

Welcome to Math 260 Sets and Logic – Spring 2018

Section 1: 10:00 - 10:50 M-F in Bouillon 111; Assistant: Rose McDonald, Office Hours M 1-3 pm

Instructor: Dr. Jean Marie Linhart

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Office Hours: TuWe 1:30 - 3 pm; Th 1:15 - 1:55 pm
and by appointment

Required Text: *Logic, Sets and Proof: An Introduction*, by James D. Harper, CWU coursepack available from the Wildcat Shop.

Recommended Text: *How to Prove It: A Structured Approach, 2nd edition*, by Daniel J. Velleman. This text is strongly recommended for mathematics majors. It is also used in Math 499S, and you will find it a valuable resource in Math 335, 351, 365, 371.

We are going to cover almost the entire book over the course of the quarter.

Reading the book will help you to master the material for this course, but reading a math book (or any academic text) isn't like reading a newspaper article or a novel. You should have paper out next to you where you are simultaneously taking notes of important points and vocabulary encountered in the text. You should also note any questions that you have. Bring your notes to class and be sure your questions get answered. I will provide you with some "guided notes" to fill in while you are reading the book. Try reading the book and filling these out at home before coming to class.

Course Goals:

If a number is divisible by 4, then it is even. By the previous statement, what do you know if you know if a number is not divisible by 4? You might think you know the number is also not even, but this is not true, as 2 and 6 are examples of even numbers that are not divisible by 4. This sentence simply doesn't tell you anything about numbers that are not divisible by 4, and it shouldn't. Being precise in our words and using careful logic in our thinking is the subject matter for this class.

We go over elementary logic and truth tables, rules of inference, which apply both to mathematics and the logic used in constructing code and the values of variables in computer science. For mathematics majors, this course helps increase your mathematical maturity and gets you the logical foundations for proof-writing which is an (in many cases the) essential facet of the discipline. Proofs must be mastered even by computer scientists and other applied mathematicians, as theoretical mathematics gives us the practical tools we use to actually compute things and that tell us that algorithms are correct and eventually terminate.

Critical thinking and writing are two crucial areas for success in the workplace, and these are the important ingredients for success in this class. Instead of long calculations and graphs, this class requires you to describe your thought process, and justify the steps you take.

I look forward to being your guide on this journey!

Grades/Exams/Homework

Assignments and grades will be posted to Canvas.

Grades

Grades will be calculated using the following weighting system and scale:

Homework and Attendance	5%	93-100	A	80-82.9	B-	67-69.9	D+
Quizzes	15%	90-92.9	A-	77-79.9	C+	63-66.9	D
Midterm Exams (3)	55%	87-89.9	B+	73-76.9	C	60-62.9	D-
Final Exam	25%	83-86.9	B	70-72.9	C-	Below 60	F

Homework

We will have a graded written assignment most weeks, and additional ungraded practice will be required for success. The purpose of homework problems are to help you learn the material, and determine what you understand well and where you have questions that you need to have answered. Please get your questions answered.

Present your work neatly, in logical order. Work that is difficult to read may not be read or graded. First restate the question if it is not already on your paper, then present your solution. Always include a graph

or diagram if needed. When possible, use a ruler to make truth-tables. Stop and write a sentence or three to explain what is going on.

Quizzes

We will have a weekly quiz which may consist of two parts, an in-class quiz on Friday, and problems taken home on Friday and handed in on Monday. In class problems should take 10-15 minutes to complete, and take-home problems should take 30-40 minutes to complete. Take-home quiz problems are meant to be done on your own, without the help of a classmate or tutor. Quizzes will be on the material recently covered in class up through Wednesday.

Quiz solutions that are difficult to read may not be read or graded. Make sure the work you had in is legible and neatly organized.

Exams

There will be three in-class midterm exams and a final exam. All exams in this class are cumulative.

