Math 220.101 Fall 2017 CRN 3169

Discrete Structures

Dr. Carl Mummert

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Marshall University

Course Title/Number	**Math 220: Discrete Structures** **CRN 3169**
Semester/Year	Fall 2017
Days/Time	Tuesday and Thursday 8:00am – 9;15am
Location	WAEC 1105
Instructor	Carl Mummert
Email	mummertc@marshall.edu
Phone	304 696-6156
Office	Morrow Library 110
Office Hours	Tuesday and Thursday: 10:00am – 11:30am Monday and Wednesday: 10:00am – 11:30am
University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy by going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to **www.marshall.edu/academic-affairs/policies/** *Policies:* Academic Dishonesty / Excused Absence Policy for Undergraduates / Computing Services Acceptable Use / Inclement Weather / Dead Week / Students with Disabilities / Academic Dismissal / Academic Forgiveness / Academic Probation and Suspension / Affirmative Action / Sexual Harassment.

Course description

Sets, relations, directed and undirected graphs, monoids, groups, lattices, Boolean algebra, and propositional logic.

Who should take this course?

Math 220 is a course in discrete mathematics. You will learn about Boolean logic, sets and relations, counting, graphs and trees, and more. These topics are particularly relevant to computer science. Topics such as the Fibonacci numbers and Pascal's triangle are also important in elementary education.

Prerequisite

ACT Math 27 or MTH 132 or MTH 229 or IST 131.

Textbook

Applied Discrete Structures version 3.3 by Alan Doerr and Kenneth Levasseur. This is a free textbook. You may view the book online at http://faculty.uml.edu/klevasseur/ads/ (HTML) and http://faculty.uml.edu/klevasseur/ads-latex/ads.pdf (PDF). You may also purchase a printed copy from Amazon at ISBN 1-1055-5929-7. The price as of July 19 was $36.00.

Schedule

Class meetings will be in WAEC 1105 from 8:00am to 9:15am, Tuesday and Thursday. This is an early period, so please feel free to bring coffee or other drinks. Non-disruptive food is also OK.

Calculators

Few of the problems in this course are made easier by calculators. The main reason to use a calculator here is for basic arithmetic. You are welcome to use a calculator during class and on exams. Acceptable calculators include scientific models like the TI-36 and graphing calculators like that TI-83. Laptops, tablets, phones, and any other devices with networking capability may not be used on exams.

Computers

This course has an associated page on MU Online, which will be used to distribute assignments and handouts. You should expect to access MU Online frequently each week. For this reason, computer and internet access is required. You will also require access to your Marshall email account for course communications.

Course goals - what will you learn?

At the end of this course:

1. You will be able to solve basic combinatorial counting problems using a variety of combinatorial techniques.
2. You will be familiar with the basic properties of graphs and trees, and able to state and apply the key definitions. You will be able to state and execute fundamental algorithms for graphs and trees.
3. You will be able to set up and solve first-degree and second-degree linear recurrence relations.
4. You will be able to recall and explain examples, compare them with each other, and apply them to produce counterexamples.
5. You will be able to write proofs in English to verify the correctness of propositions related to the course material.
6. You will be able to write proofs with a level of mathematical correctness and precision appropriate for an undergraduate student.

See “Learning outcomes” below for more information.

About the professor

Dr. Carl Mummert
Office: Morrow Library 110
Phone: (304) 696-6156
E-mail: mummertc@marshall.edu

Office hours

I am in my office most of the time, and you are welcome to come any time I am there. My ‘scheduled office hours” are:

Monday	10:00am – 11:30am
Tuesday	10:00am – 11:30am
Wednesday	10:00am – 11:30am
Thursday	10:00am – 11:30am

Assignments – what do you have to do?

There are two kinds of assignments in this course:

- *Weekly homework and quizzes* (35% of grade): There will be a written homework assignment due each week. I will occasionally give quizzes, which will be announced ahead of time. Quizzes count the same as homework assignments.
- *Exams* (65% of grade): There are three exams during the semester (15% each) and one comprehensive final exam (20%).

Grading summary

Exam 1	15%
Exam 2	15%
Exam 3	15%
Final exam	20%
Homework and quizzes	35%

Grading scale

Your grade in the course will be assigned on the following scale:

90 – 100	A
80 – 90	B
70 – 80	C
60 – 70	D

Attendance policy

The overall expectation is that you will attend every class, except for excused absences. I will keep a record of attendance each day. You may always turn in homework early, but you may not turn in late homework without an excused absence. Make up quizzes are available only for excused absences, and must be taken within two weeks of returning to class after the absence. Please email me to schedule a time to make up a missed quiz.

