CS302 Course Syllabus
Spring 2019

Course Description
- Catalog: Data structures and algorithms fundamental to computer science; abstract data-type concepts; measures of program running time and time complexity; algorithm analysis and design techniques

Prerequisites
- Courses: CS202 (Computer Science II) with a C or better

Topics: a good working knowledge of C++ programming up through recursion, dynamic memory and basic data structures such as stacks, queues, and linked lists.

Course Objective
- Students will demonstrate an understanding of data structures, how to apply them in practical problems, and how to analyze their performance.

Requirement or Elective
- This course is required for the BS CSE Program

Instructor: Dr. Kostas Alexis
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- Office: SEM202
- Web page: www.autonomousrobotslab.com
- Office Hours: Monday & Tuesday 10.30am-12.30pm

Teaching Assistants: Shehryar Khattak, Mustafa Solmaz, Bishal Sainju
- Wednesday 10am – 1pm: Mustafa Solmaz, SEM211
- Thursday 2pm – 5pm: Tung Dang, ARF003
- Friday 10am – 1pm: Mustafa Solmaz, SEM211

Lectures
- Monday, Wednesday: 2.30pm-3.45pm | WRB2003

Labs
- N/A

Important Notes and Dates
- Final Exam: TBD!

Course Requirements
- Exams, Quizzes, Programming Assignments – all these count towards your final grade as further detailed below.

Advised Textbooks
- Data Abstraction & Problem Solving with C++: Walls and Mirros, (7th edition) by Frank M. Corrano and Timothy Henry, Pearson, 2017
- C++ Data Structures: A Laboratory Course, (3rd edition) by Stefan Brandle, Jonathan Geisler, James Roberge, David Whittington; Jones and Bartlett, 2009
- Data Structures with C++ using STL, (2nd edition), William Ford and Wiliam Topp, Prentice Hall

Topics (Tentative)
- Data Abstraction
- Recursion
- Array- and Link-Based Implementations
- Recursion as a Problem-Solving Technique
- Stacks
- Lists
- Algorithm Efficiency
- Sorting (Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, Radix sort, Counting sort, Bucket sort)
- Queues and Priority Queues
- Trees (Binary Search Tree, Interval Tree, MDS Tree)
- Heaps (Heap ADT and Heap Sort)
- Dictionaries (Dictionary ADT, Hashing)
- Balanced Search Trees (2-3 Trees, 2-3-4 Trees, Red-Black Trees, AVL Trees)
- Graph (Breadth-first search, Depth-first search, Minimum Spanning Tree, Bellman-Ford shortest path, Dijkstra shortest path, Circuits)
- Processing Data in External Storage

This is a tentative list of topics, subject to modification and reorganization.

Indicative Lectures Outline
- Lecture 1: Overview & Intro
- Lecture 2: C++ classes and Data Abstraction
- Lecture 3: Recursion, Recursion with Arrays, Array-based Implementation, Memory Allocation
- Lecture 4: Link-based Implementation
- Lecture 5: Stacks
- Lecture 6: Lists
- Lecture 7: Algorithm Analysis
- Lectures 8-11: Sorting Algorithms
- Lecture 12: Queues
- Lectures 13-15: Trees
- Lecture 16: Heaps
- Lecture 17: Dictionaries
- Lectures 18-20: Balanced Search Trees
- Lectures 21-22: Graphs
- Lecture 23: Processing Data in External Storage
- Additional Lectures: Using the STL

Organization
WebCampus and the website http://www.autonomousrobotslab.com/cs302---data-structures.html will be used to distribute the course material.

Students are expected to turn in all assigned materials in a timely manner.

UNR Athletics: If you are involved with any university-sponsored athletic activities that will have an impact on your attendance, please provide your Instructor with a letter from your coach and/or the UNR Athletic Department as soon as possible, but no later than the end of the second week of classes. This should include the official schedule of your activities which will impact your attendance throughout the semester.

Assignments, Examinations and Grading: All formal homework assignments (including exercises and projects) and all exams (quizzes, exams, and the final) are to be treated as individual and not collective efforts, unless specified otherwise. A severe penalty will be given to any assignment which indicates collusion or cheating. The usual penalty for cheating on project or an exam is failure in the course.

Assignments and exams must be prepared strictly individually. You are welcome to discuss the problems or solution strategies with your class mates but the resulting work should be your own. Copying from each other or from other sources is considered as cheating.

Homework Assignments: Homework assignments will be distributed at the instructor or TAs discretion. These consist of practice questions which are intended to assist the student in mastering the course content. Some of these assignments will be collected and graded (Canvas) and count towards extra credit.

Quizzes: There will be several announced and unannounced quizzes in lecture and online (Canvas).

There will be approximately 10 quizzes given almost every week. Questions in these quizzes will be designed to give you an opportunity to test and affirm your knowledge for the week's material.

Exams: There will be one mid-term examination and one final examination. All exams will be closed books, closed notes. Permissions to take exams on other dates than scheduled will not be given, except for extreme medical or family emergencies with respective documentation. Please ensure that the instructor and TAs are notified at the earliest possible convenience. All exams will take place in the regular classroom.