Office Hours and Getting Help

Office hours are scheduled to make sure there is a time that you can come see me because you have questions on course material or have issues that you otherwise want to talk to me about. I welcome your visit, and office hours will be scheduled during the first week of class when I know what will best fit my students' schedules. Keep in mind, it is impossible for me to schedule office hours at a time convenient to everyone, and I encourage you to ask for an appointment if you need one. I also strive to promptly answer questions posted over email or by Canvas message.

We've all needed help with something. Working with students on math and to succeed in school and in their future career is one of the best parts of my job. If you have questions on course material or need to if you find yourself feeling uncertain, wanting a deeper understanding, wanting to get better grades, or struggling to learn and succeed, please take advantage of opportunities to ask questions in class, post questions on Canvas, and come see me. I want to answer all your questions thoroughly, even though it may not be possible to answer every question during class itself. Please give me a chance to help. If you can't attend office hours, you are welcome to ask questions by email or by Canvas message. If you want an appointment, please send me an email and suggest several times when you are available so we can find a mutually convenient time to meet.

Secrets for Success

1. Productive struggle is your goal – learning anything new isn't easy, but you want to make continual incremental progress.
2. Don't be afraid to make mistakes! When you get something wrong, take time to figure out why it is wrong and why the correct answer is correct. Fix your thinking.
3. Read the book before class and take notes on what you read.
4. Attend class daily and participate willingly, whether it is by asking questions, answering questions, or working with others.
5. Budget time for homework – many students need to spend 10 hours or more per week on work outside of class to truly learn the material. It can help to have a regular times when you know you'll work on math.
6. Start on the homework problems as soon as you can.
7. Attempt to work on your math every day or at least every other day. The hardest part is usually getting started. Find a quiet place to work, get your book and notes together. Put away distractions such as your cell phone, TV, or laptop. Then, set a timer for 30 minutes (or 15 if you are having a bad day) and resolve to put your best effort in for at least that length of time.
8. Discussing problems and solutions with peers and using the internet is encouraged, with two caveats.
 - Before you go ask or look for a solution, make an honorable effort to solve the problem on your own. Spend time thinking and strategizing before asking or searching for help.
 - You must write up your understanding of a solution **on your own**. Practice makes perfect! See my [guide to group work and using outside resources](http://www.cwu.edu/math/group-work-and-using-outside-resources), <http://www.cwu.edu/math/group-work-and-using-outside-resources>, on the web.

9. As you progress in your university studies and in your career, problems get more and more difficult to solve. You may have to start with easier (possibly unassigned) problems before you are even ready to start to work on an assigned problem. Some problems may take more than an hour to solve. Persistence pays off.
10. Explain what you are doing. Use your words. This will help you to understand the concepts critical to success in the class, and will help you get a higher grade.
11. I am always happy to help you if you are stuck. You will get the most out of my help and the University Math Center if you attempt the problem on your own or with your peers before asking an expert.
12. Do your scratch work before you do a final write-up of your work. What you hand in should be neat and professional and all pages should be stapled together.

Late and Make-up Policy

Field trips, illnesses, accidents and deaths in the family are a part of life. I will arrange to take late work or for a make-up or alternative if you contact me either ahead of time or within 24 hours and provide documentation.

I expect you to hold yourself to professional standards in this class. Because even professionals sometimes run into conflicts, I will accept at most **one** late homework assignment or quiz refund, no questions asked, for full credit, provided it is handed in at the beginning of the next class period, or if you get my written (emailed) agreement to hand it in later. Likewise, you may make-up one in-class quiz, no questions asked, provided you contact me within 24 hours of missing the quiz to arrange the make up, and make it up within 2 business days of the missed quiz.

Emailing me with information about absences and late work will help to make sure there's a documentation trail in case I don't remember a verbal conversation.

You must provide a documented excuse to make up a missed exam.

Academic Integrity

You have to do your own practice in order to gain a new skill; we all know this. Most of academic integrity is simply making the work you hand in reflect the understanding in your brain. Since understanding something while you are reading it or looking at or having someone explain it to you it is often different from being able to explain or produce it yourself, write up your homework by yourself when you've put all the other resources away.

