# **Discrete Structures**

Dr. Carl Mummert

August 19, 2017 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 <a href="http://faculty.uml.edu/klevasseur/ads/">http://faculty.uml.edu/klevasseur/ads/</a> (HTML) and <a href="http://faculty.uml.edu/klevasseur/ads-latex/ads.pdf">http://faculty.uml.edu/klevasseur/ads-latex/ads.pdf</a> (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:

Monday10:00am - 11:30amTuesday10:00am - 11:30amWednesday10:00am - 11:30amThursday10:00am - 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%
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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	Α
80 –	90	В
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 19 Exam 1
October 27 Last day to drop course
November 16 Exam 2
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	How the
	will be practiced	outcome will be
		assessed
solve basic combinatorial counting problems using a va-	Homework	Exams
riety of combinatorial techniques.		
familiar with the basic properties of graphs and trees,	Homework	Exams
and able to state and apply the key definitions. You will		
be able to state and execute fundamental algorithms for		
graphs and trees.		
Recall and explain examples, compare them with each	Homework, Quizzes,	Exams
other, and apply them to produce counterexamples.	Online Activitives	
Write proofs to verify the correctness of propositions re-	Homework	Exams
lated to the course material.		
Write proofs with a level of mathematical correctness and	Homework	Exams
precision appropriate for an undergraduate student.		
set up and solve first-degree and second-degree linear re-	Homework	Exams
currence relations.		

# **Proof grading rubric**

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