

Course Syllabus

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MATH 260 | Sets and Logic

Fall 2021

General Information

Section 001 -- Class Time: M – F, 10:00am – 10:50am

Location: Zoom

[https://cwu.zoom.us/j/83519172448?
pwd=RS8xKzhwbUtYcHcrTGc1SzVDWdVndz09](https://cwu.zoom.us/j/83519172448?pwd=RS8xKzhwbUtYcHcrTGc1SzVDWdVndz09)
([https://cwu.zoom.us/j/83519172448?
pwd=RS8xKzhwbUtYcHcrTGc1SzVDWdVndz09](https://cwu.zoom.us/j/83519172448?pwd=RS8xKzhwbUtYcHcrTGc1SzVDWdVndz09))

Meeting ID: 835 1917 2448

Passcode: 391458

Section 002 -- Class Time: M – F, 11:00am – 11:50am

Location: Zoom

[https://cwu.zoom.us/j/83821631849?
pwd=K0VIQWRkOFJmam1ydG0zMGYrZ1NLQT09](https://cwu.zoom.us/j/83821631849?pwd=K0VIQWRkOFJmam1ydG0zMGYrZ1NLQT09)
([https://cwu.zoom.us/j/83821631849?
pwd=K0VIQWRkOFJmam1ydG0zMGYrZ1NLQT09](https://cwu.zoom.us/j/83821631849?pwd=K0VIQWRkOFJmam1ydG0zMGYrZ1NLQT09))

Meeting ID: 838 2163 1849

Passcode: 234864

Instructor: *Dr. Emilie Hancock* (Please refer to me as Emilie or Dr. Hancock)

Office: Samuelson 218C

Phone: 509.963.2402

Email: emilie.hancock@cwu.edu

Office Hours*: M - F 12-2pm and by appointment

*Refer to the [course calendar](#) for any planned changes to office hours

Office hours held on Zoom: <https://cwu.zoom.us/j/84141825205?pwd=WUIHNUxIRGItS1kwMERwdlYrNINPZz09>
(<https://cwu.zoom.us/j/84141825205?pwd=WUIHNUxIRGItS1kwMERwdlYrNINPZz09>)

Meeting ID: 841 4182 5205 **Passcode:** 549405

Required Materials

- **Textbook:** *Mathematical Reasoning: Writing and Proof* (<https://scholarworks.gvsu.edu/books/9/>) by Ted Sundstrom. You can download the book online for free, or purchase a paper copy [online](https://www.amazon.com/Mathematical-Reasoning-Writing-Proof-Version/dp/1500143413/ref=sr_1_1?s=books&ie=UTF8&qid=1520897349&sr=1-1&keywords=t+sundstrom). (https://www.amazon.com/Mathematical-Reasoning-Writing-Proof-Version/dp/1500143413/ref=sr_1_1?s=books&ie=UTF8&qid=1520897349&sr=1-1&keywords=t+sundstrom)
- **Canvas Access:** I will update the course site on Canvas frequently with announcements, assignments, handouts, and due dates. Check Canvas daily.

Disability Support Services

Central Washington University is committed to creating a learning environment that meets the needs of its diverse student body. [Disability Services](https://www.cwu.edu/disability-services/) (<https://www.cwu.edu/disability-services/>), serves students with permanent and temporary disabilities attending Central on the Ellensburg campus, online or at any of our eight University Centers. Their mission is to make university life accessible to students with disabilities. They work individually with students identifying barriers, and providing

accommodations to ensure equal access. 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. (<mailto:DS@cwu.edu>)

Course Description and Learning Objectives¹

The primary purpose of this course is to ramp up your ability to think and approach problems like mathematicians, providing a cognitive bridge between more procedural lower-level courses such as Calculus and upper-level abstract courses such as Real Analysis, Probability Theory, or Abstract Algebra. The primary goals of the course are to help you develop the habits of mind of mathematical thinkers and problem solvers such as thinking analytically, engaging in logical reasoning, communicating effectively and with precise language, and using mathematics to advance arguments and increase understanding. Work with written and oral communication is an essential part of the course.

