The course builds on DS110 and during the first part of the semester introduces a number of classification and regression algorithms on top of the popular python packages numpy, pandas, matplotlib and scipy. It then moves to introducing a high performance language (Rust) and how to use it to implement a number of fundamental CS data structures and algorithms (lists, queues, trees, graphs etc), Students are expected to propose and complete an independent project on a large graph dataset using Rust.

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| **Date** | Topics Covered |
| --- | --- |
| Week 1 | Course overview, supervised and unsupervised learning, decision trees. |
| Week 2 | Classification, Regression, Pandas, Interpolation Homework: Markdown and decision trees |
| Week 3 | Clustering, k-means, linear programming, linear regression  Homework: Numpy and K-clustering |
| Week 4 | Loss functions, overfitting, underfitting, hyperparameter tuning  Homework: Pandas and Linear Programming |
| Week 5 | Programming languages, documentation, source control, basics of Rust.  Homework: Rust, overfitting and underfitting |
| Week 6 | Rust: project manager, functions, flow control, arrays, tuples, enums, memory management  Homework: Data set research |
| Week 7 | Rust: ownership, borrowing, methods, copying, references, generics and traits.  Homework: Basic Math in Rust |
| Week 8 | Rust: Collections, Vectors, Hash Maps, Hash Sets, Graphs  Homework: Enums, Structs and Traits in Rust |
| Week 9 | Rust: Graph algorithms, modules and external files.  Homework: Generics and methods in Rust |
| Week 10 | Rust: Parsing, stacks and queues, DFS, BFS, Priority queue, Binary heaps.  Homework: Simple decision tree in Rust |
| Week 11 | Rust: Sorting, shortest paths, strings, &str, closures and iterators  Homework: Graph pagerank in Rust |
| Week 12 | Rust: Binary search trees, dynamic programming, greedy algorithms. |
| Week 13 | Rust: Multithreading and parallel programming. |

**Homework dates are when the homeworks are due (they will be handed out the week before).**

### Course Policies

You are welcome to search the internet for help in all possible ways. You must understand your solution and be able to explain it in your writeups for the assignments.

10 Homeworks, 1 final project

Grade will be determined 25% homeworks, 20% midterm, 25% final project, 25% final exam, 5% attendance.

Code of conduct: <https://www.bu.edu/academics/policies/academic-conduct-code/>

Using AI bots: <https://www.bu.edu/cds-faculty/culture-community/gaia-policy/>