The material covered in the exams will be drawn from the lectures, quizzes, and homework. The exams will be closed books and closed notes but a single page cheat sheet (double side letter size) is allowed. No calculators (unless otherwise stated) and no other computing devices should be used during the exam.

Programming Assignments/Labs: The Programming Assignments/Labs require the solutions to problems using the computer. We will be using the workstations in the College of Engineering Computing Center (SEM 231) – at least nominally (in the sense that they allow you to code for the assignments). You will be instructed how to submit your projects for grading. Typically, you will be asked to submit an electronic version of your code, and test runs, along with a folder with an appropriate write-up for your program.

There will be approximately 8 (and 1-2 optional) programming assignments. In the lectures, you will be introduced to data structures at an abstract level. In the assignments, you will write code to implement and use these data structures. Assignments will require turning in C/C++ code that compiles and runs properly, and a report documenting the code. Some of the programming assignments may be done in groups of two. When working with a partner, both team members are expected to fully understand the structure of the code and the implemented algorithms. Discussion of the programming assignments is allowed and encouraged. However, students are expected to do their own work.

Every assignment must be completed, working, and turned in. There will be 3 points penalty for each missing programming assignment or submissions with grades less than 5 points (without late penalty). Late assignments will be penalized by 20% 10% per day, except holidays.

Programming assignment completion is essential for learning in this course.

Grading (Tentative)
Both grading policy and scale are subject to change. Failure in either the assignments or the tests will result in failure in the course.
Grading Policy
- 45 - Programming Assignments (N-1, N the number of assignments)
- 10 - Quizzes (M-2, M the number of quizzes)
- 20 - Midterm Exam
- 25 - Final Exam

Grading Scale (Tentative)
- A : [92 - 100]
- A- : [88 - 92)
- B+ : [84 - 88)
- B : [80 - 84)
- B- : [76 - 80)
- C+ : [72 - 76)
- C : [68 - 72)
- C- : [64 - 68)
- D+ : [60 - 64)
- D : [56 - 60)
- D- : [52 - 56)
- F : [0 - 52)

Important Note: You will have one week to appeal for your grades after the graded assignments/tests are returned. So, please keep this in mind if you think that there is a problem/issue with the grading of your work.

ABET Criteria
The course outcomes are skills and abilities students should have acquired by the end of the course. These outcomes are defined in terms of the ABET Accreditation Criterion 3 Program Outcomes which are relevant to this course.
Our graduates will have achieved:
(3) an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs, within realistic constraints specific to the field.
(4) an ability to function effectively on multi-disciplinary teams.
(7) an ability to communicate effectively with a range of audiences.
(9) a recognition of the need for, and an ability to engage in continuing professional development and life-long learning.
(10) a knowledge of contemporary issues.

Student Learning Outcomes
- SLO1: Students will have an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- SLO2: Students will have an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- SLO3: Students will have an ability to communicate effectively with a range of audiences.

University Policies

Statement on Academic Dishonesty
 "Cheating, plagiarism or otherwise obtaining grades under false pretenses constitute academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include filing a final grade of "F"; reducing the student's final course grade one or two full grade points; awarding a failing mark on the coursework in question; or requiring the student to retake or resubmit the coursework. For more details, see the University of Nevada, Reno General Catalog."

Statement of Disability Services
Use either the traditional or online statement, in addition to the last sentence regarding on third party materials.

For Traditional and Seated Classrooms
"Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the Disability Resource Center (Pennington Achievement Center Suite 230) as soon as possible to arrange for appropriate accommodations."

For Online Courses
"If you are a student who would normally seek accommodations in a traditional classroom, please contact me as soon as possible. You may also contact the Disability Resource Center for services for online courses by emailing drc@unr.edu or calling 775-784-6000. Academic accommodations for online courses may be different than those for seated classrooms; it is important that you contact us as soon as possible to discuss services. The University of Nevada, Reno supports equal access for students with disabilities. For more information, visit the Disability Resource Center."
This course may leverage 3rd party web/multimedia content, if you experience any issues accessing this content, please notify your instructor.

University Math Center (UMC)
The University Math Center (UMC) is focused on helping students with mathematical and statistical concepts. While mathematics is used extensively in engineering, the UMC does not have the resources to help students with engineering courses. Engineering students are encouraged to use the UMC for help in their math classes, and they are welcome to use its computer lab and study area any time –regardless of course. However, UMC tutors cannot answer questions regarding engineering courses.

Statement on Audio and Video Recording
 "Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded."
The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information related to immigration concerns, please contact the University's Equal Opportunity & Title IX office at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit the Equal Opportunity and Title IX page.
In addition to the required information listed above, it is strongly recommended that the syllabus include:

Methods for communicating with students outside the classroom regarding matters such as class cancellations, meeting times, or room changes

More detail about what constitutes academic dishonesty, with a concrete list or examples of "dos and don'ts" in the context of the class

Statement for Academic Success Services: "Your student fees cover usage of the Math Center (775) 784-4433, Tutoring Center (775) 784-6801, and University Writing Center (775) 784-6030. These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student."