
Course Information

Course: COS 485 Design and Analysis of Computing Algorithms
Call #: 41117. COS 485 is cross-listed as COS 582 Call # 40693
Credit Hours: 3
Room: Payson Smith 207
Day/Times: T/R 12:30 P.M.– 1:45 P.M.
Prerequisites: Grade of C or higher in COS 285.
Textbook: Neapolitan, R. (2014). *Foundations of Algorithms* (5th ed.).
Jones & Bartlett Learning. ISBN: 9781284049190.

Instructor Information

Name: James Quinlan, Ph.D.
Office: 228 Science Building
Phone: (207) 780 – 4499
Email: james.quinlan@maine.edu
Office Hours: T/R 11:00 A.M.- 12:00 P.M.

Course description

An introduction to the design and analysis of algorithms. Techniques for designing algorithms, such as divide-and-conquer, greedy method, dynamic programming, and backtracking, are emphasized and illustrated. Many problems of practical importance are covered, including minimum spanning tree, single source shortest path, traveling salesperson, and graph search. The concepts of NP-completeness are also considered—substantial programming in a high-level language.

Topics¹

- Algorithm efficiency, analysis, and order
 - Recurrence relations
 - Divide-and-conquer
 - Dynamic Programming
 - Greedy algorithms: MST
 - Intractability and Computation
 - Number theory algorithms
 - Parallel algorithms
-

¹Subject to change (see Disclaimer below).

Learning Outcomes

By the end of this course, students will be able to:

- List various algorithm design techniques
- Explain how different algorithm design principles translate to computational solutions
- Use mathematical analysis to calculate expected runtimes of algorithm designs
- Evaluate and compare algorithms' performance on problems using experiments
- Assess the effectiveness of different techniques for designing efficient algorithms
- Prove properties like correctness and computational complexity
- Design experiments to compare algorithms
- Compose clear written explanations of algorithmic approaches

Course Evaluation and Grading Policies

Attendance and Participation (10%)

Regular attendance and fully engaged participation is expected of all students. You should complete all assigned readings before each class session.

Assignments (50%)

Homework and programming assignments will be given throughout the semester. Due dates will be listed on Brightspaces. Submissions will be uploaded to Brightspace; \LaTeX source, PDFs, or plain text files (including markdown) will **only** be accepted—no Word documents. Late assignments will not be accepted. In recognition of the fact that there may be unforeseen circumstances that prevent you from submitting some assignments, I will drop the two lowest assignment scores.

In-class assignments may be given from time to time.

COS 485 is programming language agnostic. The book uses “C/C++” like pseudo-code. You may select a language you have been wanting to learn (e.g., C++), one with simple syntax (e.g., Python), or one that is highly expressive (e.g., Octave). Choose a language wisely.

Exams (40%)

Both exams (Midterm and Final, 20% each) will be cumulative, emphasizing material covered since the previous exam. If you cannot take an exam at the scheduled time because of illness or other problems, you must contact me through Brightspace beforehand to arrange to take the exam at a different time. Failure to make prior arrangements for a missed exam will result in a grade of 0 for the exam.

In summary, grades are based on the following weighted items:

| Item | % Weight |
|--------------------------------|----------|
| Attendance/Participation | 10% |
| Assignments | 50% |
| Exam (March 7) | 20% |
| Final exam (April 30) | 20% |
| Total | 100% |

Grade Ranges

Letter grades are assigned based on the final percent using the interval values:

| Grade | % bound |
|-------|-----------|
| A | 93 - 100 |
| A- | 90 - 92.9 |
| B+ | 87 - 89.9 |
| B | 83 - 86.9 |
| B- | 80 - 82.9 |
| C+ | 77 - 79.9 |
| C | 73 - 76.9 |
| C- | 70 - 72.9 |
| D | 60 - 69.9 |
| F | <60 |

The grade, “I” (incomplete), can be given ONLY when a student, who is doing otherwise acceptable work (passing grade), is unable to complete a part of work (e.g., the final exam) because of documented illness or other conditions beyond the student’s control. In the latter case, the student must discuss with the instructor and complete an application form from the department before the part of work is due or as soon as the circumstances are known.

Student Success Tips

- attend all class meetings
- read the material before coming to class
- complete assignments by the due dates specified
- create a study and/or assignment schedule to stay on track
- read announcements
- communicate regularly with your instructor and peers
- read and respond to course email messages as needed
- access USM Online Student Resources

Support Services

- **Request disability accommodations** | (207) 780-4706 | dsc-usm@maine.edu
- **Report interpersonal violence** | (207) 780-5767 | usm.titleix@maine.edu
- **Report on-campus emergencies and safety concerns** | (207) 780-5211 or your local police agency.
- **Get academic help** | mycampus.maine.edu/group/usm/learning-commons
- **Get technology help** | usm.maine.edu/computing/helpdesk
- **Meet with an academic advisor** | usm.maine.edu/advising

For USM’s most complete and current information on services available to students, as well as academic policies, use the QR Code to go to the Student Services and Policies Hub webpage.



Figure 1: <https://mycampus.maine.edu/group/usm/student-services-and-policies-hub>

Disclaimer

The syllabus is a statement of intent and serves as an implicit agreement between the instructor and the student. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. Remember to check Brightspace site often.
