

Course Syllabus

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MATH 332 | Discrete Models

Fall 2021

General Information

Class Time: M – Th, 9:00am – 9:50am **Location:** Zoom

<https://cwu.zoom.us/j/84103383500?pwd=YUplbGEvbzRRZE9iakFvV1VIT1oyUT09>
[_ \(https://cwu.zoom.us/j/84103383500?pwd=YUplbGEvbzRRZE9iakFvV1VIT1oyUT09\)](https://cwu.zoom.us/j/84103383500?pwd=YUplbGEvbzRRZE9iakFvV1VIT1oyUT09)

Meeting ID: 841 0338 3500

Passcode: 704290

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=WUIHNUxIRGIStS1kwMERwdlYrNINPZz09>
[_ \(https://cwu.zoom.us/j/84141825205?pwd=WUIHNUxIRGIStS1kwMERwdlYrNINPZz09\)](https://cwu.zoom.us/j/84141825205?pwd=WUIHNUxIRGIStS1kwMERwdlYrNINPZz09)

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

Required Materials

- **Textbook:** None.
- **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/) [_ \(https://www.cwu.edu/disability-services/\)](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. [_ \(mailto:DS@cwu.edu\)](mailto:DS@cwu.edu)

Course Description and Learning Objectives

Reflecting [Washington State mathematics K-12 learning standards](https://www.k12.wa.us/student-success/resources-subject-area/mathematics/mathematics-k%E2%80%9312-learning-standards) [_ \(https://www.k12.wa.us/student-success/resources-subject-area/mathematics/mathematics-k%E2%80%9312-learning-standards\)](https://www.k12.wa.us/student-success/resources-subject-area/mathematics/mathematics-k%E2%80%9312-learning-standards), the [National Council of Teachers of Mathematics \(NCTM\) principles and standards](https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/) [_ \(https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/\)](https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/) (and the associated Navigation Series: *Navigating through Discrete Mathematics in Grades 6-12* (2008)), and the [State of Washington Professional Educator Standards Board \(PESB\) endorsement standards for Discrete Mathematics](https://www.pesb.wa.gov/preparation-programs/standards/endorsement-competencies/mathematics/) [_ \(https://www.pesb.wa.gov/preparation-programs/standards/endorsement-competencies/mathematics/\)](https://www.pesb.wa.gov/preparation-programs/standards/endorsement-competencies/mathematics/), this course emphasizes the conceptual development of discrete mathematics and associated procedures. Additional focus is placed on constructing viable mathematical arguments to justify conclusions, communicate them to others, and respond to the arguments of others. Mathematics content is rediscovered through problem solving¹ and mathematical modeling in an inquiry-based learning² context

to support the development of mathematical [processes](https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/Process/) and [practices](http://www.corestandards.org/Math/Practice/).

Major content topics of the course include discrete mathematical modeling, algorithmic problem solving, and optimization. Exploration of these topics, including connections to elementary and undergraduate mathematics concepts, will follow the outline:

Unit 1: Systematic Listing and Counting (Combinatorics)

Unit 2: Vertex-Edge Graphs (Graph Theory)

Unit 3: Iteration and Recursion

Upon successful completion of this course, you will be able to:

- Use and apply the process of mathematical induction.
- Use and apply different types of counting principles.
- Use and apply algebraic and linear algebraic properties and principles.
- Use and apply deductive logic as a form of reasoning.
- Use and apply models having roots in graph theory, combinatorics, difference equations, and social choice.

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

50% Problem-Solving Working Group

30% Pedagogical Content Knowledge (PCK) Portfolio

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. 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.

Problem-Solving Working Group

In class you and a team of students will work together on a mathematical problem where you may not know how to solve the problem immediately (that's what makes it a *problem*), though the key mathematical ideas are still directly related to course content. Integrating content and problem solving³ will help you (1) deepen your mathematical content knowledge of the current unit, (2) develop your problem-solving skills, and (3) increase your awareness of your problem-solving process. All of these skills are necessary if you will be teaching mathematical problem solving in the future. Refer to the course calendar for relevant group activities.

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 for all in its classrooms, work environments, and at campus events.** Here are some ways you can contribute:

- Arrive to class on time and stay for the entire session.
- Be present. Focus on learning by being an active participant. Limit side activities and put away cell phones.
- Come to class prepared by completing any pre-session assignments.
- Bring a positive and energetic attitude.

- Respect everyone, treat each other with dignity, and encourage all to participate.
- Participate in group work by asking questions, communicating your understanding to your group mates, and completing the problems.
- Share your ideas with your group and ask questions when other students share their ideas.

Severe or repeated lapses in professional judgment that negatively impact your working group's ability to function successfully may result in disciplinary action up to and including failing 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/) [\(https://www.cwu.edu/student-success/\)](https://www.cwu.edu/student-success/).

