

MATH 210 Introduction to Discrete Structures #0923

El Camino College
Spring 2022

Room: ONLINE

Instructor: GREG FRY

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Office Hours on CAMPUS: TTH 12:00-1:00pm in office MBA 241

Office Hours on ZOOM: MW 2:30-3:45pm link sent out each week. Time may vary slightly each week. Other times may be requested.

THIS COURSE is ONLINE. You can access course materials through the El Camino Canvas site. You will upload all assignments through Canvas (you may use email as a backup). You can contact me by messaging me through Canvas or through my El Camino account.

THIS COURSE is ASYNCHRONOUS. This means that there are no live lectures. It is your responsibility to view the recorded lectures in a timely manner that allows you time to study and practice, too. However, exams have set times.

Equipment:

- 1) Any device to look at online videos, attend Zoom meetings and office hours, to read PDFs, and to check email.
- 2) Webcam - You must have access to a webcam. Exams will be taken at home and monitored by a webcam.
- 3) Scanner – You must be able to scan your work and submit it in one file as a PDF. You can do this with a physical desktop scanner, but there are also phone scanning apps that will work. See the attached document for more info on scanning apps.

Text: Discrete Math and Its Applications, Eighth Edition, Kenneth H. Rosen, McGraw-Hill Publishers, 2019. Any calculator without an internet connection or hard drive is allowed in this class.

HOW I WILL CONTACT YOU: Through Canvas using Announcements or Messages or Pronto. You should check the Canvas Announcements every day.

HOW TO CONTACT ME: Through Canvas Messaging or by Pronto or by El Camino College Email. If you contact by email you should put **MATH 210** in the Memo Section. You can also use the Pronto App, a chat application, to ask questions – it's located on the left side of the Canvas screen.

PRONTO: This is a chat group communication App. I will require you to post on this occasionally as part of some quiz grades. You may also use this to ask questions and to have group chats discussing the course. Please be collegial when posting – do not post offensive language or images. Do not post ads for products.

Prerequisite: Math 190 (Calculus I) or the equivalent with a grade of C or higher.

Attendance and Withdrawal Policy: Regular attendance is vital to success in this class. If you have excessive absences I may drop you from the class. However, it is the student's responsibility to be aware of the college drop deadlines and regulations. You are responsible for all announcements I make in class.

Homework: Selected problems will be recommended each week. These will be from the book or from PDFs emailed to you. It is essential that you understand how to do these problems – they will prepare you for quizzes and exams. The homework will not be collected. Feel free to ask questions about any of these.

Solutions to Exams and Quizzes: These will be emailed to you if you take the quiz or exam.

Grade Breakdown: Each score will be recorded as a percent from 0 to 100.

3 Exams 20% each, Quiz average 20%, Final Exam 20%

Letter Grades:

A 90% B 80% C 70% D 60%

Incomplete grades are issued only in the case of an emergency and only if these three conditions are met: i) student has missed the final exam, ii) student has a passing grade on all other work attempted and iii) a legitimate reason (with proof) is provided in the form of doctor's note, court document, car repair bill, etc.

Tutoring: The Math Tutoring Center is available online – link on left side of CANVAS page.

Quizzes: There will be at least one quiz per week. The first will be online with a webcam monitoring so we can test either Zoom or the Lockdown Browser. The remaining quizzes will be take-home quizzes where you have several days to complete and you may refer to your notes, my notes, the textbook and videos. You may also discuss with classmates, but you should do your own work. These will cover the material in the sections covered that week. There are no make-ups and no scores are dropped. Missed quizzes are a 0.

Exams: There will be three exams distributed online and taken via webcam using Zoom or Lockdown Browser. No Make-ups. No Exam scores are dropped. Missed exams are a 0. Have your photo ID available during the exam since I may ask for verification at some point. You may also take the exam on campus if I am on campus that day.

