Jackson State University
Department of Computer Science
CSC 228 – 201   Data Structures and Algorithms
Fall 2020

Instructor: Dr. Natarajan Meghanathan   **Class Room:** Online
Office: ENB 275   **Class Time:** TR 12 PM to 1.20 PM
Phone: 601-979-3661   **Office Hours:** TR 1.30 PM to 3 PM
Email: natarajan.meghanathan@jsums.edu   (using the 'Zoom' Meeting ID: 852 390 3036)

Catalog Description
CSC 228 (3) Data Structures and Algorithms; Prerequisites: CSC 119 and CSC 225. The concepts of data abstraction and data structures are developed. For the basic data structures of linked lists, stacks, queues, hash tables, graphs, and trees, associated algorithms are described and analyzed. The course also treats recursion, sorting, fundamentals of software engineering, and the philosophy of object-orientation. (F, S).

Course Outcomes
Each student who successfully completes this course should be able to:

CO-1: Analyze the asymptotic and average-case time complexity of the fundamental operations of data structures associated with linear, associative and hierarchical abstract data types through theoretical and experimental analysis

CO-2: Explain the space-time tradeoffs between different data structure implementations for a specific abstract data type and make appropriate design choices based on application data requirements

CO-3: Design and develop general purpose, reusable data structures that implement one or more abstractions

CO-4: Assess the impact of the choice of data structures on the performance of algorithm(s) developed for a specific application

CO-5: Analyze the performance of the iterative and/or recursive implementations of the classical search, sorting and traversal algorithms for data structures

Textbook
M. A. Weiss, "Data Structures and Algorithm Analysis in C++," 4th Edition, Pearson, 2013, ISBN: 013284737X.

Course Website
http://www.jsums.edu/nmeghanathan/csc228-Fall2020/
Students are required to attend every class and frequently check the course website for latest updates regarding the course. All announcements, lecture materials for all modules, programming projects, reading assignments, sample questions and quiz solutions will be posted in the course website. Note that the course website can also be accessed by visiting the website http://www.jsums.edu/nmeghanathan and clicking on the CSC 228 Course link in the list of courses for Fall 2020.

Canvas
Students are required to check the Canvas site for the course. Some of the assignments/quizzes and exams would need to be answered through Canvas. All the project submissions should be done through Canvas. NO LATE SUBMISSIONS will be accepted for any reason.

Evaluation

Exams – 60% (4 Exams; 15% for each Exam). Some exams will involve programming.

Assignments – 40% (8 Assignments; 5% for each Assignment): An assignment could be either a programming project or an online quiz (Canvas). All assignments are to be done individually.

Assignments and Exams Calendar: Unless otherwise notified, we will stick on to the following dates for the assignments and exams.

	Tuesday	Thursday
Week 1	08/18	08/20
Week 2	08/25	08/27
Week 3	09/01	09/03
Week 4	09/08, Assignment 1	09/10
Week 5	09/15, Assignment 2	09/17
Week 6	09/22	09/24, Exam 1
Week 7	09/29, Assignment 3	10/01
Week 8	10/06, Assignment 4	10/08
Week 9	10/13	10/15, Exam 2
Week 10	10/20, Assignment 5	10/22
Week 11	10/27, Assignment 6	10/29
Week 12	11/03, Assignment 7	11/05, Exam 3
Week 13	11/10, Assignment 8	11/12
Week 14	11/17	11/19, Exam 4

Assignment Report Submissions: All assignment/project reports should be submitted through Canvas. The report should include all the programs and the submission items stated in the assignment description.

Program Outcomes
Each student who graduates from the Undergraduate program in Computer Science will be able to:
(1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
(2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
(3) Communicate effectively in a variety of professional contexts.
(4) Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
(5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
(6) Apply computer science theory and software development fundamentals to produce computing-based solutions.

Mapping of CSC 228 Course Outcomes to Program Outcomes

	CO-1	CO-2	CO-3	CO-4	CO-5
(2)		X		X	
(6)	X		X		X

Course Outline (Tentative)

Week #	Topics to be Covered	Course Outcomes
Week 1	Module 1: Asymptotic time complexity; Best, Worst and Average-case analysis; Order of growth; Introduction to ADTs; Recursion examples	CO-1
Week 2	Module 2: List ADT: Implementation of static and dynamic list using arrays	CO-2
Week 3	Module 2: List ADT: Implementation using singly linked lists and comparison with arrays; Doubly linked list	CO-2
Week 4	Module 3: Stack ADT: Implementation using arrays and linked lists	CO-2, CO-3
Week 5	Module 3: Stack ADT: Applications (evaluation of expressions, checking for balanced parenthesis)	CO-4
Week 6	Module 4: Queue ADT: Implementation using arrays and linked lists	CO-2, CO-3
Week 7	Module 5: Hash tables: Implementation using arrays and applications	CO-2, CO-4
Week 8	Module 6: Binary trees: Construction algorithm and its implementation; Height-balanced binary trees; Traversal algorithms	CO-5
Week 9	Module 7: Binary search trees: Construction algorithm and its implementation; Applications of binary search trees	CO-4, CO-5
Week 10	Module 8: Priority Queue ADT: Implementation using heap; Heap construction and Heap sort algorithm	CO-3
Week 11	Module 9: Graphs: Adjacency list, Adjacency matrix, Depth first search algorithm and its implementation for undirected graphs	CO-1, CO-5
Week 12	Module 9: Graphs: Implementation of Depth first search algorithm for directed graphs; Directed acyclic graphs and topological sort	CO-1, CO-5
Week 13	Module 9: Graphs: Breadth first search algorithm and its implementation	CO-5
Week 14	Module 9: Graphs: Applications of Breadth first search algorithm	CO-5

