



Welcome to ESC 190 – Computer Algorithms and Data Structures! This course serves as an the second half of the introduction to computer programming and computer science. We will introduce advanced features of the Python programming language, and introduce the C programming language. We will implemente data structures and algorithms in Pytohn and C, and analyze them We will discuss good practices in software engineering (designing and building large software systems). We will analyze the efficiency of algorithms, and discuss designing efficient algorithms. Various research areas in computer science (AI, software engineering research, the theory of computation, etc.) will be introduced throughout the term. No previous knowledge of programming or computer science is assumed.



Website: https://www.cs.toronto.edu/~guerzhoy/190/ https://piazza.com/utoronto.ca/esc180190/ Forum:

All course handouts will be posted on the course website. Students are responsible for reading all announcements on the course forum on Piazza.



| Instructor | Email | Office | Office Hours |
|------------------|-------------------------|---------|---------------|
| Michael Guerzhoy | guerzhoy@cs.toronto.edu | BA 2028 | Tuesday 6p.m. |



The grading scheme for the course is as follows.

| | Worth | Date |
|-------------|-------|--------------------------------------|
| Labs | 8% | Starting Week 2 |
| Online labs | 2% | Due Feb. 2 and Mar. 14 |
| Projects | 12% | 2 projects, due Feb. 14 and Apr. 4 |
| Midterm | 30% | Feb 27 |
| Quizzes | 3% | Best 8 of 12 |
| Exam | 45% | TBD |



Unless specified otherwise, a lab needs to be completed every week. Labs must be completed in teams of two students. Teams that make their best effort toward completing the lab will be awarded full credit.



The following textbooks are not required, but you may find them useful as additional references.

- K. King, C Programming: A Modern Approach, 2nd ed
- B. Kernighan and D. Ritchie, *The C Programming Language*, 2nd ed.
- S. Skiena, The Algorithm Design Manual, 2nd ed.



Everyone has 5 grace days available at the start of the semester. You can use a grace day to avoid a late penalty. Grace days are applied automatically at the first opportunity that they can be used. Late submissions are allowed for up to three days after the deadlines. Late submissions after 3 days are not allowed except for documented medical/personal circumstances.



Note that this is a tentative list of topics. All topics in algorithms and data structures will be approached from both a theoretical and a practical point of view.

- Problem-solving with recursion
- Review of complexity analysis
- Introduction to C
- Pointers; the C memory model; comparison to Python
- Binary representation of objects
- Strings in C
- Multifile programs in C; the C preprocessor
- $\bullet\,$ Linked lists
- Lists, stacks, and queues
- Heaps and priority queues
- Graphs and graph algorithms
- Binary search trees
- Dynamic programming
- Hash tables