# CSCE 222: Discrete Structures for Computing
## Section 501, 502
## Spring 2018

Philip Ritchey

Last Modified February 2, 2018

## 1   Class Time and Location

**Lecture:**
Section 501: MWF 3:00pm – 3:50pm in HRBB 124
Section 502: MWF 1:50pm – 2:40pm in HRBB 124

## 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 understand the basic principles of logic, proofs and sets. They will be able to apply results from discrete mathematics to the analysis of algorithms. They will be able to produce proofs by induction and apply counting techniques. They will have a basic understanding of models of computation.

## 4   Instructor Information

**Instructor**
**Philip Ritchey**  AGGIE ALLY  QPR  Green Dot [1]
    Office: 326 HRBB
    Office Phone: 979-458-1059
    Google Voice: 979-476-2619 (forwards to my cell phone)
    Email: pcr@tamu.edu
    Office hours: TR 9am – 12pm and by appointment.

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[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.

**Teaching Assistants (TAs)**
**Sicheng "Sharon" Wang**
    Office: HRBB 320
    Email: sharonwang@tamu.edu
    Office hours: MF TBD, W 8:30pm - 10pm, 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*
Kenneth Rosen, Discrete Mathematics and Its Applications, 7th ed., McGraw-Hill, 2012.

# 6 Course Website

`faculty.cse.tamu.edu/ritchey/courses/csce222/spring18`

# 7 Grading

| Weight | Component | Date |
|---|---|---|
| 200 | Homework | Every Week |
| 200 | Quizzes | Every Week |
| 100 | Extra Credit | Every Week |
| 200 | Exam 1 | 2, 5 March |
| 200 | Exam 2 | 20, 23 April |
| 200 | Final Exam | 7 May |
| | | Section 501: 10:30am – 12:30pm |
| | | Section 502: 3:30pm – 5:30pm |

Final letter grades will be assigned according to the following cutoffs:
| | |
|---|---|
| 900+: | A |
| 800: | B |
| 700: | C |
| 600: | D |
| less than 600: | F |

# 8 Tentative Schedule of Topics

| Day | Topic | Reading |
|-----|-------|---------|
| 01/17 | Course Introduction, Propositional Logic | 1.1–1.2 |
| 01/19 | Propositional Logic | 1.2–1.3 |
| 01/22 | Predicate Logic | 1.4–1.5 |
| 01/24 | Rules of Inference | 1.6 |
| 01/26 | Rules of Inference, Proofs | 1.6 - 1.8 |
| 01/29 | Proofs | 1.7 - 1.8 |
| 01/31 | Proofs, Sets | 1.8, 2.1 |
| 02/02 | Sets, Set Operations | 2.1 - 2.2 |
| 02/05 | Sets, Set Operations, Functions | 2.1-2.3 |
| 02/07 | Functions | 2.3 |
| 02/09 | Algorithms | 3.1 |
| 02/12 | The Growth of Functions | 3.2 |
| 02/14 | The Growth of Functions Complexity of Algorithms | 3.2-3.3 |
| 02/16 | Complexity of Algorithms | 3.3 |
| 02/19 | Sequences and Sums | 2.4 |
| 02/21 | Sequences and Sums, Mathematical Induction | 2.4, 5.1 |
| 02/23 | Mathematical Induction | 5.1 |
| 02/26 | Strong Induction | 5.2 |
| 02/28 | Strong Induction | 5.2 |
| 03/02 | **Exam 1-1** | 1–3 |
| 03/05 | **Exam 1-2** | 1–3 |
| 03/07 | Recursive Definitions and Structural Induction | 5.3 |
| 03/09 | Recursive Definitions and Structural Induction | 5.3 |
| 03/19 | The Basics of Counting, The Pigeonhole Principle | 6.1 - 6.2 |
| 03/21 | Permutations and Combinations | 6.3 |
| 03/23 | Binomial Coefficients and Identities | 6.4 |
| 03/26 | Applications of Recurrence Relations | 8.1 |
| 03/28 | Solving Linear Recurrence Relations (SLRR) | 8.2 |
| 03/30 | SLRR, Divide and Conquer Algorithms and Recurrence Relations | 8.2 - 8.3 |
| 04/02 | SLRR, Divide and Conquer Algorithms and Recurrence Relations | 8.2 - 8.3 |
| 04/04 | Generating Functions | 8.4 |
| 04/06 | Relations and Their Properties | 9.1 |
| 04/09 | Equivalence Relations | 9.5 |
| 04/11 | Partial Orderings | 9.6 |
| 04/13 | Models of Computation, Languages and Grammars | 13.1 |
| 04/16 | Languages and Grammars | 13.1 |
| 04/18 | Finite State Machines with Output | 13.2 |
| 04/20 | **Exam 2-1** | 2.4, 5, 6, 8, 9 |
| 04/23 | **Exam 2-2** | 2.4, 5, 6, 8, 9 |
| 04/25 | Finite State Machines with No Output | 13.3 |
| 04/27 | Language Recognition | 13.4 |
| 04/30 | Turing Machines | 13.5 |
| 05/01 | TBD | |
| 05/07 | **Final Exam** | 1–3, 5, 6, 8, 9, 13 |