Important dates

September 4	Labor day holiday
September 21	Exam 1
October 24	Exam 2
October 27	Last day to drop course
November 16	Exam 3
November 20–24	Thanksgiving break
December 8	Final exam

Policies

For a complete list of the university policies that apply to this class, please see the undergraduate handbook at the following URL:

www.marshall.edu/wpmu/academic-affairs/policies/

Anti-plagiarism policy

Plagiarism of any kind is not permitted. Students who plagiarize on an assignment will receive a zero for that assignment, and the university-wide plagiarism policy will be followed. I will give you detailed information on what is considered plagiarism in this class.

Excused absences

I will excuse any absences that are covered by the university's excused absence policy, including:

1. *University-sponsored activities*: performing arts, debate and individual events, honors classes, ROTC, and departmental functions, etc. You must secure an excuse from the Dean of Students, Dr. Steve Hensley, in the MSC.
2. *Athletics*: official athletic events sponsored by the Athletic Department. Your coach will give you a letter to give to your instructors.
3. *Other university activities*: student government, student organizations, etc. The organization's sponsor will will give you a letter to give to your instructors.
4. *Short-term military obligation*. You must present your orders to the Dean of Students, Dr. Steve Hensley, in the MSC.
5. *Jury duty or subpoena*. You must secure an excuse from the Dean of Students, Dr. Steve Hensley, in the MSC.
6. *Religious holidays*. You must secure an excuse from the Dean of Students, Dr. Steve Hensley, in the MSC.

For other types of absences, I will decide on a case by case basis. Travel plans and work obligations can make it difficult to attend class, but they do not qualify as excused absences.

Learning outcomes

The table below shows the learning outcomes for the course. They describe the main skills that you will be tested on in the course. In general, the assignments that are intended to “practice” a skill will be graded with more partial credit than assignments that are intended to “assess” a skill.

Learning outcome	How the outcome will be practiced	How the outcome will be assessed
solve basic combinatorial counting problems using a variety of combinatorial techniques.	Homework	Exams
familiar with the basic properties of graphs and trees, and able to state and apply the key definitions. You will be able to state and execute fundamental algorithms for graphs and trees.	Homework	Exams
Recall and explain examples, compare them with each other, and apply them to produce counterexamples.	Homework, Quizzes, Online Activitives	Exams
Write proofs to verify the correctness of propositions related to the course material.	Homework	Exams
Write proofs with a level of mathematical correctness and precision appropriate for an undergraduate student.	Homework	Exams
set up and solve first-degree and second-degree linear recurrence relations.	Homework	Exams

Proof grading rubric

	Mastery (10)	**Developing (8)**	**Beginning (6)**	**Rudimentary (4)**
Mathematical writing	All variables are properly introduced before they are used. The use of quantifiers is clear. Symbols and terminology are used appropriately. The solution is written in polished prose.	Some variables are used without being introduced. Symbols and terminology are used appropriately. The solution is written in prose.	Some variables are used without being introduced. Some symbols or terminology are used incorrectly. The bulk of the solution is written in prose.	Some variable are written without being introduced. Symbols are used inappropriately. Some terminology is used incorrectly. The solution is not written in prose form.
Logical reasoning	The logical reasoning is correct and clearly explained. The solution is complete: all cases have been examined, all significant steps have been justified, and all assumptions have been clearly stated. The solution is clearly organized and the argument is easy to follow.	The logical reasoning is essentially correct, although some parts are not clearly explained. Only minimal revision would be needed to correct the explanation. All cases have been examined, all significant steps have been justified, and all assumptions have been clearly stated. The solution is organized well enough that the structure of the argument is clear.	The logical reasoning has a minor flaw, which requires rewriting part of the argument. The solution is not complete: some case has not been examined, a significant step has not been justified, or an unspoken assumption has been made. Some parts of the solution are not clearly explained. The organization makes it difficult to discern the structure of the argument.	The logical reasoning has a serious flaw or multiple minor flaws. Significant revision is required to correct the solution. The solution is not complete: some case has not been examined, a significant step has not been justified, or an unspoken assumption has been made. Some parts of the solution are not clearly explained. The solution is not well organized.
Surface features	The problem is clearly stated. Grammar and spelling errors are rare. The formatting matches the submission guideline.	The problem is clearly stated. Grammar and spelling errors do not distract from the content. The formatting matches the submission guideline.	The problem is clearly stated. Grammar and/or spelling errors distract from the content. Formatting does not meet the submission guideline.	The statement of the problem is missing or unclear. Grammar and/or spelling errors distract from the content. The formatting does not meet the submission guideline.