CSCE 222: Discrete Structures for Computing
Section 503
Spring 2019

Philip Ritchey

Last Modified January 13, 2019

1 Class Time and Location

Lecture:
Section 503: MWF 11:30am – 12:20pm in ZACH 310

2 Course Description and Prerequisites

CSCE 222. Discrete Structures for Computing. (3-0). Credit 3.
This course provides the mathematical foundations from discrete mathematics for analyzing computer algorithms, for both correctness and performance; introduction to models of computation, including finite state machines and Turing machines.
Prerequisite: MATH 151. Cross-listed with ECEN 222.

3 Learning Outcomes

At the end of the course, students will be able to

- **use** propositional logic and predicate logic to **express** mathematical statements.
- **construct** proofs of mathematical theorems using several methods, including inference, contradiction, and contrapostion.
- **contruct** proofs by mathematical induction, strong induction, and structural induction.
- **apply** sets and set operations to solve problems.
- **define** the properties of mathematical functions and **determine** which properties a given function has.
- **analyze** the time complexity of algorithms using big-O, big-Ω, and big-Θ notation.
- **apply** counting techniques, including the pigeonhole principle, permuations, and combinations, to solve problems.
- **construct** and **solve** recurrence relations.
- **define** models of computation, including finite state machines and Turing machines.

4 Instructor Information

Instructor

Philip Ritchey   [1]
Office: 102? EABB
Office Phone: 979-458-1059?
Email: pcr@tamu.edu
Office hours: TBD and by appointment.

Teaching Assistants (TAs)

Andrew Nemec
Office: 509A HRBB
Email: nemeca@tamu.edu
Office hours: TBD and by appointment.

Peer Teachers (PTs)

Peer-Teachers are available to help you with this class. For more details, see `engineering.tamu.edu/cse/academics/peer-teachers/current-peer-teachers` and the course website.

5 Textbook

Required

`zybooks.com/catalog/discrete-mathematics`

1. Sign in or create an account at `learn.zybooks.com`
2. Enter zyBook code: `TAMUCSCEECEN222RitcheySpring2019`
3. Subscribe

Recommended

Discrete Mathematics and Its Applications, Rosen

6 Course Website

`faculty.cse.tamu.edu/ritchey/courses/csce222/spring19`

[1] I am willing to provide a safe haven, a listening ear, and support for lesbian, gay, bisexual, and transgender people or anyone dealing with sexual orientation issues. I am a QPR gatekeeper for suicide prevention. I support violence prevention efforts across campus.

7 Grading

Weight	Component	Date
500	Homework	Every Week
500	Quizzes	Every Week
100	Extra Credit	Every Week
	Final Exam	7 May
		Section 503: 10:30am – 12:30pm

The final exam is optional. See Policy 11.12.

Final letter grades will be assigned according to the following cutoffs:

900+:	A	Demonstrated mastery of course material.
800:	B	Demonstrated advanced competency with course material.
700:	C	Demonstrated basic competency with course material.
600:	D	Demonstrated deficient competency course material.
less than 600:	F	Failed to demonstrate competency with course material.

8 Tentative Schedule of Topics

Day	Topic	Reading
01/14	Course Introduction	syllabus
01/16	Propositional Logic	1.1 – 1.3
01/18	Propositional Logic	1.1 – 1.3
01/23	Predicate Logic	1.4 – 1.5
01/25	Quiz 1	1.1 – 1.3
01/28	Rules of Inference	1.6
01/30	Rules of Inference	1.6
02/01	Quiz 2	1.1 – 1.5
02/04	Introduction to Proofs	1.7
02/06	Proof Methods and Strategy	1.7 – 1.8
02/08	Quiz 3	1.6
02/11	Proofs	1.7 – 1.8
02/13	Sets and Set Operations	2.1 – 2.2
02/15	Quiz 4	1.7 – 1.8
02/18	Functions	2.3
02/20	Algorithms	3.1
02/22	Quiz 5	1.7 – 1.8, 2.1 – 2.2
02/25	Algorithms	3.1
02/27	The Growth of Functions	3.2
03/01	Quiz 6	2.3, 3.1
03/04	The Growth of Functions	3.2
03/06	The Growth of Functions	3.2
03/08	Quiz 7	3.1, 3.2
03/18	Complexity of Algorithms	3.3
03/20	Complexity of Algorithms	3.3
03/22	Quiz 8	3.2
03/25	Sequences and Sums	2.4
03/27	Sequences and Sums	2.4
03/29	Quiz 9	3.3
04/01	Mathematical Induction	5.1
04/03	Mathematical Induction	5.1
04/05	Quiz 10	2.4
04/08	Strong Induction	5.2
04/10	Recursive Definitions	5.3
04/12	Quiz 11	5.1
04/15	Structural Induction	5.3
04/17	Recursive Algorithms	5.4
04/19	Quiz 12	5.2, 5.3
04/22	The Basics of Counting	6.1
04/24	The Pigeonhole Principle	6.2
04/26	Quiz 13	5.3, 5.4
04/29	Modeling Computation: DFAs	13.3
05/01	Modeling Computation: Turing Machines	13.5
05/07	**Final Exam**	1, 2, 3, 5, 6, 13