Grading Scale

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
Below 60	F

Reference Books

No.	Book Title/ Edition, Year	Authors	Publisher	ISBN
1	Introduction to Algorithms, 3rd Edition, 2009	T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein	MIT Press	0262033844
2	Algorithms, 4th Edition, 2011	R. Sedgewick and K. Wayne	Addison-Wesley	032157351X
3	The Algorithm Design Manual, 2nd Edition, 2008	S. S. Skiena	Springer	1848000693
4	Algorithms, 1st Edition, 2006	S. Dasgupta, C. Papadimitriou and U. Vazirani	McGraw-Hill Science	0073523402
5	Algorithm Design: Foundations, Analysis and Internet Examples, 1st Edition, 2001	M. T. Goodrich and R. Tamassia	Wiley	0471383651

6	Data Structures and Algorithms in Java, 6th Edition, 2014	M. T. Goodrich, R. Tamassia and M. H. Goldwasser	Wiley	1118771338
7	Data Structures and Algorithms in C++, 2nd Edition, 2011	M. T. Goodrich, R. Tamassia and D. M. Mount	Wiley	0470383275
8	Data Structures and Algorithms in C++, 4th Edition, 2012	A. Drozdek	Cengage Learning	1133608426
9	Algorithm Design, 1st Edition, 2005	J. Kleinberg and E. Tardos	Addison-Wesley	0321295358
10	Data Structures, Algorithms, and Applications in Java, 2nd Edition, 2004	Sartaj Sahni	Silicon Press	0929306333

ADA Statement

Compliance with the Americans with Disabilities Act: "It is the university policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact their instructors to discuss their individual needs for accommodations."

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and ADA Coordinator (as early as possible in the term) located in the Jacob L. Reddix Building (old student union), rooms 101 and 102. The office hours are: 8:00 a. m. to 5:00 p.m., Monday through Friday. The telephone number is (601) 979-3704 or (601) 979-6919 (TTY) and the facsimile number is (601) 979-6918. The mailing address is: Office of Support Services for Students and Employees with Disabilities, P.O. Box 17156, Jackson State University, Jackson MS 39217.

Diversity Statement

Jackson State University is committed to creating a community that affirms and welcomes persons from diverse backgrounds and experiences and support the realization of their potential. We recognize that there are differences among groups of people and individuals based on ethnicity, race, socioeconomic status, gender, exceptionalities, language religion, sexual orientation, and geographical area. All persons are encouraged to respect the individual difference of others.

Collegiate Code of Conduct

Jackson State University students are expected to dress in a manner representative of higher education institution. More information on Dress Code; Verbal and/or Physical Harassment; Indecent, Obscene, Immoral Behavior and/or Profanity is available in the JSU Student Handbook. The JSU Student Handbook is available at http://www.jsums.edu/~studentlife/handbook.pdf

Dropping a course

The last day to drop a course with no grade: August 28, 2020
The last day to drop a course with "W" grade: October 23, 2020

Course Policies

Note: The course policies will be strictly adhered to. Students are expected to be aware of the course policies throughout the semester.

Exam/ Assignment Dates
- Unless otherwise notified, we will stick on to the dates for the assignments and exams listed in Page 2 of this syllabus. All assignments and exams would need to be submitted through Canvas.

Late submissions
- **Late submission of assignments/exams will not be accepted.**

Make-up Assignments/Exams
- No Make-up Quizzes/exams/projects will be given. If a student misses an assignment for ANY reason, the student gets a score of 'zero' for the assignment and no make-up assignment will be given.
- **No make-up examinations will be given except for emergencies such as death in the family or serious illness. The instructor must be informed, through e-mail or a written request, BEFORE the time of the examination that is to be missed.** The instructor will make a decision on the make-up examination after verifying the appropriate written documentation. Failure to furnish, written, verifiable documentation will result in a grade of zero for the missed examination.
- **Any make-up exam for a missed exam has to be taken before the next class meeting time.**
- **A make-up exam will be different and will be relatively tough compared to the actual missed exam.**
- **NO MAKE-UP EXAM WILL BE GIVEN FOR THE FINAL EXAM. Students are required to take the final exam during the date and time specified by the university.**

Contesting Grades
- Grades for a particular exam or assignment can be contested only within a week after the grades for that exam/assignment are announced.
- Grades for the final exam will have to be contested within two days after the exam.
- The grade for the overall course will have to be also contested within two days after the final exam. Any change of grade requested by the student 48 hours after the completion of the final exam will not be considered.

