# Computer Science 243, Discrete Structures
# Spring 2022 Syllabus

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**General Information** | Delivery | Assignments | Exams | Course schedule

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| Course: | CS 243 |
| Title: | Discrete Structures |
| Semester: | Spring 2022 |
| Delivery: | Lectures: in-person (also remote synchronous). Office hours: remote synchronous |
| Time: | MWF 10-10:50 EST Zoom Live lecture link |
| Office hours/Link: | Mon 11:30am-1:00pm, WF 1:00-2:00pm Zoom Office hours link |
| TA, TA office hours/Link: | Michael Kolacki, (makolacki@email.wm.edu) MWF 4:00-5:00pm Zoom TA office hours link |
| Prerequisite: | CS 141 -- Computational Problem Solving |
| Add-drop dates: | Jan 25 - Feb 4 |
| Withdraw dates | Feb 5 - Mar 28 |
| Textbook: | Kenneth H. Rosen, Discrete Mathematics and Its Applications, 7th edition, McGraw Hill, 2012 |

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**Catalog Description:** Theoretical foundations of computer science, including sets, functions, boolean algebra, first order predicate calculus, trees, graphs, and discrete probability.

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**Why this course?** From bits, to integers, to enumerations, to sets, to the steps of a program, discrete quantities play a central role in Computer Science. To solve problems with computers, we use logic and mathematical reasoning to create sequences of such discrete quantities (programs that manipulate data) that when run on a computer produce the desired outcome. But how do we know we have covered all possible cases? How do we know that the structures we have created correspond to the problem we want to solve? How do know that the method we have provided is possible, efficient, or, most importantly, correct? The goal of this course is to provide you with the necessary mathematical background needed to start answering these questions.

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**Requirements**

- There will be about twelve (12) written homework assignments, assigned on a weekly basis, which account for 40% of your final grade. In the end, the homework with the lowest grade will be dropped. These assignments do not involve any programming, and will help you better understand the material taught in the class. For more information, follow the link "Assignments" at the top of this page.
- There will be two in-class tests accounting for 30% of your final grade. For more information, follow the "Exams" link at the top of this page.
- There will be a final exam accounting for 30% of your final grade. For more information, follow the "Exams" link at the top of this page.

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**Honor Code**
When you joined W&M you took the Honor Pledge:

> As a member of the William & Mary community, I pledge on my honor not to lie, cheat, or steal, either in my academic or personal life. I understand that such acts violate the Honor Code and undermine the community of trust, of which we are all stewards.

I trust that you will honor that pledge, and that you will follow and abide by the instructions for all work you will do for the class, including tests and homeworks. Violations of the honor code will be reported to the Honor Council as per College rules.

The Honor Code applies on all assignments, projects and exams. Specifically:

- For the homework assignments you may talk about the problem with fellow students, the TA, and the instructor, but *the write-up must be yours*. In particular, when discussing with fellow students you must strictly follow the "empty hand policy": You cannot leave a discussion meeting with any record of the discussion (hard copy or electronic). All scratch paper must be torn and thrown away, boards erased, zoom meetings not recorded, etc. In your homework write-ups, you should also give credit to your collaborators for each problem. Finally, you may neither consult students that have taken the course previously, nor their completed work.
- For the written assignments, you are allowed to consult other books, papers, or published material. The Web is also considered a publication media. However, you **MUST** reference all the sources that helped you in the assignment.
- You should not plagiarize. Therefore, you should write solutions in your own words, even if the solutions exist in a publication that you reference.

**Grading policy.** The following grading policies apply:

- Homework assignments should be typeset in LaTeX. For more information, follow the link "Assignments" at the top of this page.
- *No late written assignments will be accepted*. All assignments are due at noon.
- There may be a curve of the final grades, although the lower bounds of the standard scale are guaranteed, i.e., you will get an A- or A if your grade is 90 or above, a B(-/+) if it is 80-89, etc.

