MATH 4190-2, Discrete Mathematical Structures I
3 credits, Spring 2018, TR 11:00-12:15, McAdams Hall 230

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OFFICE HOURS: T 10:00–10:50, R 1:00–1:50 and by appointment   PHONE: 656-5409

CATALOG DESCRIPTION: Applies theoretical concepts of sets, functions, binary relations, graphs, Boolean algebras, propositional logic, semigroups, groups, homomorphisms, and permutation groups to computer characteristics and design, words over a finite alphabet and concatenation, binary group codes, and other communication or computer problems.

PREREQUISITE: MATH 3110

REQUIRED MATERIALS:
- *Discrete Mathematics: An Open Introduction*, 2nd Edition, by Oscar Levin. Download from `http://discretetext.oscarlevin.com/home.php`
- *Discrete Math for Computing*, by Wayne Goddard (selected sections only). Download from `https://people.cs.clemson.edu/~goddard/texts/discreteMath/`
- *Monomial Ideals and their Decompositions* by Moore, Rogers, and Sather-Wagstaff (selected sections only). Download from `https://ssather.people.clemson.edu/DOCS/monhist.html`

OPTIONAL MATERIALS: Print copy of the Levin text available from `amazon.com`.

GOALS AND OBJECTIVES: To understand the techniques of discrete mathematics and number theory, including various proof techniques, and to apply them to important algorithmic questions. Advanced application topics may include cryptographic protocols for sharing secrets, the RSA cryptosystem, graph theory, and applications to the Phasor Measurement Unit (PMU) problem. All students will be expected to learn a particular set of mathematical facts and to apply them, and to learn and understand mathematical reasoning in order to read, comprehend, construct and apply mathematical arguments.

LEARNING OUTCOMES: On successful completion of Math 4190, students should be able to
1. use the basic objects of discrete mathematics and number theory in computations and proofs,
2. construct mathematically rigorous proofs using a variety of techniques, including induction,
3. describe some applications of discrete mathematics and number theory, and
4. execute a few standard algorithms from discrete mathematics and number theory by hand.

TOPICS: We will cover most, if not all, of the Levin text, and parts of the other texts.

COURSE GRADES: Student grades are based on attendance, weekly written assignments, eleven (11) in-class quizzes, two (2) non-final exams, and one (1) comprehensive final examination covering students' understanding of the course material. Grades will be updated throughout the semester at the Canvas site `http://www.clemson.edu/canvas/`. Weights are summarized in the following table along with grade ranges. Grades in this class will not be curved.

Attendance	10%	A	90–100%
Assignments	10%	B	80–89.9%
Quizzes	20%	C	70–79.9%
Non-final Exams	20% each	D	60–69.9%
Final Exam	20%	F	0–59.9%

READING: Before each class meeting, read the relevant sections of the textbook; I will announce

these at the end of each class. Reading assignments will also be posted on Canvas. This is the first step in the learning process in this course. Even if you do not understand everything you read, it will help prepare you for the day's lecture and activities.

Reading a math book is not like reading other types of books. Read the article "How to read a math book" by Stan Brown `http://brownmath.com/stfa/read.htm` for some tips on how to (and how not to) read a math book.

LECTURE: You are responsible for taking notes during lecture, as the instructor will not be posting notes. This is the second step in the learning process in this course.

ATTENDANCE: If the instructor does not arrive in the classroom within 15 minutes after the scheduled start time, class is dismissed for the day.

Students should attend all class meetings. Good attendance is critical to success in the class, not only because attendance is worth 10% of your grade.

There are no make-ups (quizzes or exams) and there are no exceptions to this policy. Unexcused absences will result in a grade of 0 for the day's activities. However, you will not be penalized for excused absences. In order for an absence to be excused, it must be documented with the instructor. Note that vacations and other recreational activities are not excusable.