This course concentrates on training you in clear thinking and creative experimentation in the exploration of mathematical ideas. Because proof solidifies intuition into certainty, this course also focuses on the careful use of mathematical language, logical reasoning, and proof. Upon successful completion of this course, you should be able to:

- read, understand, and construct proofs
- write and speak about mathematics using precise mathematical language
- understand the role of definitions in mathematics and use (and possibly construct) them effectively
- understand elementary logical principles and proof techniques
- understand generalization and abstraction and their roles in mathematics
- know how to capture the essential elements of intuitive mathematical objects in precise language that can make them subject to rigorous mathematical analysis (e.g., definitions and axiom systems), and understand the importance of this process in mathematical discourse

Major content topics of the course include proper use of logical connectives and quantifiers, negation of mathematical statements, the equivalence of a statement and its contrapositive, direct proof, proof by contradiction, proof by induction, and basic set theory. Exploration of these topics will follow the outline:

Unit 1: Introduction to Proofs and Logical Reasoning (CH 1 and 2)

Unit 2: Constructing and Writing Mathematical Proofs (CH 3 and 4)

Unit 3: Proof in Context (CH 5)

Grading Scale and Method of Evaluation

Final letter grades will be determined based on your weighted percent grade, rounded to the nearest whole percent.

Letter Grade	F	D	D+	C-	C	C+	B-	B	B+	A-	A
Percent	0-59	60-66	67-69	70-72	73-76	77-79	80-82	83-86	87-89	90-92	93-100

Overall grades will be determined as a weighted average:

- 20% Pre-Class Assignments
- 7% Attendance and Professional Participation
- 58% Standards-Based Mastery Exams

Pre-Class Assignments

Preview activities are designed for you to complete and submit *before* class. This work serves to motivate the upcoming topic and prepare you with necessary background information for in-class activities and discussions. Typically, you will need to read some sections of the textbook, watch some related videos for extra practice, and answer some questions to check for your current understanding of the material. Don't worry if you don't understand all of the material the first time you see it - that's to be expected! These assignments are designed to introduce you to new ideas and terminology at a basic level so that, together, we can extend and practice these ideas in class in an active and engaged way.

Attendance and Professional Participation

Your grade in this category is the percentage of class sessions you attend and participate professionally while present, recorded using Canvas [Roll Call Attendance](#). Regular attendance is essential for successful completion of this course. As a member of a peer learning community, a high degree of professionalism is necessary. CWU expects every member of the university community to contribute to an inclusive and respectful classroom culture. I measure professional participation based on the following criteria:

- Arrive to class on time and stay for the entire class.
- Be present. Focus on learning by being an active participant. Limit side activities and put away cell phones. (If you are anticipating an emergency phone call, just let me know in advance.)
- Come to class prepared. You may need to finish up short activities between classes.
- Bring a positive and energetic attitude every day.
- Respect everyone, treat each other with dignity, and encourage all to participate.
- Participate in group work by asking questions, communicating your understanding to your groupmates, and completing the handouts.
- Present your ideas to the class and ask questions when other students present.
- Keep handouts, assignments, and notes organized to promptly access during class.

A lack of professional participation will result in a loss of attendance/participation credit for the day. Severe or repeated lapses in professional judgment may result in disciplinary action, up to and including removal from the course.

If you will miss class:

- Get information about what will happen/happened in class.
- Communicate with me as soon as possible. If you are not in communication with me, I will immediately reach out to the [Office of the Dean of Student Success](#) [\(https://www.cwu.edu/student-success/\)](https://www.cwu.edu/student-success/).