Note on Showing Work: You must show work using the methods discussed in the lectures, the notes, the textbook or in Zoom office hours. One goal of the course is for you to learn the specific methods stressed in this course. You are welcome to research other ways to do problems, but they are not allowable on exams and quizzes unless you discuss them with me first and I give approval.

Final Exam: The comprehensive final exam will be during the final week of class.

Important Information About Taking Exams and the Final Exam: When working on exams, students are expected to use a computer that has a strong internet connection and that is not likely to crash. The student is solely responsible for any crashes or lost connections before or during exams, and is also responsible for any points deducted or lost due to these causes. Please consider before taking this course.

Important Information About Submitting Exams and the Final Exam: You must upload the exam before the online exam window closes. Extra time is allocated for exam to allow for scanning and uploading. It is your responsibility to include all pages. Any missing can't pages can't be submitted after the exam ends. Also, make sure that your scan is clear and readable – if a page isn't legible, then you will not get points for what can't be read. If you are unsure if your exam was uploaded through Canvas, then you should submit a second way just to be sure: by attaching it to a Canvas message or to an email.

File Naming: All submitted files must be combined in a single PDF and named in the format:

Last Name – First Name – M210 – Quiz/Exam Number

For example: Newton-Isaac-M210-E1

Zoom Meeting Etiquette: A collegial attitude should be maintained at all times. You must show respect for everyone attending a Zoom meeting or you will not be allowed to participate in future Zoom meetings and you will be referred to the college administration for disciplinary action.

Student Misconduct: Cheating will not be tolerated. You must do your own work on exams, using methods from class. Do not share answers with other students, do not access and use answers from any websites or apps. Any cheating will result in a 0 on that exam and it will count as a double exam. Additionally a school report will be filed which could result in further disciplinary action.

Academic Dishonesty: El Camino College places a high value on the integrity of its student scholars. When an instructor determines that there is evidence of dishonesty in any academic work (including, but not limited to cheating, plagiarism, or theft of exam materials), disciplinary action appropriate to the misconduct as defined in BP 5500 may be taken. A failing grade on an assignment in which academic dishonesty has occurred and suspension from class are among the disciplinary actions for academic dishonesty (AP 5520). Students with any questions about the Academic Honesty or discipline policies are encouraged to speak with their instructor in advance.

Time Commitment: It is expected that for every hour of class lecture approximately two hours is required for homework and study time.

Privacy: I am not allowed to discuss your performance in this class with anyone except for you. I will not answer any questions from parents, family or friends about your grade or attendance.

Note on Grading: All answers must be justified by showing work or clearly giving a reason. Partial credit is given at my discretion. You must use the method specified in the problem statement to get credit for a problem. Clearly indicate your final answer by circling it or underlining it.

Rescoring Exams/Quizzes: If you find that I have made an error in grading, then you may resubmit the exam or quiz – do not write on the test – write a note, attach it to the exam, and give it to me for evaluation. There is no danger of losing more points – the score will either stay the same or it will increase. The deadline for resubmission is one week after a quiz/exam is returned.

You must earn your Grade: You will have plenty of opportunities to show me that you understand the material. Do not beg for grades based on arguments about your GPA or your scholarship or transfer opportunities – I do not give grades – you earn them. If you have health, family, car, or legal problem, then you may discuss it with me, and I will try to accommodate you, but you must do all of the work. If the problems are too great, then it is best that you retake the class when you are not so burdened. Vacations are NOT a valid reason for missing work. I do not deal with parents and I don't have to.

Accommodations: It is the policy of the El Camino Community College District to encourage full inclusion of people with disabilities in all programs and services. Students with disabilities who believe they may need accommodations in this class should contact the campus Special Resource Center as soon as possible. This will ensure that students are able to fully participate. As well one may contact the instructor privately to discuss your specific needs. The Special Resource Center is located in the southeast wing of the Student Services Center, (310) 660-3295. More guidelines for students with disabilities may be found on page 27 of 2013-2014 College Catalog or may visit their website at www.elcamino.edu/academics/src <<http://www.elcamino.edu/academics/src>> ."

