University of Oklahoma
Data Science and Analytics
DSA/CS 5005: Computing Structures
Course Syllabus
Fall 2022– 5 credit hours

Data Structures (DS) Instructor
Dr. Sridhar Radhakrishnan
Email: sridhar@ou.edu
Office Hours:
  Will be held on Zoom(click to join)
  Every Monday and Wednesday
  By appointment from 3:30 pm and 4:30 pm

Discrete Mathematics (DM) Instructor
Dr. Sudarshan Dhall
Email: sdhall@ou.edu
Office Hours:
  Will be held on Zoom(click to join)
  Every Tuesday and Thursdays
  By appointment from 6:30 pm and 7:30 pm

Teaching Assistants:

  Aditya Narasimhan
  Email: adinaras@ou.edu
  Office Hours:
    Will be held online on Zoom(click to join)
    Every Monday and Wednesday
    5:00pm – 6:30pm

Learning Management System: canvas.ou.edu and gradescope.com

Course Meeting Time and Location
Fully online. See course schedule below.

Course Prerequisite
For students enrolled in MS in DSA Program; all other students need special permission

Course Description
This course addresses discrete mathematics, object-oriented programming in C++, and data structures in C++. As part of the discrete mathematics students will be introduced to combinatorics, logic, relations, functions, computational complexity, automata, and graph theory. Students will be introduced to the fundamentals of object-oriented programming and learn to design, build, and analyze data structures using object-oriented principles and techniques.

Course Overview
This course is organized by week and is divided into two main sections: (1) Data Structures (DS) and (2) Discrete Mathematics (DM). In addition to watching screencasts,

reading texts and taking notes, you will have weekly homework assignments (DM), three programming projects (DS), a mid-term and a final exam.

Texts:
1. For Data Structures (you must [purchase this book](#))
   Radhakrishnan, S., Wise L., and Sekharan, N. 2013. *Data Structures Featuring C++: A Programmer's Perspective.*

2. For Discrete Mathematics (this content is available for free on the Canvas platform)
   Doerr, A. and Levasseur, K. 2013. *Applied Discrete Mathematics.*

Materials
To get the most out of this course, you will need to make sure that you have the following hardware, software or web accounts:

• Webcam	• B Virtual Proctoring account
• Calculator	• Zoom account from OU
• [Wolfram CDF Player](#)	• Respondus LockDown Browser.
• Access to scanner or scanning App to PDF	• Adobe Acrobat PDF reader
	• Updated browser
• C++ Compiler	

Expectations
This is a very intensive course. You are expected to reserve AT LEAST three to four hours *every day* to watch the lectures, take notes, read the texts, do the self-checks, and complete the homework assignments and projects.

All assignments and exams must be uploaded in the GradeScope system by the due date and time stipulated in the platform. Ensure your familiarity with the GradeScope system in advance, and allot a sufficient amount of time for assignment submission and any technical difficulties that may arise.

If you need to reach either of us, you can initiate a private IM Chat through the Canvas platform or join us on Google Hangouts during our office hours. If you need to email us, please put "CS 5005-" in your subject line as a prefix. For example, your subject line could be "CS 5005-Syllabus" or "CS 5005-Project Question".

DM Homework
You will have weekly homework assignments for Discrete Mathematics. You may work out your homework assignments by hand, with pen/pencil and paper. Submitting handwritten homework assignments will require the use of a scanner or smart phone-scanning app. Each device is hyperlinked.
- Evernote Scannable ([iOS](#))
- Tiny Scan ([Android](#) & [iOS](#))

- Genius Scan ([Android](#) & [iOS](#))
- Handy Scan ([Windows Phone](#))
- You may also use iOS's scanning feature on the native Notes app

There are tutorials for the scanning apps available on Lynda.com, which you can access for free. Just sign in with your OU 4x4 and password (http://www.lynda.com/Android-tutorials/Using-PDF-scanner-mobile-apps/183383/367929-4.html).

