Missouri University of Science and Technology	Department of Computer Science
Spring 2022	**CS 2500: Algorithms (Sec: 102)**

SYLLABUS

Instructor: *Dr. Sid Nadendla*　　　　　　　　　　　　**Email:** *nadendla@mst.edu*

1 Course Information

Course Website:	https://sid-nadendla.github.io/teaching/SP2022_Alg/index.html
Lecture hours:	Tuesdays & Thursdays; 3:30-4:45 PM
Lecture Venue:	Room 220, Computer Science Building
Instructor:	Dr. Sid Nadendla
Office:	313 Computer Science Building
Office hours:	Fri 2PM - 3PM, or by appointment.
E-mail:	nadendla@mst.edu
Website:	https://sid-nadendla.github.io
Office Phone:	(573) 341-4090

Required Textbook:　Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein, *Introduction to Algorithms*, Third Edition, MIT Press, 2009. ISBN 978-0-262-03384-8.

2 Description

The goal of this course is to ensure that the students are exposed to several fundamental algorithms, while simultaneously developing abilities in both formal thinking (proof techniques and algorithm analysis) and problem solving skills (algorithm design and selection). A gamut of fundamental problems in computing will be introduced and algorithms are devised to solve them using techniques such as recurrence relations, dynamic programming, greedy, shortest-path, minimal spanning trees, and maximum flow algorithms. Furthermore, these algorithms shall also be analyzed for correctness and time/space complexity, and validated through programming. This is a writing intensive course and will include significant writing (like assignment reports) which will count towards their grade in this class.

3 Course Objectives

This course has the following objectives:

- Be thoroughly familiar with a collection of core algorithms.

- Be fluent in the following algorithm design paradigms: recursion, sorting, divide and conquer, greedy algorithms, dynamic programming and graph algorithms.

- Be proficient in analyzing the correctness and run-time performance of a given algorithm, and be familiar with the inherent complexity (lower bounds and intractability) of certain problems.

- Be able to apply these techniques to real-world problems.

- Improve technical writing skills in computer science through HW assignments and projects to enable them to fluently write algorithms using pseudocodes and flowcharts, articulate complexity analysis, and present design approaches in a clear and comprehensive manner.

4   Intended Audience & Prerequisites

This course is aimed at undergraduate students in any science or engineering degree program who are proficient in a procedural programming language, have a solid understanding of data structures, and have a basic proficiency in calculus. If in doubt, contact the instructor! Python is the programming language adopted for this course; under extraordinary circumstances, students may obtain instructor's approval to adopt other programming languages. The prerequisites for this course are (i) "C" or better grade in both Comp Sci 1200 and Comp Sci 1575; (ii) preceded by "C" or better grade in either Math 1208 or Math 1214, or accompanied by either Math 1208 or Math 1214.

5   Tentative Schedule

Topic	Subtopics	# Lectures
Foundations	Complexity Analysis, Recursion, Randomization	4
Sorting	Insertion, Heapsort, Quicksort, Radixsort	4
Midterm 1		**1**
Other Design Techniques	Dynamic Programming, Greedy Algorithms	4
Graph Algorithms	Searching, Shortest Path, Spanning Trees, Max. Flow	4
Midterm 2		**1**
NP-Completeness	P vs. NP, Reducibility, Heuristics, Traveling Salesman	4
Special Topics (Tentative)	Linear Programming, String Matching	4
Final		**1**

6   Grading Information

Grading will depend on student's performance across six homework assignments, two midterm examinations and a final comprehensive exam. All the grades will be posted and maintained on Canvas. However, the best five homework grades shall only be considered for the sake of calculating the final grade, as shown below:

Assignments (5/6):	50% of total grade
Midterm Exams (2):	30% of total grade
Final Exam (1):	20% of total grade
Final Grade:	$[90 - 100]$: A, $[80 - 90)$: B, $[70 - 80)$: C, $[60 - 70)$: D, < 60: F

This section has **two graders**, who will be introduced/announced in the first lecture. Registered students will be assigned to either one of the graders based on the lexicographical order of their last names. If a student has any question regarding the HW grades, they may contact their respective graders directly. Upon discussing with the grader, if the student feels that the issue remains unresolved, the student may reach out to the instructor.

7 Course Policies & Campus Resources

7.1 Required Materials and COVID-19 Contingency Plans

This course will be offered in-person only. Registered students (in both sections) are expected to attend the class in person, but are strongly encouraged to have a face covering, so that we have a safe and trustworthy learning environment. The instructor will also teach the class (in-person) using a transparent face-shield in the classroom. All lectures will be recorded in SP'22 via Zoom as a contingency plan, which will be available to all students through CANVAS after the class.

All students are strongly encouraged to get vaccinated (and with a booster shot) against COVID-19. Although there is no requirement to provide proof of immunization, voluntary reporting is strongly encouraged at MyHR. For more details, please visit **https://coronavirus.mst.edu** to learn about the campus policy. If quarantined, or are unable to attend class or take tests on campus due to any illness, students are advised to work through Care Management (cm@mst.edu), 573-341-4209. In case of rampant spread of COVID-19 (or any other infection) in the midst of SP'22, the campus can mandate all the instructors to switch to online instruction, in which case, in-class exams will be replaced by take-home exams.

Students will submit all of their homework assignments via Gitlab, regarding which the instructor will discuss in the first class. All other submissions will be disregarded and will be treated as a no submission. In order for this plan to work successfully, students are mandated to have laptops, web cams, scanners[1] (if submitting a hand-written assignment), headsets, microphones, or other resources to learn in an online synchronous setting. Most of these items are available for checkout from the Service Desk in the library.

