



NORTHWEST
MISSOURI STATE UNIVERSITY
MARYVILLE | KANSAS CITY

School of Computer Science and Information Systems
44-349-01/44-599-01 Survey of Algorithms (3 hours)
Spring 2026

Instructor: Dr. Charles Hoot
Phone: 660-562-1801
Section 1 MWF 11:00-11:50 CH3600

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Office: Colden Hall 2163

Office Hrs:

MWF - 1:00-2:00pm

TTh - 1:00-3:00pm

TA:

Tristen Thompson S547289@nwmissouri.edu

Prerequisites: 44-242 and 44-249, with a grade of C or better, or instructor's approval.

Textbook: There is no textbook for this course. Course slides and additional materials will be made available on the course website. Additional material will be presented in class. For this course, there will be several programming projects where you will be timing the execution time of algorithms you implement. You may choose to write your solutions in any programming language you wish. The grader may ask you to provide instructions to set up an environment to execute your programs to ensure their correctness. I will provide several sources of information in this course. Slides will be distributed as PDFs. Students are required to have a GitHub account for this course. The student's school email address should be associated with the account, but is not required to be the primary email on the account.

Useful reference books:

Donald Knuth – The Art of Computer Programming – A bit dated in places. Serious math in places. The classic, but he stopped at vol 4 of a planned 10, so missing some algorithms. Knuth created TeX so he could write papers and books.

Cormen, Leiserson, Rivest – Introduction to Algorithms – This is the current reference for algorithms and is commonly called CLR. Serious math in places. This is not a text book. Does not cover everything.

Sedgewick – Algorithms – Good coverage of topics. Good visualizations. Code in C, C++, or Java depending on the edition. The more recent versions have expanded the text considerably to give more details on the algorithms, but I find the earliest version to be delightfully compact.

Skiena – The Algorithm Design Manual – Lots of practical information on algorithms and problems of interest.

Course description: A study of correctness and performance of algorithms central to the major areas of Computer Science.

Student learning outcomes: This course satisfies the following outcomes for the School of CSIS:

Outcome	Assessment Methods
An ability to apply theory in the design and implementation of computer-based solutions	Graded on project implementations and papers

In addition, after completing this course, a student should be able to:

- describe a variety of widely used algorithms
- trace the execution of algorithms to understand how they work
- mathematically analyze algorithms to determine their execution time and memory requirements as a function of problem size
- experimentally determine execution times of algorithms on different types of data sets
- choose an appropriate algorithm for a particular instance of a problem

Assessment methods: Desired Student outcomes will be assessed via homework, midterms, projects and a final exam.

Instructional methods: Instructional methods include lectures, and individual work.

Graded course requirements:

Category	Weight
Work Sheets/Quizzes	15%
Projects	25%
Midterm Exams (2)	30%
Final	20%
Attendance/Participation	10%
Total	100%

Grading scale:

Undergraduate Credit	
Percent Range	Grade
90-100%	A
>= 80% and < 90%	B
>= 70% and < 80%	C
>= 60% and < 70%	D
below 60%	F

Graduate students will use the same grading scale, but will have an extra project to complete:

Late Policy: Assignments may be submitted for partial credit (-10%) up to 24 hours from the deadline. The instructor may give extensions in extenuating circumstances; extensions should be discussed with the instructor before the deadline.

Office Hours:

I will be in my office during office hours, but a zoom session can be arranged as well.

Course Outline/Major Topics Studied: Spring 2025

This is a tentative schedule and is subject to change. For exact information, including important dates, check announcements on the course website.

- **Introduction**
 - **Measuring Execution Time**
 - **Discrete Math Review**
- **Algorithm Analysis**
 - **Counting Operations**
 - **Algorithm Analysis**
 - **Asymptotic Order**
 - **Recurrences**
 - **(GRAD) Amortized analysis**
- **Divide and Conquer**
 - **Divide and Conquer**
 - **Maximum Subarray Problem**
- **Dynamic Programming**
 - **Dynamic Programming**
 - **Problems: Coin Changing/Rod Cutting/Matrix Multiplication/Longest Common Subsequence**
- **EXAM 1 (Date to be announced)**
- **Graphs**
 - **Intro to Graphs**
 - **Searching Graphs**
 - **Topological Sort**
 - **Shortest Paths**
 - **Minimal Spanning Trees**
 - **Union/Find**
 - **Backtracking**
 - **Heuristic Searching**
- **Text Processing**
 - **Searching Text: naive vs KMP vs Boyer-Moore-Horspool**
 - **Compressing Text**
- **Pvs NP**
 - **Hard Problems**
 - **Bin Packing**
- **EXAM2 (Date to be announced)**
- **Bonus Materials**
- **Final Exam (Wednesday, April 19, 10:10am-12:10pm)**

Note: Course schedule is subject to change with instructor notification and students will be responsible for abiding by these changes.

Academic Calendar: <http://www.nwmissouri.edu/academics/calendar.htm>

Written Exams: There will be two written midsemester exams in this course. Exams will be announced at least one week before the exam date. A portion of the class before the exam will be devoted to review time. You will be allowed to refer to your handwritten notes during the exam. You are not allowed any other resources.

Final Exam: The final exam will be comprehensive and will be given during the time specified by the registrar at <http://www.nwmissouri.edu/registrar/finals.htm>

Programming Projects: Periodically you will be required to write programs where you will implement various algorithms discussed in the course, determine their execution time, and write a short report. You may discuss the projects with each other, but you (or your team in the case of a group project) are responsible for writing your own code and responses to the questions posed as part of the assignment. The project will be split into milestones, each with their own deadline.

Quizzes and Worksheets: You will be assigned exercises to do on your own time. At any time, the instructor may choose to give a quiz in lieu of collecting an assigned worksheet.

Attendance

You are expected to attend class each day AND BE ON TIME. Attendance will be a factor in your grade. If you must miss class due to a university sponsored event (documented with an excuse signed by the university sponsor prior to the event) or by circumstances considered extenuating by the course instructor, it is your responsibility to inform the instructor/TA BEFORE class time via email. If the instructor/TA was not notified before class time, the absence will be unexcused. Please refer to the general university policy on attendance at <https://www.nwmissouri.edu/policies/academics/Attendance.pdf>

Classroom Decorum

Students are required to come to class prepared for the day's activities. That means be in your seat before the class starts, with the textbook, notepaper or notebook and writing instrument. We will start class promptly at the designated time.

Cell phones and pagers must be turned off during class time and are not allowed during exams. Laptop computers and handhelds may be used during class time if they are being used for a class activity, such as taking notes. Students are not to read or send e-mails, text messages, or surf the web during class time. Anyone using an electronic device to give or receive assistance during exams will be in violation of the "Academic Integrity" section of the catalog.

Refer to Syllabus Addendum for additional information.