

# CSCI 128 – Computer Science for STEM

## Class Topics List

### Programming Language: Python 3

- **Python Basics**
  - Syntax
  - Variables
  - Text input and output
  - Data types (ints, floats, strings, lists)
- **Algorithms**
  - Algorithmic thinking
  - Algorithm design and pseudocode
  - Algorithm time efficiency
  - Common search and sorting algorithms
- **Data Representation**
  - Binary numbers
  - Fractional values and floating point
  - ASCII and Unicode
- **Conditionals and Boolean Logic**
  - Branching and control flow
  - Logical operators: AND, OR, NOT
  - Boolean type
  - Truth tables
  - Correspondence with digital circuitry
- **Scientific Computing Best Practices**
  - Code reading
  - Code peer review
  - Variable naming
  - Effective software development
  - Debugging
- **Loops**
  - Looping with for and while
- **Complex logic**
  - Nested conditionals and loops
  - Advanced string and list methods
- **Files**
  - File directories
    - Absolute and relative paths

- Simple shell commands
  - ls, cd, mkdir, cp
- Text file input and output
- CSV file input and output
- File compression
- File backups
- **Data Science**
  - The data science process: collect, clean, explore, predict
  - Analyzing real data sources from multiple disciplines
  - Data visualizations
  - Plotting
    - Python modules
    - 2-D data visualizations
    - Matplotlib
  - Big data concerns
- **Social Concerns**
  - Diversity and representation in computing
  - Software ethics
  - Digital access
  - Automation and AI
  - Software accessibility
- **Functions**
  - Parameters
  - Return
  - Scope and globals
  - Recursion
    - Common mathematical functions (Fibonacci, factorial)
    - Recursive search and sort algorithms
- **Classes and Objects**
  - Class definitions
  - Fields
  - Methods
  - Constructors