



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

Intro to Python for Computer Science and Data Science: Learning to Program with AI, Big Data and The Cloud, First Edition, 2020. Publisher: Pearson

Print book ISBN: 9780135404676, 0135404673 ISBN: 9780135404676, 0135404673

eText ISBN: 9780135404812, 0135404819

Publisher's website: <https://www.pearson.com/us/higher-education/program/Deitel-Intro-to-Python-for-Computer-Science-and-Data-Science-Learning-to-Program-with-AI-Big-Data-and-The-Cloud/PGM2392788.html>

SUPPLEMENTAL TEXTBOOKS

Data Visualization with R, 2nd edition by Thomas Rahlf. Publisher: Springer

ISBN-10 3030284433, ISBN-13 9783030284435

Publisher's website: <https://link.springer.com/book/10.1007%2F978-3-319-49751-8>

REQUIRED SOFTWARE

Anaconda: Individual Edition: An Integrated Programming Environment freely available for download at <https://www.anaconda.com/products/individual>

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>, please follow installation instructions to install on personal computer.

R: An interpreted programming language freely available for download at <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>

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>

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