The [Office of the Dean of Student Success](#) [\(https://www.cwu.edu/student-success/\)](https://www.cwu.edu/student-success/) provides resources and services for students to better navigate the CWU Community, including:

- FREE [in-person counseling](#) [\(https://www.cwu.edu/medical-counseling/counseling-clinic\)](https://www.cwu.edu/medical-counseling/counseling-clinic) and 24/7 [virtual counseling](#) [\(https://timely.md/schools/index.html?school=wildcatcare365&=#\)](https://timely.md/schools/index.html?school=wildcatcare365&=#).
- [On-campus health services](#) [\(https://www.cwu.edu/health-services/welcome-student-health-services-shs\)](https://www.cwu.edu/health-services/welcome-student-health-services-shs) (most services are free) and FREE 24/7 [tele-health services](#) [\(https://timely.md/schools/index.html?school=wildcatcare365&=#\)](https://timely.md/schools/index.html?school=wildcatcare365&=#).
- [\(https://www.cwu.edu/disability-services/\)](https://www.cwu.edu/disability-services/) A [wellness center](#) [\(https://www.cwu.edu/wellness/welcome\)](https://www.cwu.edu/wellness/welcome) providing support and education for life outside the classroom so you can maximize your time at CWU and build skills for the future (e.g., coaching related to stress/time management, alcohol and drugs, supporting others experiencing mental health challenges, violence prevention and response, sexual health and healthy relationships).
- See the [Student Success website](#) [\(https://www.cwu.edu/student-success/\)](https://www.cwu.edu/student-success/) for even more services, and [here is a list of](#) [o \(https://www.cwu.edu/student-success/where-go\)](https://www.cwu.edu/student-success/where-go) [ther services around campus](#) [\(https://www.cwu.edu/student-success/where-go\)](https://www.cwu.edu/student-success/where-go) you may need.

University Policy [CWUP 5-90-040\(38\)](http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations#Class%20Attendance%20and%20Participation) provides for reasonable accommodation of student absences for religious holidays in accordance with [RCW 28B.137.010](https://apps.leg.wa.gov/rcw/default.aspx?cite=28B.137.010). Students seeking reasonable accommodations under this policy must provide written notice to their instructors within the first two weeks of class specifying the dates for which religious accommodations are requested. Contact the Dean of Student Success at (509) 963-1515 for further information.

Standards-Based Mastery Exams

The purpose of this evaluation component is for you to demonstrate mastery of course content standards. Each mastery exam will assess a set of performance standards. Your final grade in this evaluation category is determined by the total number of standards for which you have demonstrated mastery. This means you will not receive a numerical score for each exam question, but a list of standards mastered and standards to-be mastered.

M	Mastered	Demonstrates understanding of the relevant target. May include some errors, but no additional study or review is needed. Correct, complete, convincing, and clear.
P	Progressing	Demonstrates partial understanding, but with a fundamental error, misunderstanding, or is incomplete. Needs review and revision.
X	Not Assessable	Not enough work to determine mastery: An insubstantial attempt, too many errors to correct each individually, or uses an inappropriate method or tool.

Learning happens over time, as we revisit ideas and reflect on them. Your final grade in this evaluation component will reflect how well you *eventually understand* each topic. This grading system rewards **growth**; you can make mistakes without penalty, as long as you eventually demonstrate mastery of the topic. Your first attempt for each exam will take place in class. See the [course calendar](#) for this quarter's exam schedule. You will be given additional opportunities to demonstrate your mastery of any standards not yet mastered after the first attempt. **You may only retest if you took the first in-class attempt.** You may test once each day until the exam retake deadline. Retakes during office hours do not need to be scheduled in advance.

Proof Portfolio

While your written work on mastery exams provides a brief snapshot of your thinking (the end product), this evaluation component focuses on the reflective *process* crucial to developing the habits of mind of mathematical thinkers and problem solvers. Expert mathematicians have a high level of self-awareness, regularly engaging in metacognition (monitoring, regulating, and reflecting) while working on a mathematical proof or problem solving.² They reflect on their current strengths and weaknesses as they focus on developing aspects of mathematical creativity such as making connections and taking risks.³ The goal of the proof portfolio is to build metacognitive skills by making your proof process explicit. Your portfolio includes seven submissions, one for each major proof method and a final reflection. Refer to Canvas Assignments for submission details.

