Course Introduction

Introduction to Programming

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Welcome to KAUST Introduction to Computer Programming!

Your Objectives:

- Describe the goals and structure of this course.
- Describe the grading scheme.
- Use a Jupyter Notebook to run simple Python programs
- Maybe install Jupyter on your own computer

About your Instructor

Name	Mattox Beckman
Education	PhD from UIUC in 2003
Previous Work	Senior Lecturer at Illinois Institute of Technology in Chicago 2003 – 2015
Research Interests	CS Education, Programming Languages
Hobbies	Fermentation, Meditation, Philosophy, Irish Music

Class Structure

- Topics are divided by week.
- Standard Format
  - Group Activity (20–30 minutes)
  - Short lecture / Live coding demo (20–30 minutes)
  - Time for homework (remaining time)

Assignments and Grading

- Most weeks will have a small homework set.
  - Due one week after assigned (usually in class the next week).
  - Feedback and opportunity for revision if good effort
- There will be a larger "final project"
  - This will depend on your interests, in part!
  - Projects count as 3 homework sets.
- We will use a standard 90/80/70 point standard for grades.

Topics Weeks 1 to 5

- Week 1 - Course Introduction
  - Using Jupyter Notebooks
  - Simple Python Programs
- Week 2 - Data Structures
  - Lists, Sets, Hashmaps in Python
  - Functions
- Week 3 - Classes and Objects
  - Classes and Objects in Python
- Week 4 - Interactive Text Programs
  - Getting input and output from the user
  - Pattern matching and intelligent interaction
- Week 5 - Web Programming
  - Using Flask to build interactive web pages

Topics Weeks 6 to 10

- Week 6,7 - Databases
  - CSV and other file formats
  - Basic SQL
  - Tables and Queries
  - Connecting to databases with Python
  - Building data-driven programs
- Week 8 - Visualization
  - Seaborn and visualizations
  - Data Frames
  - Telling a story with data
- Week 9 - Competitive Programming
- Week 10 - Algorithms 1
  - Divide and Conquer
  - Greedy Algorithms

Topics Weeks 11 to 15

- Week 11 - Algorithms 2
  - Binary Search
  - Dynamic Programming
- Week 12 - Programming Language C++
  - Strongly-typed Languages
  - Comparisons with Python
- Week 13 - Programming Lanugage Matlab
  - Using Matlab for scientific computation
- Week 14,15 - Basic Excel
  - Summary and Lookup Functions
  - Conditional Formatting
  - Data Validation
  - Pivot Tables

POGIL

- Process Oriented Guided Inquiry Learning
  - Based on more than 20 years of learning research!
- "Process Oriented"
  - Manager
    - keeps track of time,
    - makes sure team stays on task,
    - makes sure everyone participates
  - Recorder
    - Records the answers and decisions
    - Provides copies of notes for the team
  - Reflecter / Quality Control
    - Provides quality control for the team.
    - "Are you sure that's the right answer?"
    - Considers how team performance can continually improve
  - Reporter
    - Asks and answers questions in class on behalf of the team

POGIL, ctd

- "Guided Inquiry Learning"
  - Exploration section
    - You will see examples of the topic of the day.
    - "Leading questions" there to help you notice the right things.
  - Concept Invention
    - Introduce vocabulary
    - Refine understanding
  - Application
    - Use new knowledge to solve a problem!