Schedule – Spring 2022

Week 1 (2/14-2/18): 1.1-1.6	Quiz #1 TH 2/17 2-2:30pm
Week 2 (2/21-2/25): 1.7-1.8, 2.1-2.2	
Week 3 (2/28-3/4): 2.3-2.6	
Week 4 (3/7-3/11): 5.1-5.2, 3.1-3.3	
Week 5 (3/14-3/18): Exam #1	TH 2:30-5:00pm
Week 6 (3/21-3/25): 4.1-4.4	
Week 7 (3/28-4/1): 4.5-4.6, 6.1-6.2	
Week 8 (4/4-4/8): 6.3-6.5, 7.1	
*** SPRING BREAK: 4/11-4/15 ***	
Week 9 (4/18-4/22): Exam #2	TH 2:30-5:00pm
Week 10 (4/25-4/29): 7.2-7.4	
Week 11 (5/2-5/6): 8.1-8.2, 8.5-8.6	
Week 12 (5/9-5/13): 9.1, 9.5, 10.2-10.4	
Week 13 (5/16-5/20): 10.5-10.8	
Week 14 (5/23-5/27): Exam #3	TH 2:30-5:00pm
Week 15 (5/30-6/3): 11.1, 11.4, 11.5	
Week 16 (6/6-6/10): FINAL EXAM	TH 12/16 2:30-5:00pm

Exam Dates could change at my discretion, but I would give at least a one week notice.
The week a section is covered could change, but we will cover all sections.

Drop Dates: Sunday, February 27th – No Notation
Friday, May 13th – Drop with a W

Sections to be covered/Good practice problems

1.1 Propositional Logic	p13 #11, 13, 19, 29, 33, 37, 39, 41
1.2 Applications of Propositional Logic	p23 #17, 21-41odd
1.3 Propositional Equivalences	p38 #7, 11, 21-37odd
1.4 Predicates and Quantifiers	p56 #5, 7, 11-15, 23, 25, 33, 35, 37
1.5 Nested Quantifiers	p68 #7, 9, 11, 25, 27, 31, 33, 39
1.6 Rules of Inference	p82 #5, 7, 9, 15, 19, 31
1.7 Introduction to Proofs	p95 #5-19 odd, 27, 29, 31, 33, 35, 41, 43
1.8 Proof Methods and Strategy	p113 #9, 21, 37, 43-49 odd
2.1 Sets	p131 #7-13odd, 21-29odd, 33-47odd
2.2 Set Operations	p144 #1-37odd, 41, 43, 45, 53-57odd
2.3 Functions	p161 #9-15all, 21, 23, 33, 35, 47-55odd
2.4 Sequences – Recurrences (p167-169)	p177 #9-17odd, 45, 47
2.5 Cardinality of Sets	p186 #1-11odd, 15-21odd
3.1 Algorithms	p214 #9, 13, 31, 37, 43, 47, 57, 59
3.2 Growth of Functions	p228 #1-11odd, 25, 27
3.3 Complexity of Algorithms	p241 #1-9 odd
4.1 Divisibility and Modular Arithmetic	p258 #3-11odd, 17-23odd, 41-47odd
4.2 Integer Representations and Algorithms	p269 #1-11odd, 25, 27, 31, 33, 37
4.3 Primes and Greatest Common Divisors	p288 #5, 15, 21, 33, 39, 41, 43, 49
4.4 Solving Congruences	p301 #5-17odd, 21, 27, 31-39odd
4.5 Applications of Congruences	p309 #15-29 odd (check digits)
4.6 Cryptography	p322 #1-13odd, 25, 27, 29, 31
5.1 Mathematical Induction	p350 #1-23odd, 31-43odd, 49, 59
5.2 Strong Induction and Well-Ordering	p362 #1-15odd, 25-29odd, 33, 37
5.3 Recursive Definitions	p378 #13, 15, 17, 25, 27

