

Clemson University  
Department of Mathematical Sciences

**MATH 4190-141 / 6190-141, Discrete Mathematical Structures**  
Summer Session I, 2019

**Instructor:** Matthew Macauley, Martin O-325, 656-1838 (no voicemail)

**Instructor e-mail:** macaule@clemson.edu

**Course Description:** This course is an introduction to discrete and algebraic mathematics and its applications, intended for students in computer science and engineering. Topics include basic set theory, inclusion-exclusion, counting, binomial and multinomial coefficients, multisets, propositional logic, proofs, paradoxes and the halting problem, the pigeonhole principle, existential and universal quantifiers, divisibility and primes, modular arithmetic, basic number theory, rational and irrational numbers, ceiling and floor, the Euclidean algorithm, relations, equivalence relations and equivalence classes, partial orders, functions, set cardinality, cryptography, symmetric ciphers, RSA, Diffe-Hellman, basic coding theory.

**Prerequisite:** Math 3110 (Linear Algebra).

**Office Hours & Communication Strategy:**

“Office hour meetings” can happen by appointment through Adobe Connect and/or Google Hangout. Please send an e-mail for an appointment time, giving me block(s) of time in which you are available. These meetings could be individual or group.

Email is the best way to reach me. I have not set up voicemail on my phone (as a way to encourage you to use email instead!), and I will be traveling to a few conferences during the class. I strongly recommend that you put Math 4190 in the subject line of any email – I will set up a Gmail filter for this.

Students are responsible for checking their Clemson email regularly, as that address will be the one subscribed to the class email list. I am not responsible if you miss important messages because you use a different email account.

**Useful websites:**

*Course webpage:* [http://www.math.clemson.edu/~macaule/classes/m19\\_math4190/](http://www.math.clemson.edu/~macaule/classes/m19_math4190/) (all relevant links posted here)

*Canvas:* <https://www.clemson.edu/canvas/> (will be used minimally)

**Texts:** We will use several *Open Textbooks*, which means they are published under a Creative Commons license and freely available online.

*Applied Discrete Structures*, by Ken Levasseur and Al Doerr. Version 3.5, 2018. Available at <http://faculty.uml.edu/klevasseur/ads2/>. A printed version can be purchased for \$36 from [www.lulu.com](http://www.lulu.com).

*Discrete Mathematics: An Open Introduction*, by Oscar Levin. 2nd edition, 2016. Available at <http://discrete.openmathbooks.org/home.php>. A printed version can be purchased for \$12.50 on Amazon.

*Discrete Mathematics for Computing*, by Wayne Goddard. Draft, 2018. <https://people.cs.clemson.edu/~goddard/texts/discreteMath/>

**Required technology:**

A computer on which you can watch the YouTube lecture videos and view pdf files.

Access to Canvas at <https://www.clemson.edu/canvas/> is required.

Adobe Connect - recommended for 'office hour meetings'.

Hardware – headset microphone - recommended, not required for meeting through Adobe Connect.

**Calculators/Other Technology:** A calculator is not required, but a may be useful when we cover cryptography. You will be allowed a calculator on the exams.

**Schedule:** This course is being offered in an entirely ONLINE asynchronous format through the course website and Canvas (only for submitting HW). The course calendar can be found on the course website.

**Lectures:** The lectures will be available on my YouTube channel. Students will be required to watch 1–2 lectures each day. The lecture schedule is listed on the course calendar.

**Homework:** Most homework assignments will be assigned using the open source program WeBWork, freely available online. There will be selected written homework as well. Late assignments will NOT be accepted.

**Course Format:** This course is being offered in one summer semester so EVERYTHING GOES QUICKLY.

You should expect to spend *at least* 4 hours per day on this course:

Watching to 1–2 online lectures.

Working homework problems.

You will prepare for two tests and a cumulative Final Exam.

Because this is an online course, our chief means of communication is through e-mail. It is important that you check your Clemson e-mail on a regular basis - at least once a day.

**Attendance:** Because this is an asynchronous online course, a zero on a written homework assignment that is not turned in will be counted as 2 missed class. Any student who accumulates 4 'missed classes' before Mon. May 20 (the last day to drop the course without a final grade) is subject to being dropped from the course.

**Exams:** There will be 2 exams (closed book and notes) during the semester and a cumulative final exam: Midterm 1 on Wed. May 29, Midterm 2 on Wed. June 12, and the Final Exam on Thu. June 20. All three exams must be taken either at Clemson or at an approved proctored test facility. Guidelines for administration of these exams are given in the separate write-up under the heading Proctored Tests Policy. These guidelines must be followed by all students.

**Grading:** Your final grade will be computed as follows:

Homework	25%
Midterm 1	25%
Midterm 2	25%
Cumulative Final Exam	50%

I will drop either your lowest midterm grade, OR half of the weight of the final exam; whichever is lowest. Also, if you get at least an A or B on the final exam, then you get at least that grade in the course, *assuming you have a passing grade on the homework.*

**Make-Up Policy:** No make-up exams will be given. I will drop your lowest midterm, which means that if you miss a midterm, then your final exam grade will replace it. The homework deadlines will not be extended for individual students, and assigned homework must be turned in by the deadline. **PLAN AHEAD:** If you submit assignments minutes before the deadline, you take the risk of bad luck, e.g., a power outage, computer freeze or crash, personal emergency, zombie attack, etc., that could make you miss the deadline.

**Student Learning Outcomes:** Upon successful completion of MATH 4190, students will be able to

Demonstrate knowledge and solve problems in several areas of discrete mathematics and number theory.

Use basic combinatorics to count various sets of objects.

Execute a few standard algorithms.

Demonstrate knowledge about elementary discrete and algebraic structures.

Read, write, and critique simple mathematical proofs.

Apply discrete and algebraic mathematical structures to topics from cryptography, coding theory, and network / graph theory.

### Key Dates

May 14 (Tue)	Classes begin; late enrollment fee applies
May 15 (Wed)	Last day to register or add a class
May 20 (Mon)	Last day to drop a class or withdraw from the University without a W grade
May 27 (Mon)	Memorial Day holiday
May 29 (Wed)	Midterm 1
June 7 (Thu)	Last day to drop a class or withdraw from the University without final grades
June 12 (Wed)	Midterm 2
June 18 (Tue)	Last day of class
June 20 (Thu)	Final Exam
June 26 (Wed)	Deadline to submit grades

**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.”

**Special Accommodations:** Students with disabilities who need accommodations should make an appointment with Dr. Arlene Stewart, Director of Disability Services, to discuss specific needs within the first week of classes. Students should present a Faculty Accommodation Letter from Student Disability Services when they meet with instructors. Student Disability Services is located in Suite 239 Academic Success Building (656-6848; sds-1@clemson.edu ). Please be aware that accommodations are not retroactive and new Faculty Accommodation Letters must be presented each semester.

**Copyright Statement:** Some of the materials in this course are possibly copyrighted. They are intended for use only by students registered and enrolled in this course and only for instructional activities associated with and for the duration of the course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the Teach Act. Refer to the Use of Copyrighted Materials and “Fair Use Guidelines” policy on the Clemson University website for additional information: <http://clemson.libguides.com/copyright>

**Statement Included for Certification Purposes:** In this online course, you will interact with the content, instructor and classmates on at least a weekly basis through course assignments, asynchronous discussions and/or synchronous sessions as indicated in this syllabus.