Circumstance	Required documentation
Illness or other medical situation	Official note or receipt from clinic, hospital, doctor, nurse, Redfern, or other health care provider
Military service	Official military activation orders
Funeral or other family emergency	Official documentation from newspaper, funeral, or medical official
Sports or other official Clemson activity	Official documentation from Clemson athletics or activity's faculty adviser

In case of minor illness, if you might be contagious, do not come to class. Use the Notification of Absence feature to notify the instructor of the circumstances, and talk to him once you are better. See the FAQ at `https://www.clemson.edu/studentaffairs/advocacy-success/faq/`.

What should you do if you miss class?
- Read through the appropriate parts of the text.
- Get the notes from a classmate.
- Print out a copy of any documents you missed (e.g., quiz or exam) and any reading/homework assignments from Canvas.
- Work through any missed activity and check your work against the posted answer key.
- Seek help if needed. However, the instructor will not re-present the missed lecture.

HOMEWORK: This is the third step in the learning process in this course.

The instructor will announce homework assignments Thursdays in class and in Canvas. Solutions to each week's assigned exercises will usually be due by 4:30PM the subsequent Thursday, either in class, in office hours, or in the instructor's mailbox in Martin Hall O-110.

Each week's homework assignment will be worth the same amount.

Students will receive no credit for solutions with no work or justification. The instructor reserves the right to deduct points for solutions without full and complete sentences where appropriate,

and/or messy papers. You may even consider using LATEX to typeset your solutions.

Start these assignments early. In general, you have a week to complete the assignment from the time the material is covered in class. Late homework will only be accepted for full credit under unavoidable, documented circumstances. Homework that is late for avoidable and/or undocumented circumstances may be accepted for reduced credit, at the instructor's discretion.

Students are encouraged to work on assignments in small groups, but each student is required to turn in their own neatly written, organized set of solutions. Copying solutions from a classmate (either directly or with only superficial changes) constitutes academic dishonesty and will not be tolerated. If you do work with any other students in the class, you must list them on your homework as collaborators. Failure to do so may result in loss of credit or more serious sanctions, following Clemson's Academic Integrity policy.

Students are strongly discouraged from using outside sources (especially online solutions) for your homework. Copying solutions from outside sources (either directly or with only superficial changes) constitutes academic dishonesty and will not be tolerated. If you do use any outside sources (online source, student not in the class, alternate textbook, etc.), you must cite them in your assignment and similarly for inside sources (course notes, text, instructor, etc.). Failure to do so may result in loss of credit or more serious sanctions, following Clemson's Academic Integrity policy.

QUIZZES: Dates for the quizzes are in the Tentative Schedule. They will be given in-class most Tuesdays, during the last 20–30 minutes of class.
- Most quiz questions will be taken directly from the homework submitted the previous Thursday. Quizzes may also ask you for statements of definitions or results from class or the texts, or conceptual questions (T/F or fill in the blank) about these.
- Books, notes, and technology will not be allowed during the quizzes.
- Early or make-up quizzes will not be allowed. If you miss a quiz and your absence is excused, you will not be penalized: these quizzes will be discarded in the computation of your midterm and final course grades. However, unexcused absences on a quiz day will result in a grade of 0 for the day's quiz.
- Studying for the quizzes, taking them, and processing the feedback given on them form the fourth step in the learning process in this course.

NON-FINAL EXAMS: The non-final exams will be taken in-class on Tuesdays (Feb 20, Apr 3) and will last 75 minutes. Topics for these exams will be announced the week before each exam.
- Some exam questions will come directly from the homework. Exams will also include other questions like unassigned exercises from the texts. Exams may also ask you for statements of definitions or results, or conceptual questions, as in the quizzes.
- Books, notes, and technology will not be allowed during the exams.
- Early or make-up exams will not be allowed. If you miss a non-final exam and your absence is excused, then your final exam grade will be substituted for the exam you missed. However, unexcused absences on an exam day will result in a grade of 0 for the day's exam.
- Studying for these exams, taking them, and processing the feedback given on them form the fifth step in the learning process in this course.
- You must bring your Clemson ID card with you to each exam.

FINAL EXAM: The final examination will be comprehensive and will be administered during the official final exam time, Wednesday, May 2, 3:00–5:30PM.

