SCI 1 – Computer Science 1
Intro to the Module

SCI-1 | BOSTON | RAHUL | SPRING 2024

Course Learning Objectives

On completion of this module, students are expected to be able to:

- MLO1: Apply machine learning techniques and understand the fundamental concepts of databases and the architecture within organizations.

- MLO2: Analyze different problems and implement appropriate programming solutions in Python.

- MLO3: Write simple object-oriented programs in Python using classes, objects, inheritance, polymorphism and encapsulation.

How will you be learning?

- In-class activities – hands on programming tasks
- Case Studies
- Projects
- Assignments
- Papers

Work

You will be, via work and discussion in class, and via assignments:

- Doing multiple datacamp assignments, some in class
- Learning how to breakdown a large project into parts and using the right level of abstraction for each part
- Learning how to use the shell and terminal
- Learning how to set up a python project
- Learning how to collaborate on a project using github
- Learning how to use an API to obtain data from an external source and how to put it into a database
- Doing a database and machine learning project in class
- Learning about 3 kinds of databases: Relational (row), Relational (Column) and Vector
- Learning the basic concepts of machine learning
- Learning the basic concepts of AI
- Doing a group project that involves you building a RAG (retrieval augmented generation) application.
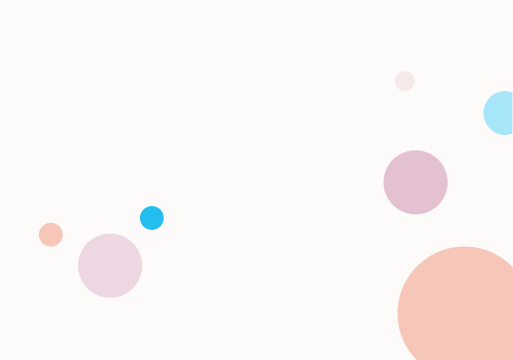
Technical Skills

- Python

- Numpy

- Pandas

- SQL

- Exploratory Data Analysis with matplotlib and seaborn, and third-party packages

- Machine learning with sklearn

- Deep Learning with Keras

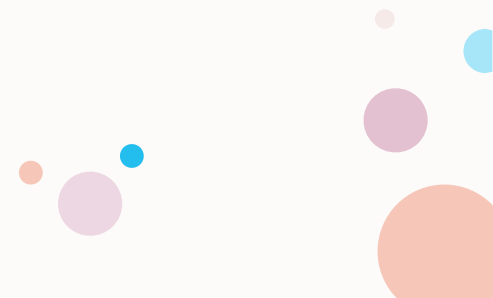- Natural Language Processing with HuggingFace
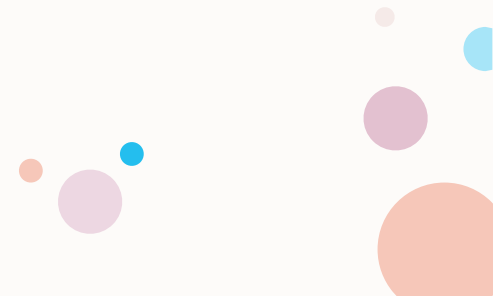
General Education Component

- History of Computing

- How the Internet Works

- The Global Technology Market

- Cloud Computing Tech

- Cloud computing, Bitcoin Mining, and environmental impact

- Business value and risks and consequences of cloud computing

- IT infrastructure and security

- Gender Gap, Diversity Gap, and efforts to close it (with discussion and paper)

Professional Development Component

- Critical Thinking and Statistical Understanding

- Problem Solving

- Team Working with github: continuous integration and deployment

- Communication of Technical Concepts

- Lifelong learning

Books (a non-exhaustive list)

- Think Python, 2nd edition: https://greenteapress.com/thinkpython2/html/index.html

- Python for Data Analysis, 3rd edition: https://wesmckinney.com/book/

- SQL for web nerds: http://philip.greenspun.com/sql/

- Better Presentations, Jonathan Schwabish (Perlego)

- Data Visualization, Kieran Healy: https://socviz.co/