A specific naming convention is required for homework submissions, where X is the assignment number: **hwX_lastname_firstname.pdf.** Handwriting should be legible and easy to understand (e.g. not too small, not too light, not too dense, not too close to the margin). Be sure to clearly label each problem. The instructor should not have any difficulty in interpreting the problem being graded, solution techniques or answers due to a lack of organization or neatness. Further, the technology used to scan the submission (a scanner or scanning app for smart phone or tablet) should effectively provide legible results. Any confusion in interpreting the answer to a problem (whether the fault of the student or technology) will result in zero credit for that problem.

DS Programming Projects

Projects have to be coded in C++. Make sure that the C++ code you write and submit can be compiled using C++ complier. Microsoft provides a free version of the development environment (Visual Studio Express).

You can download this Express 2017 for Windows Desktop by clicking on the link https://www.visualstudio.com/en-US/products/visual-studio-express-vs.
For mac users you can follow the link http://www.stroustrup.com/compilers.html. This provides access to several free compilers.

Your programming projects will be evaluated as follows:
1.   For every 24 hours late, you will be deducted 10% of the grade of the programming project. Any project that is more than 5 days late will not be evaluated.
2.   A programming project that does not meet the specifications will receive an automatic deduction 50% of the grade.
3.   You are better off submitting a working project on the fifth day rather than one that does not on the day it is due.
4.   Programs have to be documented clearly. Programs that lack sufficient documentation will receive a deduction of up to 30% of the grade. Follow the documentation methods that were used in programs presented in your data structures book.
5.   The specification for the projects presented by the instructor may not contain all the details of implementation. It is your responsibility to understand the specifications thoroughly.
6.   Copying programs or consulting others for coding is strictly prohibited.
7.   Apart from the above general policies for evaluating, each programming project will also have a set of specifications that should be met.
8.   All programming projects will be checked for plagiarism using an automated tool.

A specific naming convention will be required for Project submissions, where X is the project number: **hwX_lastname_firstname.**

Exams
The mid-term and final exams will cover materials from both DS and DM. Failure to take the final exam will result in an automatic "F" for the course. Exams will be open for a 12-hour window on the exam date. You have 90 minutes to complete the mid-term and 2 hours for the final.

Exams will be taken through the Canvas platform on Zoom.

Once the exam is activated on Canvas, students will have a limited amount of time to complete it. Please note the exam period INCLUDES the scanning and uploading of handwritten notes, so allow sufficient time to upload these documents to the Canvas platform. The system will record the time a student retrieves the exam and when the exam is finally submitted, but the platform offers no timekeeping function for the student. As such, it is incumbent upon you to monitor your own examination pace and ensure that submission is on time. We reserve the right to release the final exam scores. You can request if you are wanting to know your score.

Course Grading
The course letter grade will be assigned based on the overall percentage: 90-100 (A), 80-89 (B), 70-79 (C), 60-69 (D), and < 60 (F). The allocation of percentages is given below:

	Percentages
Discrete Math Homework Assignments	20%
Discrete Math Final Exam	20%
Data Structures Projects	35%
Data Structures Final Exam	25%

Technical Support
The instructor and teaching assistant will not be able to help with issues related to the platform. Requests for platform assistance should be directed to the Canvas Support Live Chat. For OU IT support, please phone (405) 325-HELP or email **needhelp@ou.edu**.

Course Policies

Late Policy
Work submitted *five days* or more after the due date will NOT receive credit. You will earn 0 points for the assignment or exam.

Attendance
Since this is a fully online class. You are expected to view all lectures and complete all readings throughout the course.

University Policies

Academic Integrity

Cheating is strictly prohibited at the University of Oklahoma, because it devalues the degree you are working hard to get. As a member of the OU community it is your responsibility to protect your educational investment by knowing and following the rules. For specific definitions on what constitutes cheating, review the Student's Guide to Academic Integrity at http://integrity.ou.edu/students_guide.html.

To be successful in this class, all work on exams and quizzes must be yours and yours alone. If you become aware of a fellow student engaging in suspicious behavior, I encourage you to report it to us or directly to the Office of Academic Integrity Programs. That student is devaluing not only their degree, but yours, too. Be aware that it is our professional obligation to report academic misconduct, which we will not hesitate to do. Sanctions for academic misconduct can include expulsion from the University and an F in this course, so don't cheat. It's simply not worth it.

Religious Observance

It is the policy of the University to excuse the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays, without penalty.