- Final exam questions will be chosen like (but will mostly not repeat) non-final exam questions.
- Books, notes, and technology will not be allowed during the final exam.
- Early or make-up final exams will not be allowed.
- Studying for and taking the final exam is the sixth step in the learning process in this course.
- You must bring your Clemson ID card with you to the final exam.

TECHNOLOGY: If you plan to take notes on a tablet or laptop, you must sit in the front of the class. The use of tablets and/or laptops during quizzes and exams, and for non-class activities, is strictly prohibited.
- The use of other electronic devices (e.g., smart watches, iPods, cell phones, ear buds, and calculators) is strictly prohibited during class time (especially during quizzes and exams), unless you are otherwise instructed or permitted for official accommodations. All such technology (including all watches) should remain off (or on silent) and out of sight for each entire class period and the final exam. If you are expecting an important call or text during our class time, notify the instructor before class begins.
- If you violate this policy, you will lose attendance credit for the day. If the violation occurs during a quiz or exam, you will receive a 0 for that item, and you may also be subject to an official university-level academic dishonesty penalty. If you violate this policy repeatedly, you will be asked to leave the classroom. Please note, the instructor may choose not to interrupt class and point out the fact that you are violating the policy. The instructor will simply record your 0 for that day.
- Graphing calculators and computer software are not required for this course.

QUESTIONS: If something the instructor says or writes in class is unclear, raise your hand and ask a question. He will try to clarify the point being made.

OFFICE HOURS: Come to office hours for help. This gives the instructor the opportunity to focus on specific problems you may be having and to explain things in a more personal manner. If the scheduled times are bad for you, make an appointment.

COMMUNICATION: The instructor will regularly post announcements for the entire class to Canvas. It is recommended that you set your Canvas notification settings to send you these announcements by email. The instructor may also send individual messages by email, so check your email regularly for announcements and other messages.

The best way to communicate with the instructor (outside of class and official office hours) is by email. If you have a question, problem, or concern, email him. He is here to help you learn and will generally respond to email within 24 hours, usually faster.

In case you wish to submit feedback anonymously during the semester (outside of the official course evaluations) feel free to use the unofficial instructor evaluation form here: https://ssather.people.clemson.edu/ssw-eval.html.

WORK ENVIRONMENT: You should make your work environment free of distractions like cell phone, email, facebook, video games, etc.

INCLEMENT WEATHER: Any exam that was scheduled at the time of a class cancellation due to inclement weather will be given at the next class meeting unless you are notified otherwise by the instructor. Any assignments due at the time of a class cancellation due to inclement weather will be due at the next class meeting unless you are notified otherwise by the instructor. Any extension or postponement of assignments or exams must be granted by the instructor via email

or Canvas within 24 hours of the weather related cancellation.

ACCESSIBILITY: Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged — drop-ins will be seen if at all possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: http://www.clemson.edu/campus-life/campus-services/sds/.

TITLE IX: Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at
http://www.clemson.edu/campus-life/campus-services/access/title-ix/.
Ms. Alesia Smith is the Clemson University Title IX Coordinator, and the Executive Director of Equity Compliance. Her office is located at 110 Holtzendorff Hall, 864.656.3181 (voice) or 864.656.0899 (TDD).

ACADEMIC INTEGRITY: As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. Refer to the Undergraduate Announcements for the complete undergraduate academic integrity policy.

Note that giving access to an academic website that requires your password (such as WebAssign or Canvas) violates the code of student conduct computer use policy.

Instances of academic dishonesty in this class will be adjudicated to the fullest extent. This includes, but is not limited to, unauthorized collaboration, copying, and use of outside sources.

DIVERSITY, INCLUSIVITY, AND RESPECT: In this classroom, diversity and individual differences will be respected, appreciated, and recognized as sources of strength. Everyone in this class is encouraged to participate during class meetings, and to listen respectfully to others. Every person in this classroom must show respect for every other person in this classroom.

Any attitude or belief that espouses the superiority of one group of people over another in any manner is not welcome in this classroom. Such attitudes and beliefs are destructive to the sense of community that we strive to create, and will harm our ability to learn from each other.