7.2 S&Tconnect

S&Tconnect enables students to request appointments with their instructors and advisors via the S&Tconnect calendar, which syncs with the instructor's Outlook Exchange calendar. S&Tconnect tracks each student's performance. S&Tconnect Early Alert enables students to be provided with services. S&Tconnect training is provided by Rachel Morris at rachelm@mst.edu or 341-7600.
https://canvas.mst.edu/ ("Starfish" icon on left toolbar)

7.3 Accessibility and Accommodations

It is the university's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on a disability, please contact Student Disability Services at (573) 341-6655, sdsmst@mst.edu, visit http://dss.mst.edu/ for information.

---

[1]There are several mobile applications available in different platforms that can use the camera in smart devices to scan documents.

7.4 S&T Writing Center

The Writing Center's mission is to assist all students in their efforts to become better writers through structured one-on-one conversations with peer consultants. Writing Center consultants are fellow students whose strong writing skills and special training allow them to offer meaningful feedback and guidance. More information can be found at their website and through email: writing@mst.edu

7.5 Student Success Center

SSC was developed as a campus-wide initiative to foster a sense of responsibility and self-directedness to all S&T students by providing peer mentors, caring staff, and approachable faculty and administrators who are student centered and supportive of student success. The Student Success Center in Toomey Hall was designed for students to visit and feel comfortable about utilizing the campus resources available.

Visit the SSC at 198 Toomey Hall; 573-341-7596; success@mst.edu, or join us on social media @sandtssc

Facebook: https://www.facebook.com/SandTssc,

Web: https://studentsuccess.mst.edu/

7.6 Statement about Copyright, FERPA, and Use of Video

It is vitally important that our classroom environment promote the respectful exchange of ideas. This entails being sensitive to the views and beliefs expressed during discussions whether in class or online. Please obtain instructor permission before recording any class activity. It is a violation of University of Missouri policy to distribute such recordings without authorization and the permission of all who are recorded. More information is provided online at this link: https://www.umsystem.edu/ums/elearning/policies

7.7 Student Well-Being

Link: https://wellbeing.mst.edu/

Student Well-Being provides counseling services, health promotion initiatives, and prevention programs to empower the S&T community to thrive and enhance personal, academic, and professional success. Department office hours are Monday-Friday, 8am-5pm. On the website, you can find information related to individual and group counseling, wellness consultations and trainings, resources for many health and wellness topics, and help for mental health crisis situations.

7.8 UCARE

Link: https://go.mst.edu/ucare-report

Any of us may experience strained relationships, increased anxiety, feeling down, alcohol/drug misuse, decreased motivation, challenges with housing and food insecurity, and any other number of mental health or well-being concerns. If you notice these or other alarming concerns in a friend or fellow student and would like to consult with a Care Manager, please make a UCARE referral for support and assistance.

7.9 Health and Well-Being Canvas Course

Link: https://umsystem.instructure.com/enroll/G3LY3G

The Health and Well-Being Canvas Course features trainings, presentations, and other health and well-being resources for students. One feature of the course is the Miner Well-Being Certification Program, a semester-long certification where participants can engage with campus-wide services and initiatives and develop skills that contribute to personal well-being and student success. Students can enroll in the free, non-credit course at any time.

7.10 Student Honor Code and Academic Integrity

- All students are expected to follow the Honor Code, which can be found at this link: http://stuco.mst.edu/honor-code/

- Page 30 of the Student Academic Regulations handbook describes the student standard of conduct relative to the University of Missouri System's Collected Rules and Regulations section 200.010, and offers descriptions of academic dishonesty including cheating, plagiarism and sabotage (http://registrar.mst.edu/academicregs/index.html), any of which will be reported to the Vice Provost for Academic Support.

- Other resources for students regarding academic integrity can be found at http://academicsupport.mst.edu/academicintegrity/studentresources-ai

7.11 Health and Well-Being CANVAS Course

Link: https://umsystem.instructure.com/enroll/G3LY3G

The Health and Well-Being Canvas Course offers the Miner Well-Being Certification Program, a semester-long certification where participants can engage with campus-wide services and initiatives and develop skills that contribute to personal well-being and student success. Students can enroll in the free course at any time.

7.12 Accessibility and Accommodations

It is the university's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on a disability, please contact Student Disability Services at (573) 341-6655, sdsmst@mst.edu, visit http://dss.mst.edu/ for information.

7.13 Nondiscrimination, Equity, and Title IX

Missouri S&T is committed to the safety and well-being of our campus community, and to creating an environment free from discrimination and harassment. The University does not discriminate on the basis of race, color, national origin, ancestry, religion, sex, pregnancy, sexual orientation, gender identity, gender expression, age, disability, protected veteran status, and any other status protected by applicable state or federal law. As used in this policy, the word "sex" is also inclusive of the term "gender."

Additionally, US Federal Law Title IX states that no member of the university community shall, on the basis of sex, be excluded from participation in, or be denied benefits of, or be subjected to discrimination under any education program or activity. Violations of this law include sexual harassment, sexual assault, dating/domestic violence, and stalking.

In accordance with the University of Missouri's Collected Rules and Regulations, all faculty and staff are required to report any information concerning discrimination disclosed through communication including,

but not limited to, direct conversation, email, social media, classroom papers and homework exercises to the Equity Officer/Title IX Coordinator.

7.13.1   Office of Equity and Title IX

Equity Officer and Title IX Coordinator: Dr. Paul Hirtz
Phone: (573) 341-7734
Location: 900 Technology Drive, Suite 500
E-mail: equity@mst.edu

7.14   Classroom Egress Maps

For all in-person instruction, faculty should explain where the classroom emergency exits are located. Classroom egress maps are posted at http://designconstruction.mst.edu/floorplan/.