

Professor: Dr. Chris Black
Office: Des Moines HEC #268
Office Hours: By arrangement
Office Phone: x3850 (but it's best to contact me via email)
Email : blackc@cwu.edu

Required Text: *How to Prove It: A Structured Approach*, Third Edition, Daniel J. Velleman,
Cambridge University Press, 2019

GOALS FOR COURSE:

Upon completion of MATH 260, students will:

- ... be able to understand and use logical terminology and symbolism, and to write the contrapositive and negation of a compound statement and determine its truth value;
 - ... be able to present logically correct proofs of mathematical statements, using a variety of methods including mathematical induction and proof by contradiction, and be able to determine the veracity of a mathematical statement and then prove or disprove it;
 - ... understand and prove theorems in areas which are basic to much of mathematics, including set theory, functions and relations, elementary number theory and cardinality;
 - ... actively participate in the classroom dialogue, both as an individual and as a member of a small group;
 - ... increase the use of precise mathematical language, both orally and in writing;
 - ... gain sufficient mathematical maturity to be able to successfully undertake subsequent advanced coursework in mathematics.
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COURSE PHILOSOPHY:

In this course, we will be using topics from many different branches of mathematics to illustrate different logical structures and methods of proof techniques. We will touch upon ideas in set theory, number theory, calculus, linear algebra, and other topics not listed here. Because modern mathematics is rooted in set theory, many of our ideas will be expressed using set-theoretic terminology. We will focus on learning to speak and write in concise mathematical language, and to formulate and prove our own propositions in areas that form the basis for advanced mathematics.

COURSE TOPICS:

- ▷ Sentential and quantificational logic, including truth tables, connectives and set theory
- ▷ Proof strategies & techniques: negations, conjunctions, existence and uniqueness proofs
- ▷ Relations & functions
- ▷ Mathematical induction
- ▷ Cardinality & infinite sets

HOMEWORK:

Much of your work for this course will not be collected and graded. You will be assigned several problems from each section of the text; three of these are candidates for presentations (see below); two of these problems will be presented, and the third will be collected and graded. The majority of these problems will be proofs, which are expected to be written formally. Proofs will be graded according to the *Assessment of Proof Writing* document to be distributed in class. You may work in groups to discuss the homework problems, however the final versions should be written individually. **It is considered plagiarism to find solutions to proofs assigned as homework in other texts or on the internet.** You are invited to ask me for hints on homework problems.

HOMEWORK REWRITES:

The primary goal of this course is mastery of logic and mathematical proof-writing. However, it is not to be expected that this mastery will occur with only one attempt. Thus, graded proofs can be re-worked and re-submitted up to two times. If no numerical grade was assigned, then the proof **must** be rewritten; if the proof received a numerical grade, then you can decide whether or not to rewrite it to improve your score. The score on a rewrite replaces the original score for a problem. When I return homework papers, I will stamp them with the return date. You have one week from that date in which you can analyze your errors, re-write these proofs and return them to me.

PRESENTATIONS:

Each day, two or three students will present solutions to selected homework problems. Students will be chosen at random to present their work. Problems presented can be resubmitted if necessary.

TESTS & FINAL EXAM:

There will be two take-home tests, during which the only allowed resources are the professor and the textbook. Use of the internet, any other written source, or any person other than the professor is considered plagiarism and will result in a score of 0 on the test. The final exam will take place in person on **Tuesday, 3/14/23** during our normal class time. The 100-point final exam will be scaled to 150 points for the final grade calculation.

PARTICIPATION/ATTENDANCE/CITIZENSHIP:

Discussion, interaction, and group problem solving will all be important aspects of this course, which necessitate your attendance.

One of the goals of this course is to increase your comfort with using precise mathematical language. Every career demands that you can communicate clearly and succinctly, both orally and in writing. The best way to develop these communication skills is to actively participate in classroom activities, presentations, discussion and critiques.

Citizenship addresses your behavior and comportment with class members and the professor. We each need to be respectful of other students, other cultures, and differing ideas within our learning community. In particular, in a class where you are expected to critique each other's work, we need to keep our comments constructive.