9 Tentative Homework Due Dates

HW	Date Assigned	Date Due (before 11:59 p.m. CST)
1	18 January	27 January
2	25 January	03 February
3	01 February	10 February
4	08 February	17 February
5	15 February	24 February
6	22 February	03 March
7	1 March	10 March
8	08 March	17 March
9	22 March	31 March
10	29 March	07 April
11	05 April	14 April
12	12 April	21 April
13	19 April	28 April

10 Tentative Quiz Dates

Quiz	Date (at the beginning of class)
1	25 January
2	01 February
3	08 February
4	15 February
5	22 February
6	01 March
7	08 March
8	22 March
9	29 March
10	05 April
11	12 April
12	19 April
13	26 April

11 Policies

11.1 Attendance

You are expected to come to class prepared to discuss the material. You are strongly encouraged to attend every class, arrive on time, and stay the whole time. You are responsible for learning the material regardless of your attendance in class.

11.2 Late and Missed Work

Late homework is penalized at 1% per hour. Exams and other in-class work can be made up in the event of a documented University Excused Absence. See rule 07 of the student rules: `student-rules.tamu.edu/rule07`.

11.3 Typesetting

All homework must be typed and submitted as a PDF. You are strongly encouraged to typeset your work using LaTeX. Resources for LaTeX can be found on the course website and on the Internet. Microsoft Word and OpenOffice Write are vastly inferior but acceptable alternatives.

11.4 Version Control

You are **strongly** encouraged to use a version control system to track changes and back up your work. Texas A&M has an enterprise GitHub server (`github.tamu.edu`) that you can use. Learn to use git in 15 minutes: `https://try.github.io/`. Install a git client: `https://git-scm.com/downloads`.

11.5 Collaboration

You are explicitly prohibited from collaborating on homeworks. Collaborating means copying the work of another and submitting it as your own (*plagiarism*), or allowing another to copy your work and submit it as their own (*complicity*). In either case, the minimum penalty is a zero (0) on the assignment. All violations will be reported to the Aggie Honor System Office.

You may discuss homeworks on a conceptual level only. You are encouraged to work with others to understand the concepts required for the homework. However, you must take care that your discussions do not cross the line into collaboration. One way you can protect yourself and others is to not work on the homework with others. When discussing the homework with others, put it away and focus on understanding the concepts rather than seeking answers for a specific problem. You may work together to solve problems that are not assigned as homework, but all the work you submit on the homework must be your own. Another method is to not work on homework when solutions are in front of you. If you have the solution to a problem which you cannot solve on your own, put it away before returning to your own work. If you get stuck and have to go back to the solution, put your work away before looking at the solution.

Go to office hours. For help with course material, you are strongly encouraged to attend my office hours and those of the TAs and the PTs. We are ready, willing, and able to help you understand the material.

11.6 HW Grading

Homework is for practice, not assessment. Most of the homework will be Exercises in the zyBook. A subset of the problems for each homework assignment will be thoroughly graded. The other problems will be graded for completion only. Thus, homework grades are not accurate indications of content mastery. Students are responsible for reviewing their own homework and the posted solutions.

11.7 Solutions

When homework outside of the zyBook is assigned, solutions will be posted to the course Google Team Drive after the due date. Quiz solutions will be available for review during the instructor's office hours.
No, you cannot copy them. See my advice under Collaboration.

11.8 Return of Graded Work

We will make an effort to complete the grading of work submitted on time within one week of the due date.

11.9 Regrading

If you believe that your work has been graded incorrectly or incompletely, you must submit a regrade request within one week of the date the work is returned.

11.10 Extra Credit

There are 100 points of extra credit built into the grading rubric. Examples of places where extra credit can be earned include: fun problems, the pudding, Piazza. These 100 points are the only extra credit that is available in the course.

11.11 Curving

This class is not graded on a curve.

11.12 Grades Don't Matter

I care very much more about your education than I do about your grades. Your final grade will reflect the degree to which you demonstrated competency with the course material. Significant improvement throughout the semester — and shown on the final exam — is taken into account. To state it numerically, your final quiz score (500 points) will be computed using the maximum between your final exam score (scaled to 500 points) and the arithmetic average of your final exam (scaled to 500 points) and your total quiz scores.

11.13 Discussion of Grades

Federal law prohibits the instructor, TAs, and graders from discussing grades over email or phone. If you have a question about your grade, you must discuss it with us in-person, such as during office hours.

11.14 Email Formatting

When you send email to me or a TA, the subject must be prefixed with [CSCE 222] and you must sign your name to the email. Putting [CSCE 222] in the subject will let us know in which course of ours you are enrolled. Signing your name will let us know who you are. If you do not sign your name, we may assign you one at random in our reply. Please send all email from your @tamu email address.