All in-class quizzes and tests are expected to be done without any resources except those explicitly authorized by the instructor. Please be discreet about discussing exams and quizzes when others may not yet have taken the exam or quiz. Someone may be taking an exam or quiz at a later time than you are.

Students with Disabilities

I am happy to work with students with disabilities. To set up academic adjustments in this class, you should give me a copy of your *Confirmation of Eligibility for Academic Adjustments* from the Disability Support Services Office and come see me in office hours or make an appointment to come see me as soon as possible so we can discuss how the approved adjustments will be implemented in this class. Students without this form should contact the Disability Support Services Office, Hogue 126, dssrecept@cwu.edu, <https://www.cwu.edu/disability-support/>, phone (509) 963-2171. **Testing requests with testing services must be submitted at least 48 hours before an exam is given, or you will have to take the exam with the rest of the class.**

Important Dates

April 2 – Last Day for Add/Drop
 April 20 – first mid-term exam
 May 11 – second mid-term exam
 May 11 – uncontested withdrawal deadline
 May 16-17 – SOURCE Days, class as usual
 May 25 – Third Exam
 May 28 – Memorial Day, no classes
 June 1 – last day of classes
 W June 6 – 8-10 am Final exam

Math 260: Tentative Schedule / Reading:

Changes to the schedule will be announced in class; changes to the exam schedule will also be posted to Canvas.

T Mar 27	Introduction; Why Prove Theorems?
W Mar 28	1.1 Statements, Logic
Th Mar 29	1.2 Biconditional, Logical Equivalence and Implication
F Mar 30	1.2 Biconditional, Logical Equivalence and Implication
M Apr 2	1.3 Sets and Predicates
T Apr 3	1.3 Sets and Predicates
W Apr 4	3.1 Proofs and Sets
Th Apr 5	3.1 Proofs and Sets
F Apr 6	Quiz, 1.4 Quantifiers
M Apr 9	1.4 Quantifiers
T Apr 10	1.4 Quantifiers
W Apr 11	1.5 Rules of Inference
Th Apr 12	1.5 Rules of Inference
F Apr 14	Quiz, 1.6 Negations
M Apr 16	1.6 Negations
T Apr 17	1.6 Negations
W Apr 18	1.7 Distributive and Factor Laws for \vee and \wedge
Th Apr 19	1.7 and 1.8 The Conditional Redux
F Apr 20	Exam 1 over Chapter 1 and section 3.1
M Apr 23	2.1 Direct Proof and Existential Proof
T Apr 24	2.1 Direct Proof and Existential Proof
W Apr 25	2.2 Divisibility
Th Apr 26	2.2 Divisibility
F Apr 27	Quiz, 2.3 The Division Algorithm and Prime Factorization
M Apr 30	2.3 The Division Algorithm and Prime Factorization
T May 1	2.3 The Division Algorithm and Prime Factorization
W May 3	2.4 The Contrapositive Proof
Th May 4	2.4 The Contrapositive Proof
F May 5	Quiz, 2.5 Proof by Cases
M May 7	2.5 Proof by Cases
T May 8	2.6 Reductio Ad Absurdum: Proof by Contradiction
W May 9	2.6 Reductio Ad Absurdum: Proof by Contradiction
Th May 10	2.7 Logs and Contradiction
F May 11	Exam 2; Chapter 1, 2.1 - 2.6
M May 14	2.7 Logs and Contradiction
T May 15	2.7 Logs and Contradiction
W May 16	5.1 Induction
Th May 17	5.1 Induction
F May 18	Quiz, 5.2 Induction
M May 21	5.2 Induction
T May 22	5.2 Induction
W May 23	5.2 Induction
Th May 24	3.1-3.2 Proofs and Sets
F May 25	Exam 3; Chapter 1, Chapter 2, Induction
M May 28	Memorial Day Holiday, No Class
T May 29	3.1-3.2 Proofs and Sets
W May 30	4.1-4.2 Functions
Th Jun 31	4.1-4.2 Functions
F Jun 1	To Be Determined
M June 4	Finals Week Office Hours 1-3 pm
W Jun 6	8-10 am, Final Exam