Maintaining Registration Status
- It is the duty of the student to make sure that he/she stays registered in the course throughout the semester. If a student sees he/she is dropped from the course without his/her knowledge, the student should notify the instructor before the next meeting of the class.
- A student cannot attend a class or take an exam/quiz if the student is not registered for the course at that point of time.

Dropping the Course
- The last date to drop the course without any grade is August 28, 2020. The last date to drop the course with a "W" grade is October 23, 2020.
- The instructor will not assist in any way to get the student dropped with no grade or "W' grade after the above dates.

Anticipated Leave
- If a student is anticipating any medical emergency (like surgery, pregnancy, etc.), conference participation, game participation, etc. during the course of the semester, the student should furnish the appropriate medical documents, conference registration receipt, letter from the coach, etc, and discuss with the instructor within the first two weeks of the course on how to make up for the classes/exams/assignments that will be missed.
- The instructor will make a decision on the make-up examination after verifying the appropriate written documentation. Failure to furnish, written, verifiable documentation will result in a grade of zero for the missed examination.
- The instructor will give a different set of assignments, projects and make-up exams than the ones given in class.
- **The student is responsible for the materials covered in a class that he/she misses.**

Other Course Policies
- If a student leaves the classroom during a quiz or exam for any reason, the student's exam paper will be collected, and thus he/she will not be able to resume the testing after coming back to the room. Inform the instructor if any health problem prevents you from remaining in the classroom until you complete the quiz or exam.
- Students should not use cell phone and/or laptop during lecture time for purposes other than those related to the course.

- Students found to be disturbing the class during lecture time could be asked to leave the class for the remaining lecture time of the day.

Cheating

- Student(s) found to have involved in cheating (e.g., copying work) for even one question in an exam/quiz/project will get a ZERO for the entire exam/quiz/project. All the students involved (i.e., those who copied the work of others as well as those who did the work and shared with others) in copying will get a ZERO for the entire exam/quiz/project.

Explaining the Submitted Work/Code

- Student(s) should be able to explain their work/code any time (after submission) when the instructor questions them. Failure to adequately explain the submitted work/code will result in a ZERO for the corresponding exam/quiz/project.

Student Conduct and Class Attendance Policy

Students at Jackson State University must fully commit themselves to their program of study. One hundred percent (100%) punctual class attendance is expected from each student for all the scheduled classes and activities. The instructor will be maintaining the attendance record and any absence of a student without providing any written official excuse, is counted as an unexcused absence. Irrespective of the type of excuse (i.e., official or unofficial), the student is responsible for the work required during their absences.

The instructor will call the roll at the beginning of the class. Also, the instructor will pass an attendance sign-up sheet to each student. Students coming late to the class by more than 10 minutes will be marked "Absent".

Students may be officially excused from class for attendance at University approved functions provided the sponsor properly executes a Student Affairs Leave Form. The instructor shall accept such excuses. The Dean of the School or the Vice President for Academic Affairs may also officially excuse students for certain campus activities. Students must submit written documentation to Student Affairs to obtain official excuses for absences due to illness or other emergency situations. Students who willfully miss class face serious consequences. After being absent four times in a 80-minute class, one time immediately before or after a scheduled recess/holiday, the instructor shall report the next unexcused absence to the Dean of University College for freshmen and sophomores and to the School Dean and Department Chair for Juniors and Seniors. The Dean/Chair or designee will counsel with the student and in concert with the instructor, may require the student complete complimentary course assignments. If a student does not respond well to the counsel or with the assignments, the instructor may impose a grade penalty on the student. Unexcused absences that exceed the equivalency of four 80-minute sessions may lead to an "F" for the course.

Academic Honesty

All acts of academic dishonesty (e.g., cheating on exams, plagiarizing – presenting another person's work as one's own, having another person write one's paper, making up research data, presenting excuses which are untrue for failing to meet academic and professional standards) are a violation of engineering values, ethics, and University policy, which will entail appropriate penalties.

Policy Regarding Course Incompleteness

Incomplete is the designation used to indicate failure to complete assignments or other course work including final or other examinations, by the end of the term in which the student is enrolled. The grade of incomplete "I" is recorded when the student has not completed the course due to some unavoidable reason that is acceptable by the instructor. An incomplete grade "I" is to be considered only when the majority of the course requirements and the assignments have been successfully completed and there is a documented crisis situation of illness, accident, or other occurrence which prevents a student from completing the remaining requirements before the school term ends. The incomplete grade "I" is not a substitute for the failure grade "F".

The instructor is required to indicate on the grade sheet the grade the student should receive if the incomplete is not removed within the prescribed time. If the student fails to complete the course requirements satisfactorily within the specified time, the alternate grade will be recorded as the grade of record.