11.15 Gradescope and eCampus

All homeworks must be submitted as PDFs to gradescope (`gradescope.com`). You may submit an unlimited number of times. Quizzes will be scanned and uploaded to gradescope for grading. Feedback on homeworks and quizzes will be given via gradescope. Grades for homeworks and quizzes will be posted on eCampus and/or gradescope.

11.16 Piazza

All questions and comments about the course should be posted on Piazza (`piazza.com`). Piazza is designed and managed so that you can get help quickly and efficiently from classmates, the PTs, the TAs, and me. If you email a question or comment about the course to me or a TA, you will very likely be redirected to Piazza.

11.17 Google Team Drive

This course has a Google Team Drive. Lecture notes, homeworks, homework solutions, fun problems, and other course material will be posted on the Team Drive. You must be signed in to you @tamu account to access the Drive.

11.18 Logic Daemon

The Logic Daemon and Quizmaster(`logic.tamu.edu`, mirror: `logic.ua.edu`) are useful tools for practicing first order logic (propositional and predicate logic, chapter 1 of the zyBook and sections 1.1 - 1.6 of Rosen). The Daemon Proof Checker can check your logical proofs for validity, and sometimes can even suggest hints when you get stuck. The Quizmaster has several practice problems for you to work on. The Countermodel Checker will check whether your countermodel is correct. The Equivalency Checker will check whether two formulas are logically equivalent. The WFF Checker will check whether a formula is well-formed. If you can produce proofs that the Proof Checker will mark as correct, then you probably have mastered basic logical proofs.

11.19 Algebra Readiness

Basic algebra is one of the most common difficulties with which I have seen students struggle in this class. I plan to give an algebra test on the first day of class. It will not count for a grade, but it will be valuable feedback for you to know whether, and how much, effort is needed on your part to bring yourself to a state of readiness for the remainder of the course. A good place to practice and improve is Art of Problem Solving's Alcumus (`https://artofproblemsolving.com/alcumus`).

11.20 Workload

A common rule of thumb for determining the amount of time that should be spent on a course is the rule of "3 for 1": for every 1 credit hour in which you enroll, you should plan to spend approximately 3 hours per week outside of class studying. This is a 3-credit course, thus you should plan to spend approximately 9 hours outside of class studying. A corollary to this rule is that a course load of 15 hours means that you should plan to spend approximately 45 hours outside of class studying every week. That means you will spend 60 hours per week on your courses. Take this time committment seriously.

11.21 Diversity and Inclusion

In an ideal world, science would be objective. However, much of science is subjective and is historically built on a small subset of privileged voices. I acknowledge that it is possible that there may be both overt and covert biases in the material due to the lens with which it was written, even though the material is primarily of a scientific nature. Integrating a diverse set of experiences is important for a more comprehensive understanding of science. Occasionally, as part of the course, I would like to discuss issues of diversity in computer science.

I (like many people) am still in the process of learning about diverse perspectives and identities. I would like to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, ability, etc.) To help accomplish this:

- If you have a preferred name that differs from what appears in your official Texas A&M records, please let me know.
- If you have a set of pronouns you use, please let me know. For example, I use the pronouns he/him/his.
- If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me.
- If something was said in class that made you feel uncomfortable, please talk to me about it. As a participant in course discussions, you should also strive to value the diversity of your classmates.
- You can also submit anonymous feedback (which will lead to me making a general announcement to the class, if necessary, to address your concerns). If you prefer to speak with someone outside of the course, the Texas A&M Office for Diversity is an excellent resource.

Please contact me or submit anonymous feedback if you have any suggestions to improve the quality of the course materials.

11.22 Harassment and Discrimination

Texas A&M is committed to the fundamental principles of academic freedom, equality of opportunity and human dignity. To fulfill its multiple missions as an institution of higher learning, Texas A&M encourages a climate that values and nurtures collegiality, diversity, pluralism and the uniqueness of the individual within our state, nation and world. All decisions and actions involving students and employees should be based on applicable law and individual merit.

Texas A&M University prohibits harassment and discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran.

Students who believe they have experienced harassment or discrimination prohibited by this statement are encouraged to contact the Office of the Dean of Student Life at 979-845-3113.

11.23 Americans with Disabilities Act (ADA) Policy Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit `disability.tamu.edu`.

11.24 Academic Integrity Statement and Policy – Aggie Code of Honor

An Aggie does not lie, cheat, or steal, or tolerate those who do.

For all academic work in this and every course, it is expected of you that you shall neither give nor receive any unauthorized aid.

All violations of the Aggie code of Honor will be reported to the Aggie Honor System Office.

For more information, see `aggiehonor.tamu.edu/RulesAndProcedures/`.

Things you cannot do include, but are not limited to:

1. Submit your own or another student's work from a previous semester.
2. Copy any portion of another student's HW, quiz, or exam.
3. Tell another student what is on the quiz or exam before that student has taken the quiz or exam.
4. Find the solution online and copy any part of it.