Discrete Mathematics
Math 228 – Spring 2020 (3 credits)

Professor: Oscar Levin, Ph.D, Ross 2239G, 970-576-0225 (cell), oscar.levin@unco.edu

Student Hours: Regular times TBA; also other times by appointment.

Website: We will use Canvas. http://canvas.unco.edu/.

Textbook: *Discrete Mathematics: Early Graph Theory*, by Oscar Levin, 0th ed. Free interactive online ebook available through Canvas.

Welcome to what promises to be an exciting and fun filled semester of Discrete Math! I know you are all eager to get started, but please take a few moments to glance at this syllabus, as it contains information on a slew of important topics, mostly related to this course.

Prerequisite: MATH 131 with a grade of C or better.

Course Description: Math 228 is a survey course of non-calculus based mathematics used extensively in computer science and other disciplines. We will study sequences, counting techniques, sets, types of proofs, logic, recursion, graph theory, number theory and related topics. You will most likely find this course very different from previous math courses. Instead of memorizing formulas and procedures, we will spend our time investigating patterns and solving problems. Further, getting an answer will rarely be enough for us; we will need to give good reasons that the answers are correct. To give these "proofs" of our answers, there will be a fair amount of writing in this course.

Outline of Course Content:

1. Graph Theory: colorings, trees, planar graphs, Euler trails and Hamilton paths.
2. Logic: truth-tables, valid arguments, converse and contrapositive, quantifiers, sets, proofs.
3. Combinatorics: binomial coefficients, binomial expansions, principle of inclusion/exclusion, permutations, sum and product rule, derangements.
4. Sequences and Recursions: finite differences, polynomial fitting, characteristic roots, generating functions.
5. Mathematical induction and recursive reasoning.

Grade Distribution: Your final grade will be calculated as follows:

Homework:	20%	Quizzes:	10%
Exams:	20% each	Final Exam:	25%
Participation & effort	5%		

Grade Scale: Grades will be assigned according to the following scale:

93-100%: A	90-92%: A-	87-89%: B+	83-86%: B	80-82%: B-	77-79%: C+
73-76%: C	70-72%: C-	67-69%: D+	63-66%: D	60-62%: D-	$\leq$ 59%: F

Exams: There will be two midterm exams and a cumulative final. The midterm exams will have both an in-class and a take-home portion, due the day of the in-class exam (distributed the class period prior). The midterm exams are tentatively scheduled for the following dates:

Exam 1: Monday, February 24
Exam 2: Monday, April 20

The cumulative final exam will be on **Wednesday, May 6 at 1:30pm**. Missed exams will be made up at the discretion of the instructor and only for excused absences.

Quizzes: There will be two types of quizzes: frequent online reading quizzes (on Canvas) and occasional short (10 minutes) in-class quizzes. The in-class quizzes can cover any material from previous lectures, class activities or homework problems. Reading quizzes will always be posted in Canvas; you should check for one for every class period (they will be due one hour before class). In-class quizzes will rarely be announced ahead of time and you should be prepared for a quiz on any given day of class. These quizzes will allow you to check yourself on some basic problems as we move through the semester, so that you will not be surprised when you get to the exams, and to ensure you are keeping up with the material. Missed in-class quizzes may NOT be made up under any circumstances.

Homework: Homework will be assigned for each topic we cover. Most assignments will be submitted through Canvas (using Edfinity), although there might be some assignments you will turn in on paper. Some problems will be quick to answer (you will enter a number of calculate, for example). Others will require you to think deeply and carefully about the math we are studying and then submit a written response. All assignments will be listed on Canvas. The assignment for each section will generally be due the night of the class after we have finished discussing the section in class.

Participation: Mathematics is more fun with friends. Class periods will be a mix of lecture, discussion and discovery, with an emphasis on the latter two. Come to class ready to do some math. Outside of class, I encourage you to work in small groups as well. Actively participating in your own learning, as well as helping your classmates, is the best way to succeed in the course.

Attendance Policy: You are expected to attend every class period.

Makeup Policy: In general, missed exams may not be made up and homework may not be turned in late. Exceptions will be made only in *very* extreme cases. Please contact me well in advance whenever possible if you need me to consider such an exception. Note, since quizzes are not announced ahead of time, they cannot be made up under any circumstances.

Classroom Policies: Don't be rude. Please be considerate of your fellow classmates and do not act in a disruptive manor. Turn off your cell phones and mp3 players before coming to class and keep them put away, arrive on time, and do not pack up your things before the end of class. When working in groups, try your hardest to keep the conversation on the mathematics at hand. If you need to leave the room for any reason (like using the restroom) please do so as quietly as possible. Since your cell phones should be off, this of course means **no texting**.

Statement of Academic Integrity: Don't cheat! It is expected that members of this class will observe strict policies of academic honesty. In particular, you are expected to solve homework problems by yourself or together with your group, and not find solutions online. In general, UNC's

policies and recommendations for academic misconduct will be followed. For additional information, please see the Student Code of Conduct at the Dean of Student's website `http://www.unco.edu/dos/Conduct/codeofconduct.html`. In the case of academic appeals, university procedures will be followed. For information on academic appeals, see `http://www.unco.edu/regrec/Current%20Students/AcademicAppeals.html`.

Disability Resources: It is the policy and practice of the University of Northern Colorado to create inclusive learning environments. If there are aspects of the instruction or design of this course that present barriers to your inclusion or to an accurate assessment of your achievement (e.g. time-limited exams, inaccessible web content, use of videos without captions), please communicate this with your professor and contact Disability Resource Center (DRC) to request accommodations. Office: (970) 351-2289, Michener Library L-80. Students can learn more about the accommodation process at `https://www.unco.edu/disability-support-services/`.

Suggestions for a Successful Semester:

1. Your **JOB** as a student of mathematics is to **ask questions**. This can be difficult but it is an important skill that will serve you well. Use this class as a safe place to practice. My promise: any question you ask will only ever improve my opinion of you.
2. Think critically! Don't believe something just because I tell you that it's true. Always ask yourself if you have good reason to believe it.
3. Do all the homework as soon as possible. Practice, practice, etc.
4. Challenge yourself. Some topics we study might come easy to you, others not. You should look for these challenges, work hard, and overcome them. You are here to learn, not to demonstrate what you already know.
6. Don't skip numbers.
7. Work with others. We will do a lot of group work in class. There is no reason you can't continue to work with your new friends on the homework and when studying for exams. Teaching each other mathematics is the best way to learn it.
8. Don't eat raw chicken past the expiration date.
9. If you need help, come see me in my office during the hours listed above or make an appointment with me for some other time. My door is always figuratively open when it's literally open.
10. Most importantly, if you don't understand something: ASK! See suggestion number 1.