# 9    Tentative Homework Due Dates

| HW | Date Assigned | Date Due (before 11:59 p.m. CST) |
| --- | --- | --- |
| 1 | 19 January | 26 January |
| 2 | 26 January | 02 February |
| 3 | 02 February | 09 February |
| 4 | 09 February | 16 February |
| 5 | 16 February | 23 February |
| 6 | 23 February | 05 March |
| 7 | 28 February | 09 March |
| 8 | 09 March | 23 March |
| 9 | 23 March | 30 March |
| 10 | 30 March | 06 April |
| 11 | 06 April | 13 April |
| 12 | 13 April | 20 April |
| 13 | 20 April | 30 April |

# 10    Tentative Quiz Dates

| Quiz | Date (at the beginning of class) |
| --- | --- |
| 1 | 26 January |
| 2 | 02 February |
| 3 | 09 February |
| 4 | 16 February |
| 5 | 23 February |
| 6 | 09 March |
| 7 | 16 March |
| 8 | 23 March |
| 9 | 30 March |
| 10 | 06 April |
| 11 | 13 April |
| 12 | 20 April |

# 11    Tentative Fun Problem Dates

| Fun Problem | Date (at the beginning of class) |
| --- | --- |
| 1 | 22 January |
| 2 | 29 January |
| 3 | 05 February |
| 4 | 12 February |
| 5 | 19 February |
| 6 | 26 February |
| 7 | 19 March |
| 8 | 26 March |
| 9 | 02 April |
| 10 | 09 April |
| 11 | 16 April |
| 12 | 23 April |

# 12 Policies

## 12.1 Attendance

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

## 12.2 Late and Missed Work

Late work is not accepted. 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`.

## 12.3 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.

## 12.4 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. Aside from Git, other free options for version control include SVN, CVS, Mercurial, and Perforce.

## 12.5 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.

## 12.6 Return of Graded Work

You may pick up your graded work from the TA during office hours. We will make an effort to complete the grading of work submitted on time within one week of the due date.

## 12.7    Regrading

If you believe that work submitted on time has been graded incorrectly or incompletely, you must **meet with a TA within <u>one week</u> of the date the work is returned**. Only if you can prove to the TA that your solution is correct and complete will your work be regraded.

## 12.8    HW Grading

A nonempty subset of the problems for each homework assignment will be thoroughly graded. The other problems will be graded for completion only. Problems which are less than 50% complete will be assigned a grade of 0. Completion is an assessment of the work shown: $X\%$ completion means that $X\%$ of the work required is shown.

## 12.9    Solutions

Homework, quiz, and exam solutions will be available for review during the instructor's office hours. *No, you cannot copy them. See my advice under Collaboration.*

## 12.10    Extra Credit

There are 100 points of extra credit built into the grading rubric. This is the only extra credit that is available in the course.

## 12.11    Curving

This class is not graded on a curve.

## 12.12    Gradescope and eCampus

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

## 12.13    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. You may post questions or comments anonymously on Piazza, however this privilege will be revoked if it is misused.

## 12.14    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.

## 12.15    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.

## 12.16    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`.

## 12.17    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.

## 12.18    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/`.