

# CS 4040/5040

## Milestone 1

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### 1. Build / Run Instructions

- a) **Python version:** Python 3.12.6
- b) **Run program:**
  - Open terminal / command prompt
  - Navigate to project folder
  - Run: `python main.py`

### 2. The program will:

- Test correctness of Insertion Sort and Randomized Quick Sort on small sample arrays.
- Measure **median runtime** for each input size  $n$ .
- Skip Insertion Sort for very large inputs ( $n = 10000, 20000$ ) because it is too slow.
- Print runtimes in milliseconds (ms).

### 3. Algorithms Implemented:

Algorithm	Type	Time complexity
Insertion Sort	Comparison-based	In-place, $O(n^2)$ worst-case
Randomized Quick Sort	Comparison-based	Recursive, pivot chosen randomly, $O(n \log n)$ expected