6.1 The Basics of Counting	p416 #1-73odd
6.2 The Pigeonhole Principle	p426 #1-21odd, 35, 37-43odd
6.3 Permutations and Combinations	p435 #1-47odd
6.4 Binomial Coefficients and Identities	p444 #17-33odd
6.5 Generalized Permutations and Comb	p454 #1-47odd, 53-61odd
7.1 Intro to Discrete Probability	p475 #1-39odd
7.2 Probability Theory	p492 #7-11odd, 17-35odd
7.3 Bayes' Theorem	p501 #1-11odd, 15, 19, 21
7.4 Expected Value	p518 #1-13odd
8.1 Applications of Recurrence Relations	p536 #1-27odd
8.2 Solving Linear Recurrence Relations	p550 #1-35odd, 45
8.5 Inclusion-Exclusion	p584 #1-27odd
8.6 Applications of Inclusion-Exclusion	p591 #1-21odd
9.1 Relations and Their Properties	p608 #1-21odd, 31, 43-51odd
9.3 Representing Relations	p626 #1-31odd
9.5 Equivalence Relations	p646 #1-15odd
10.1 Graphs and Graph Models	None
10.2 Graph Terminology	p699 #1-9odd, 21-25odd, 37-45odd, 61
10.3 Representing Graphs and Isomorphism	p710 #1-21odd, 39-51odd, 59-69odd, 73
10.4 Connectivity	p725 #1-33odd, 47, 63
10.5 Euler and Hamilton Graphs	p739 #1-15odd, 19-47odd
10.6 Shortest-Path Problems	p751 #1-11odd, 25, 27, 29
10.7 Planar Graphs	p760 #1-15odd, 19-25odd
10.8 Graph Coloring	p768 #1-25odd
11.1 Intro to Trees	p791 #1-21odd
11.4 Spanning Trees	p832 #1-15odd
11.5 Minimum Spanning Trees	p839 #1-9odd

Catalog Description

This course is a study of mathematical ideas and techniques to analyze problems and algorithms which occur in Computer Science. Topics covered include: logic, set algebra, functions, algorithms, the integers, mathematical induction, elementary matrix algebra, mathematical reasoning, combinatorics, recurrence relations, relations, graphs and trees.

Course Objectives

1. Use the standard operations and techniques of propositional logic, set algebra, functions, sequences, and series.
2. Determine the complexity of algorithms.
3. Use the division and Euclidean algorithms and other techniques to find the prime factorization of a given integer, to find the least common multiple and greater common divisor of a given set of integers, to rewrite a given number in another base, and to perform modular arithmetic.
4. Prove mathematical theorems using direct proofs, indirect proofs, trivial proofs, proof by contradiction, proof by contraposition, proof by cases, and proof by mathematical induction.
5. Disprove a statement by producing a valid counterexample.
6. Define sequences and sets recursively.
7. Evaluate a given algorithm that is defined recursively.
8. Solve combinatoric problems using permutations, combinations, inclusive-exclusion, and the pigeonhole principle.

9. Prove the binomial formula and use it to expand a given binomial and to find the coefficient of a particular term in an expansion.
10. Model a combinatoric problem with a recurrence relation and solve it.
11. Determine whether or not a given relation is an equivalence relation.
12. Solve problems in graph theory that relate to graph isomorphisms, planar graphs, and Eulerian and Hamiltonian paths.
13. Prove the standard graph theorems.
14. Solve problems using tree traversal, spanning trees, and minimal spanning trees.

SLO Statements

SLO#1 UNDERSTANDING CONCEPTS - Students will explain and demonstrate an understanding of the key principles of logic, number theory, combinatorics, probability and graph theory.

SLO#2 SOLVING PROBLEMS - Students will use logic, functions, number theory, and combinatorics to solve a variety of problems, including application problems and computer science algorithm analysis.

SLO#3 GRAPHS - Students will analyze and solve problems in graph theory.

SLO#4 PROOFS - Students will analyze and construct proofs in logic, number theory, combinatorics, probability and graph theory.