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# Delivery

The class lectures are *in-person but also remote synchronous*.
Office hours will be in a remote synchronous format through Zoom.

## Pandemic preparedness

*W&M continues to require masks in shared indoor spaces at all times unless actively eating or drinking*.
Additionally, consider the following respectful recommendations:
If you do not feel well it is strongly recommended not to attend the lecture in person.
If you have tested positive for COVID please follow W&M's procedures.

To facilitate learning under these circumstances the in-person **lectures will be also broadcast synchronously through Zoom and their video recordings will be placed on Blackboard.** You can access W&M zoom accounts via https://cwm.zoom.us/. You can join the meeting in any of several ways:

- Bookmark the recurring meeting link https://cwm.zoom.us/j/93467862427 in your browser. If you are not logged onto Zoom, the browser should direct you to a login interface which you can do through your institution (cwm.zoom.us).
- Log onto Zoom https://cwm.zoom.us/ , select "join meeting", and put in our meeting ID (934 6786 2427).
- Log onto Blackboard, go to the CSCI 243 page, and click the tab on the left: "Zoom link to live lectures".

Blackboard is the main gateway to our class, containing the following content:

- a Zoom link to live lectures,
- recorded class sessions are posted under "Recorded lecture videos",
- pdf of the class notes under "Lectures"
- a Zoom link to live Office Hours ,
- homeworks will be posted under Assignments,
- a forum will be created for course/homework discussions that don't violate the honor code,
- this syllabus.

**Recording Consent**
The class meetings will be recorded. Students who participate remotely and choose to switch their video on implicitly consent to be video recorded. Similarly, students who speak through Zoom or in class implicitly consent to be audio recorded.

**Participation**
Class attendance is strongly recommended but not mandatory. However, according to past experience, students that did not attend did not perform well and sometimes were not able to complete the course. The hope is that the availability of lectures in-person/live remote/video recordings will enable all students to attend in their preferred format.

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# Assignments

Homeworks will appear on **Blackboard** weekly.
You will upload a pdf of your solution onto **Blackboard** by the due date.
Graded homeworks will be returned through **Blackboard**.

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### Procedural

- Homework write-ups are required to be produced with LaTeX, the standard high-quality typesetting program in our field and in technical writing. LaTeX is a based on mark-up language (like HTML) as opposed to "what you see is what you get" of word-processors. As in all learning experiences, in the beginning it looks difficult and tedious but it is very powerful.
  You must pick-up LaTeX skills by yourself. However, to make things a little easier for you, Prof. W. Mao has written a brief introduction, called LaTeX summary, that contains a minimum set of things you need to know to produce a homework write-up in LaTeX. Moreover, each homework assignment will be posted both in PDF and in the source LaTeX.
- Homework write-ups must contain for each problem both the problem description and its solution.
- Remember each homework assignment is due at noon on its due date. You should upload onto Blackboard only the pdf document produced by your latex file; not the latex file. *No late homework will be accepted unless there is a medical reason (with doctor's note) or family emergency as defined by the College*.
- Always give yourself plenty of time to work on a problem set. Never expect to be able to start and complete a problem set the night before it is due.
- Since another goal of doing homework is to improve your technical writing skills, it is important that you write in a comprehensive and yet concise style. Points may be taken off for poorly written solutions.

### Reiterating the Honor Code policy

- For the homework assignments you may talk about the problem with fellow students, the TA, and the instructor, but *the write-up must be yours*. In particular, when discussing with fellow students you must strictly follow the "empty hand policy": You cannot leave a discussion meeting with any record of the discussion (hard copy or electronic). All scratch paper must be torn and thrown away, and boards erased. In your homework write-ups, you should also give credit to your collaborators for each problem. Finally, you may neither consult students that have taken the course previously, nor their completed work.
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- You should not plagiarize. Therefore, you should write solutions in your own words, even if the solutions exist in a publication that you reference.

