRIPTION

Data is asset only if it is of high quality and usable, otherwise it’s liability. This course introduces data mining, machine learning, deep learning, data analytics and data visualization combining statistical theories with real-world computer-based applications. Students, through hands on practice by running and creating machine learning projects, will gain understanding of the fundamentals of machine learning, deep learning, artificial intelligence and their real-world applications.

COURSE OBJECTIVES
Upon successful completion of this course, students should have an understanding of the following:

- Fundamentals of statistics
- Fundamentals of machine learning
- Application of statistics, machine learning and data visualization concepts and techniques on computer-based systems.

PREREQUISITE
21:198:102 or 21:219:220

TEXTBOOK
eText ISBN: 9780135404812, 0135404819

SUPPLEMENTAL TEXTBOOKS
Data Visualization with R, 2nd edition by Thomas Rahlf. Publisher: Springer
Publisher’s website: https://link.springer.com/book/10.1007%2F978-3-319-49751-8
**REQUIRED SOFTWARE**

Developed for solo practitioners, it is the toolkit to work with thousands of open-source packages and libraries. Please follow installation instructions to install on personal computer.

**Python**: An interpreted programming language freely available for download at [https://www.python.org](https://www.python.org), please follow installation instructions to install on personal computer.

**R**: An interpreted programming language freely available for download at [https://www.r-project.org](https://www.r-project.org), please follow installation instructions to install on personal computer.

Any other required software.

**SUPPLEMENTARY READINGS**

*Any and all other additional materials, or means by which to obtain these materials, will be physically or electronically provided to you by your instructor.*

**FINAL EXAM**
Date and time according to Academic Calendar
Location: Classroom

**DEPARTMENT WEBSITE**
Mathematics & Computer Science | Rutgers SASN

**NOTES ABOUT REMOTE LECTURES**
Students should be aware of and follow the University guidance concerning web conferencing: [https://it.rutgers.edu/knowledgebase/etiquette-and-best-practices-for-web-conferencing](https://it.rutgers.edu/knowledgebase/etiquette-and-best-practices-for-web-conferencing)

Prior to recording, students should notify anyone that may appear in the recording (including any residents where the recording is taking place) that the student is recording a video, in order to ensure that any recordings do not invade any third-party privacy rights.

**TENTATIVE COURSE TOPICS**

- Chapter 1: Introduction to Computers and Python
- Chapter 2: Introduction to Python Programming
- Chapter 3: Control Statements and Program Development
- Chapter 4: Functions
- Chapter 5: Sequences: Lists and Tuples
- Chapter 6: Dictionaries and Sets
- Chapter 7: Array-Oriented Programming with NumPy
- Chapter 8: Strings: A Deeper Look
- Chapter 9: Files and Exceptions
Chapter 10: Object-Oriented Programming
Chapter 11: Computer Science Thinking: Recursion, Searching, Sorting and Big O
Chapter 12: Natural Language Processing (NLP)
Chapter 13: Data Mining Twitter
Chapter 14: IBM Watson and Cognitive Computing
Chapter 15: Machine Learning: Classification, Regression and Clustering
Chapter 16: Deep Learning
Chapter 17: Big Data: Hadoop, Spark, NoSQL and IoT

GRADING
90 and above: A
85-89  B+
80-84  B
75-79  C+
70-74  C
60-69  D
0-59   F

ABSENCES
Per the University’s Course Attendance policy (10.2.7), students are responsible for communicating with their instructors regarding absences. The Division of Student Affairs is available to verify extended absences: (973) 353-5063 or DeanofStudents@newark.rutgers.edu

HONOR PLEDGE
Please type and sign the following honor pledge on all your exams and assignments: “On my honor, I have neither received nor given any unauthorized assistance on this examination (assignment).”

ACADEMIC INTEGRITY
As an academic community dedicated to the creation, dissemination, and application of knowledge, Rutgers University is committed to fostering an intellectual and ethical environment based on the principles of academic integrity. Academic integrity is essential to the success of the University’s educational and research missions, and violations of academic integrity constitute serious offenses against the entire academic community. The entire Academic Integrity Policy can be found here: https://sasn.rutgers.edu/student-support/current-students/academic-performance-standards/academic-integrity-ai

LEARNING RESOURCES
- Rutgers Learning Center (tutoring services)
  Room 140, Bradley Hall
  (973) 353-5608
  https://sasn.rutgers.edu/student-support/tutoring-academic-support/learning-center
- Writing Center (tutoring and writing workshops)
  Room 126, Conklin Hall
  (973) 353-5847
  nwc@rutgers.edu
  https://sasn.rutgers.edu/student-support/tutoring-academic-support/writing-center

Department of Mathematics & Computer Science
Smith Hall 216, 101 Warren Street, Newark, New Jersey 07102
Phone: (973) 353-1004 Fax: (973) 353-5270