Academic Honesty and Student Conduct

Consult university policies [CWUP 5-90-040\(25\)](http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations#Class%20Attendance%20and%20Participation), [CWUR 2-90-040\(24\)](http://www.cwu.edu/resources-reports/cwur-2-90-040(24)), and [WAC 106-125-020](https://apps.leg.wa.gov/WAC/default.aspx?cite=106-125-020) for student conduct, cheating, plagiarism, and other academic expectations. CWU's policies and recommendations for academic misconduct will be followed, leading to disciplinary action up to and including failing the course.

Central Washington University is committed to providing all community members with a learning and work environment that is free from sexual harassment and assault. Students have options for getting help if they have experienced sexual assault,

relationship violence, and sexual harassment, or stalking. Information can be found at <http://www.cwu.edu/wecare> (<http://www.cwu.edu/wecare>) and in [CWUP 2-35-050 \(http://www.cwu.edu/resources-reports/cwup-2-35-equal-opportunity-policies-and-programs#Harassment\)](http://www.cwu.edu/resources-reports/cwup-2-35-equal-opportunity-policies-and-programs#Harassment): Sexual Harassment. Faculty are required to report information regarding sexual misconduct or related crimes. Students may speak to someone confidentially by contacting the CWU Wellness Center, 509-963-3213, or the CWU Student Counseling Clinic, 509-963-1391.

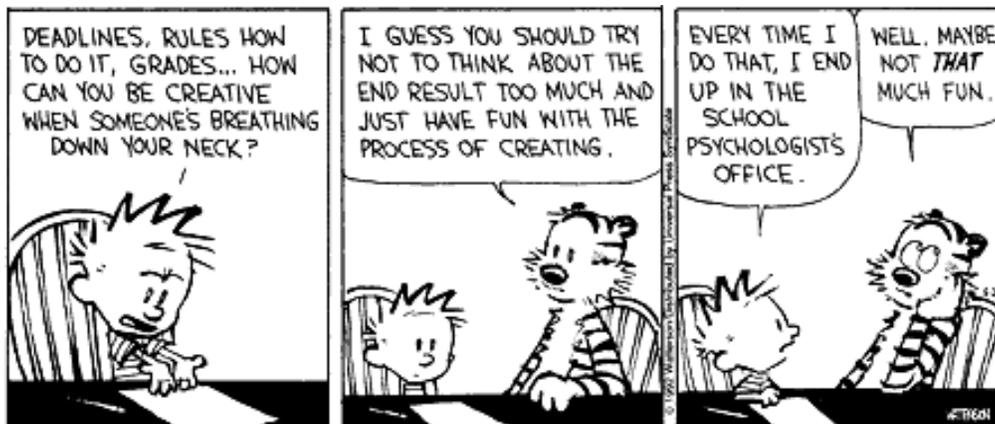
A Positive Note

Remember that I want you to be successful. That is, I want you to develop a deep, personal understanding of the material we study so that you become a better student of mathematics who can go on to do well in all of your future endeavors. Every part of this course structure is intended to help you with this. You will often struggle, and that's intentional – struggle (and eventual success!) is essential to learning.

In all aspects of the course, please understand that I am always willing to discuss problems with you. I will never simply give you an answer, but I will offer direction and guidance that will assist you in coming up with a solution on your own. This is by far the most satisfying way to solve a problem, and the difficulty is well worth it. You are always welcome to discuss your questions or concerns with me at any time.

Changes

I reserve the right to amend, adjust, or otherwise modify the syllabus at any time during the course.



Footnotes

1. Taken/adapted from 2015 CUPM Curriculum Guide to Majors in the Mathematical Sciences. Zorn, P. (Ed.). (2015). Mathematical Association of America.
2. Carlson, M. P., & Bloom, I. (2005). The cyclic nature of problem solving: An emergent multidimensional problem-solving framework. *Educational studies in Mathematics*, 58(1), 45-75.
3. Savic, M., Karakok, G., Tang, G., El Turkey, H., & Hancock, E. (2017). Formative assessment of creativity in undergraduate mathematics: Using a creativity-in-progress rubric (CPR) on proving. In *Creativity and Giftedness* (pp. 23-46). Springer, Cham.