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# In class exams

Two 50 minute tests.

Open-textbook and open-notes. No calculators, web-searches, phones, etc.
1st test: during class period on Friday, March 11
Covers the course materials up to 3/07
2nd test: during class period on Friday, April 29
Covers the course materials up until before Trees

Final exam:

Open-textbook and open-notes. No calculators, web-searches, phones, etc. Covers the course materials of the entire semester.
May 09, 2pm-5pm.

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**Student Accessibility Services**
William & Mary accommodates students with disabilities in accordance with federal laws and university policy. Students who feel they may need an accommodation based on the impact of a learning, psychiatric, physical, or chronic health diagnosis should contact Student Accessibility Services staff at 757-221-2512 or at sas@wm.edu to determine if accommodations are warranted and to obtain an official letter of accommodation. For more information, please see the www.wm.edu/sas .

**Mental and Physical Well-Being**
William & Mary recognizes that students juggle different responsibilities and can face challenges that make learning difficult. There are many resources available at W&M to help students navigate emotional/psychological, physical/medical, material/accessibility concerns. Asking for help is a sign of courage and strength. If you or someone you know is experiencing any of these challenges, we encourage you to reach out to the following offices:

- For psychological/emotional stress, please consider reaching out to the W&M Counseling Center ; or (757) 221-3620, 240 Gooch Dr., 2nd floor. Services are free and confidential.
- For physical/medical concerns, please consider reaching out to the W&M Health Center ; or (757) 221-4386, 240 Gooch Drive.
- For additional support or resources, please contact the Dean of Students by submitting a Care Report at https://www.wm.edu/offices/deanofstudents/services/caresupportservices/index.php ; or by calling 757-221-2510, or by emailing deanofstudents@wm.edu.
- For a list of many other resources available to students, see Health and Wellness Resources for Students.

As your professor, I also ask you to reach out to me if you are facing challenges inside or outside the classroom; I will guide you to the appropriate resources on campus.

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# Course schedule

Week 1 (01/26 and 01/28):

Logic

Week 2 (01/31, 02/02, 02/04):

Methods of proofs

Week 3 (01/07, 02/09, and 02/11):
Sets

Week 4 (02/14, 02/16, and 02/18):
Functions, sequences and sums

Week 5 (02/21, 02/23, and 02/25):
Asymptotic notation

Week 6 (02/28, 03/02, and 03/04):
Algorithms

Week 7 (03/07, 03/09, and 03/11):
Complexity and Test 1 on 03/11

Spring Break 03/12-03/20

Week 8 (03/21, 03/23, and 03/25):
Discussion of Test 1 and mathematical induction

Week 9 (03/28, 03/30, and 04/01):
Mathematical induction

Week 10 (04/04, 04/06, and 04/08):
Recursive definitions and algorithms

Week 11 (04/11, 04/13, and 04/15):
Counting

Week 12 (04/18, 04/20, and 04/22):
Discrete probability

Week 13 (04/25, 04/27, and 04/29):
Trees and Test 2 on 04/29

Week 14 (05/02, 05/04, and 05/06):
Graphs and final review

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Functions, sequences and sums

Week 5 (02/21, 02/23, and 02/25):
Asymptotic notation

Week 6 (02/28, 03/02, and 03/04):
Algorithms

Week 7 (03/07, 03/09, and 03/11):
Complexity and Test 1 on 03/11

Spring Break 03/12-03/20

Week 8 (03/21, 03/23, and 03/25):
Discussion of Test 1 and mathematical induction

Week 9 (03/28, 03/30, and 04/01):
Mathematical induction

Week 10 (04/04, 04/06, and 04/08):
Recursive definitions and algorithms

Week 11 (04/11, 04/13, and 04/15):
Counting

Week 12 (04/18, 04/20, and 04/22):
Discrete probability

Week 13 (04/25, 04/27, and 04/29):
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