Reasonable Accommodation Policy

Students requiring academic accommodation should contact the Disability Resource Center for assistance at (405) 325-3852 or TDD: (405) 325-4173. For more information please see the Disability Resource Center website http://www.ou.edu/drc/home.html Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

Title IX Resources and Reporting Requirement

For any concerns regarding gender-based discrimination, sexual harassment, sexual misconduct, stalking, or intimate partner violence, the University offers a variety of resources, including advocates on call 24/7. To learn more or to report an incident, please contact the Sexual Misconduct Office at 405-325-2215 (8 to 5, M-F) or OU Advocates at 405-615-0013 (24/7). Also, please be advised that a professor/GA/TA is required to report instances of sexual harassment, sexual assault, or discrimination to the Sexual Misconduct Office. For more information, please see http://www.ou.edu/eoo.

Adjustments for Pregnancy/Childbirth Related Issues

Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact your professor or the Disability Resource Center at 405-325-3852 as soon as possible. Please see http://www.ou.edu/eoo/faqs/pregnancy-faqs.html for answers to commonly asked questions.

<u>COVID - 19 policies</u>

For information about the changes to the course from the University side, please keep yourself updated from OU's learn anywhere website - https://www.ou.edu/learnanywhere .

Tentative Schedule – Fall 2021

Week	Type	Topic	Assigned	Due
Week 1: **August 22 - August 26**		**Unit 0 and Unit 1**		
		Unit 0 – Course Intro		
	DS	Unit 1 – 1.1 C++	**Project 1**	*Sept. 9*
	DS	Unit 1 – 1.2 Intro to Object-Oriented Programming		
Week 2: **August 29 – September 2**	DM	**Unit 2**		
	DM	2.1 Set Theory	**DM HW-1**	*Sept. 6*
	DM	2.2 Combinatorics		
Week 3: Sept. 5 -Sept. 9	DM	**Unit 3**		
	DM	2.3 Logic	**DM HW-2**	*Sept. 13*
	DM	3.2 More on Sets		
	DM		**Project 2**	*Sept. 30*
Week 4: **Sept. 12 - Sept. 16**	DM	**Unit 4**		
	DM	3.2 Relations and Graphs	**DM HW-3**	*Sept. 20*
	DM	3.3 Graph Theory		
	DM	4.1 Trees		
Week 5: **Sept. 19 - Sept. 23**	DM	**Unit 5**		
	DM	4.2 Functions	**DM HW-4**	*Sept. 27*
	DM	4.2 Recursion and Recurrence Relations		
Week 6: **Sept. 26 – Sept. 30**	DM	**Unit 6**		
	DM	5.1 Generating Functions	**DM HW-5**	*Oct. 4*
	DM	5.2 Number Theory		
Week 7: Oct. 3 - Oct. 7	DS	**Unit 7**		
	DS	**Discrete Math Final Exam**		*Oct. 7*
Week 8: Oct. 10 - Oct. 14	DS	**Unit 8**		
	DS	7.1 Algorithms and Recursion	**Project 3**	*Oct. 21*
Week 9: Oct. 17 - Oct. 21	DS	**Unit 9**		
	DS	8.1 Arrays, Strings, Matrices and Vectors		
Week 10: **Oct. 24 - Oct. 28**	DS	**Unit 10**		
	DS	9.1 Linked List Structures	**Project 4**	*Nov. 4*
	DS	9.2 Stacks and Queues		
Week 11: Oct. 31 - Nov. 4	DS	**Unit 11**		
	DS	10.1 Simple Search Trees		
Week 12: **Nov. 7 - Nov. 11**		**Unit 12**		
	DS	11.1 Self-Modifying Search Trees	**Project 5**	*Nov. 18*
Week 13: Nov. 14 – Nov. 18		**Unit 13**		
	DS	11.2 Priority Structures		
		12.1 Sorting		
Week 14: Nov. 21 - Nov. 25		Thanksgiving week		
Week 15: Nov. 28 - December 2		**Unit 15**		
	DS	14.1 Hashing	**Project 6**	*Dec. 9*
	DS	15.1 Graphs		
Week 16: Dec. 5 - Dec. 9		**Unit 16**		
		Dead week		
	DS	**Data Structures Final Exam**		*Dec. 13*