GRADING:

Homework:	Scale to 200 points	33.3%
Take-Home Tests (2):	200 points (100 pts each)	33.3%
Final Exam:	150 points	25%
Presentations:	30 points total	5%
Participation/Attendance/Citizenship:	20 points	3.3%

ACADEMIC HONESTY AND RESPECT:

Each of us should consider our placement at this institution to be a privilege. We need to have respect for one another and for ourselves. In light of these facts, cheating in any form will not be tolerated. You are encouraged to work together on homework problems, however anything you turn in with your name on it should have been written by you alone. In a course where much of your grade is determined by your proof writing, plagiarism is a concern. The word “plagiarize” is defined by the New Oxford American Dictionary as “the practice of taking someone else’s work or ideas and passing them off as one’s own.” Plagiarism includes but is not limited to:

- Copying another student’s work and submitting it as your own
- Submitting a proof copied from the internet
- Submitting a proof copied from another text
- Consulting **any** source other than the assigned text, your class notes or the professor on a take-home test

Any incidence of plagiarism will not be tolerated.

MENTAL AND EMOTIONAL HEALTH AND SUPPORT:

Stress and other life circumstances that may be out of your control can make learning and focusing difficult. If you find stress or other mental health concerns make academics difficult, Central has resources to support you. I encourage you to reach out as soon as you notice you’re struggling.

- Student Counseling Services: Crisis appointments are available. Call 509-963-1391
www.cwu.edu/medical-counseling/counseling-clinic
 - Mental health crisis support outside of normal business hours: Call 1-800-273-8255 or Text HOME to 741741
 - Wellness Center: Confidential sexual assault and other victim advocacy. Call 509-963-3213 or visit www.cwu.edu/wecare, www.cwu.edu/path
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DISABILITY SERVICES:

Central Washington University is committed to creating a learning environment that meets the needs of its diverse student body. Students with disabilities should contact Disability Services to discuss a range of options to removing barriers, including accommodations: Hogue Hall 126, 509.963.2214, DS@cwu.edu, www.cwu.edu/disability-services.

EXPECTATIONS FOR STUDENT CONDUCT:

Students in this class are expected to interact with students and the professor professionally. Instances of disruptive conduct, obstructive conduct, or harassment (see definitions below from the Washington Administrative Code) will be referred to the Dean of Student Success.

Per WAC 106-125-020, the term “disruptive” or “obstructive” conduct means conduct, not protected by law, that interferes with, impedes, or otherwise unreasonably hinders the normal teaching, learning, research, administrative, or other functions, procedures, services, programs, or activities of the university. The term includes disorderly conduct, breach of the peace, violation of local or university noise policies, lewd or obscene conduct, obstruction of pedestrian or vehicular traffic, tampering with student election processes, or interfering with the orderly conduct of university investigations or disciplinary proceedings, including interfering with or retaliating against any witness, party, or other participant.

The term “harassment” means unwelcome and offensive conduct, including verbal, nonverbal, or physical conduct, that is directed at a person because of such person’s protected status and that is sufficiently serious as to deny or limit the ability of a student to participate in or benefit from the university’s educational program, or that creates an intimidating, hostile, or offensive environment for any campus community member(s). Protected status includes a person’s actual or perceived race, color, national origin, gender, disability, or other status protected by law.

ACCOMMODATION FOR RELIGIOUS OBSERVANCES:

In compliance with RCW 28B.137.010, Central Washington University makes every effort to deal reasonably and fairly with students who, because of religious obligations, have conflicts with scheduled tests, assignments or required attendance. Students must present written notice to their instructor within the first two weeks of class listing the specific dates on which accommodations are required. Contact the Dean of Student Success at (509) 963-1515 for further information.

STATEMENT ON DIVERSITY:

CWU expects every member of the university community to contribute to an inclusive and respectful culture for all in its classrooms, work environments, and at campus events. As a student in this course, you are expected to treat your professors, fellow students, and other people affiliated with your work at CWU with respect, regardless of their sex, race and color, religion and creed, national origin, sexual orientation, gender identity and gender expression, disability and use of assistive devices or a service animal, and veteran or military status.

ADAPTATIONS FOR WINTER 2023:

As we are STILL in the COVID-19 pandemic, the following policies are in effect:

- To the extent that it is possible, please stay in touch with me if COVID-19 affects your ability to do the work in this course.
- If you must miss a class, you do not need to provide a reason. Let me know ASAP so we can work out a way to get you the information you need to proceed.
- Any assignment can be rescheduled as needed – just ask! When possible, ask before the day of the scheduled event, but due to the extraordinary circumstances we’re living under right now, all requests will be honored. Let me know what adjustments you need so I can make the necessary arrangements.