Discrete Mathematics for Computer Science

CS 3653 — Dr. Douglas R. Heisterkamp
PS 110 — MSCS 508
10:30-11:45 a.m. Tuesday, Thursday — 918-200-9377
Spring 2021 — doug@cs.okstate.edu

Course Catalog Description: Prerequisite: MATH 2144 with a grade of "C" or better. Theory and applications of discrete mathematical models fundamental to analysis of problems in computer science. Set theory, formal logic and proof techniques, relations and functions, combinatorics and probability, undirected and directed graphs, Boolean algebra, switching logic.

Primary Texts (require): *Discrete Mathematics and Its Applications*, Eighth Edition, by Kenneth Rosen.

Secondary Texts (optional): *Mathematics for Computer Science* by Eric Lehman, F Thomson Leighton, and Albert R Meyer; 2018. Available online at `https://courses.csail.mit.edu/6.042/spring18/mcs.pdf` and will be posted to the course canvas page.

Secondary Texts (optional): *Discrete Mathematics for Computer Science* by zybooks.com, 2020. Online interactive book. To rent:

1. Sign in or create an account at `https://learn.zybooks.com`
2. Enter zyBook code: `OKSTATECS3653HeisterkampSpring2021`
3. Subscribe

Zoom Office Hours: 3:00-4:00 p.m. Tuesday, Wednesday, and Thursday
See canvas for zoom invite for office hours.
Other times available by appointment.

Grading:

Online Quizzes	10%
Assigned work	30%
Exam 1	20%
Exam 2	20%
Final Exam	20%

Grading Scale: for score x in

$90\% \leq x$	A
$80\% \leq x < 90\%$	B
$70\% \leq x < 80\%$	C
$60\% \leq x < 70\%$	D
$x < 60\%$	F

Dates:

Exam 1	:	**February 25**
Wellness day – class does not meet	:	March 4
Exam 2	:	**April 6**
Wellness day – class does not meet	:	April 13
Final Exam	:	**May 4, 10:00-11:50 a.m.**

Examinations: During an examination period, no communication of any kind about the exam (except with the instructor or proctor) is allowed. In you are not able to take the

exam you will need to schedule the exam with OSU testing center (they will charge for proctoring).

Online Quizzes: quizzes will be posted on canvas. Typically will be due at 11:59 on Wednesdays. You may take each quiz three times, with the highest score used for grading. Quizzes will be available for two weeks after initial due date with no late penalty.

Assigned work: No explicit programming course is required, but knowledge of programming is assumed. Examples for class will be in C++, Python, or pseudo-code. Assignments may require the structured pseudo-code as describe in the textbook's appendix. If assignments are turned in late, they lose a percentage of their graded point values according to the following schedule:

Written and Programming Exercises		
On time	:	0%
One week	:	10%
More than one week	:	50%

Assignments will be due at 11:59 p.m. on Fridays. Assignments may be turned in using the dropbox on canvas. Please use a high resolution black and white scan for hand written exercises. At some time to double check your submission to verify that it was correctly. Written exercises may also be turned in during class. All assignments must be submitted by 2021-04-30.

Collaboration: Discussion of concepts, ideas, and techniques is allowed. After discussion, each student must write up his/her own solution. Copying another person's work, in part or whole, is not allowed. Giving another student your work, in part or whole, is considered cheating as well. If you are unsure whether your collaboration is acceptable, speak with the instructor in advance. Any violation of academic integrity would result in a non-droppable grade of zero for that assignment and an additional reduction of one letter grade in the course and a report to the university administration. Major violations will result in a grade of F!.

Disabilities act: If any student feels that he/she has a disability and needs special accommodations of any nature whatsoever, the instructor will work with you and the Office of Disabled Student Services to provide reasonable accommodations to ensure that you have a fair opportunity to perform in this class. Please advise the instructor of such disability and the desired accommodations at some point before, during, or immediately after the first scheduled class period.

Syllabus Attachment: See `https://academicaffairs.okstate.edu/site-files/documents/spring-2021-syllabus-attachment-1-6-21.pdf` for Stillwater's syllabus attachment. The syllabus attachment will also be uploaded to canvas.

All students are expected to follow university COVID-19 guidelines as they exist at the beginning of the semester and adapt to them as they may change during the semester.

The in person lectures will also be available live on zoom. The zoom invites will be posted on canvas. The lectures will be recorded and made available on canvas. Warning: recorded lectures may only be available for two weeks if storage becomes a problem.

Tentative Schedule

Date	Textbook	Topics
01-19	—	syllabus, course introduction
01-21	1.1-1.3	propositional logic
01-26	1.4,	predicates and quantifiers
01-28	1.5,	nested predicates and quantifiers
02-02	1.6, 1.7	inference, introduction to proofs
02-04	1.8	proof methods
02-09	2.1-2.3	sets; functions
02-11	2.4-2.5	sequences, summations, set cardinality
02-16	2.6, 6.1	matrices, basics of counting
02-18	6.2-6.3	permutations; combinations; pigeonhole principle
02-23	6.4	binomial coefficients; exam 1 review
02-25	—	Exam I
03-02	3.1-3.3	algorithms and complexity
03-04	—	*Wellness day — no lecture*
03-09	6.5-6.6	generalized permutations and combinations
03-11	5.1	introduction to induction
03-16	5.2	strong induction, well ordering principle
03-18	5.3	recursive definitions and structural induction
03-23	5.4-5.5	recursive algorithms, program correctness
03-25	7.1-7.2	introduction to probability
03-30	7.3	Bayes' Theorem
04-01	7.4	Expected Value and Variance, exam 2 review
04-06	—	Exam II
04-08	8.1-8.3	recurrence relations, divide and conquer algorithms
04-13	—	*Wellness day — no lecture*
04-15	8.4-8.6	generating functions, inclusion-exclusion
04-20	9.1-9.3	relations
04-22	9.4-9.6	closure, equivalences, partial orderings
04-27	10.1-10.3	intro to graphs
04-29	10.4	graph connectivity, final exam review
05-04	—	**final exam**, 10:00-11:50 a.m.