The [Office of the Dean of Student Success](https://www.cwu.edu/student-success/) [\(https://www.cwu.edu/student-success/\)](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) [\(https://www.cwu.edu/medical-counseling/counseling-clinic\)](https://www.cwu.edu/medical-counseling/counseling-clinic) and 24/7 [virtual counseling](https://timely.md/schools/index.html?school=wildcatcare365&=#) [\(https://timely.md/schools/index.html?school=wildcatcare365&=#\)](https://timely.md/schools/index.html?school=wildcatcare365&=#)
- [On-campus health services](https://www.cwu.edu/health-services/welcome-student-health-services-shs) [\(https://www.cwu.edu/health-services/welcome-student-health-services-shs\)](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://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) [\(https://www.cwu.edu/wellness/welcome\)](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/) [\(https://www.cwu.edu/student-success/\)](https://www.cwu.edu/student-success/) for even more services, and [here is a list of](https://www.cwu.edu/student-success/where-go) [o](https://www.cwu.edu/student-success/where-go) [\(https://www.cwu.edu/student-success/where-go\)](https://www.cwu.edu/student-success/where-go) [ther services around campus](https://www.cwu.edu/student-success/where-go) [\(https://www.cwu.edu/student-success/where-go\)](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) [\(http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations#Class%20Attendance%20and%20Participation\)](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) [\(https://apps.leg.wa.gov/rcw/default.aspx?cite=28B.137.010\)](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.

Pedagogical Content Knowledge (PCK) Portfolio

Teachers have to know the content they will teach (content knowledge) and how to teach (pedagogical knowledge). But experienced teachers also have a super power, where these two types of knowledge intersect: Pedagogical Content Knowledge (PCK). As a (future) teacher, you are always wearing two hats: your student hat and your teacher hat.

When I say "student hat," I mean that we are working on our content knowledge. As you learn new content and improve your problem-solving skills in this course, you're developing your content knowledge. Assignments in the 'Problem-Solving Working Group' evaluation category align with your student hat.

When we put on our "teacher hat," we are tapping into our pedagogical content knowledge (and sometimes some plain old pedagogical knowledge). You'll find me asking you often to reflect on your content knowledge and think about the implications for teaching this content -- using different representations, creating problems that illustrate key mathematical ideas for students, thinking about possible correct but different student solutions, or thinking about possible student misconceptions and why they might give a particular incorrect answer. Assignments in the 'Pedagogical Content Knowledge (PCK) Portfolio' evaluation category align with your teacher hat. See Canvas for portfolio assignments and deadlines.

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) (<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)) (<http://www.cwu.edu/resources-reports/cwur-2-90-040-academic-and-general-regulations#Academic%20Dishonesty>), and [WAC 106-125-020](https://apps.leg.wa.gov/WAC/default.aspx?cite=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-2-35-050) (<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.

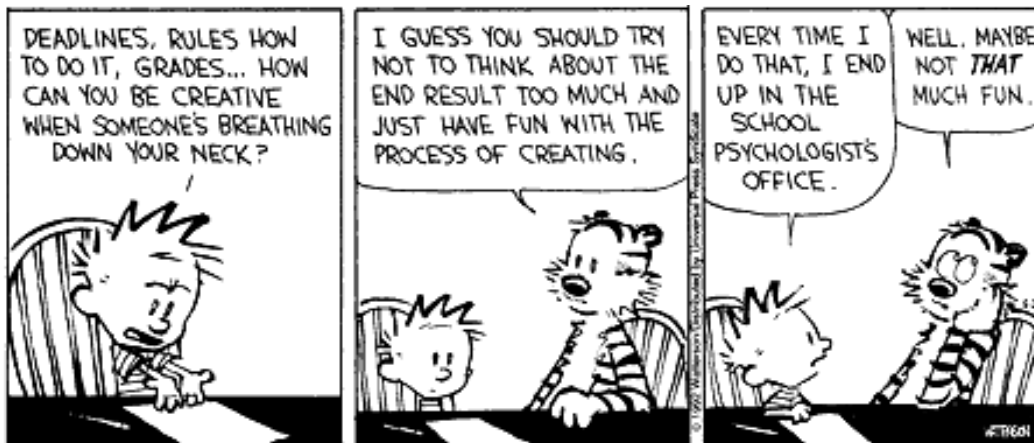
A Positive Note

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. Stein, M. K., Boaler, J. & Silver, E. A. (2003). Teaching mathematics through problem solving: Research perspectives. In H. L. Schoen & R. I. Charles (Eds.), Teaching mathematics through problem solving: Grades 6-12 (pp. 245–256). Reston, VA: National Council of Teachers of Mathematics.
2. Ernst, D. C., Hodge, A., & Yoshinobu, S. 2017. Inquiry-based learning. Notices of the AMS, 64(6), p. 570-574.
3. Cai, J., & Lester, F. (2010). Why is teaching with problem solving important to student learning. National council of teachers of mathematics, 13(12), 1-6.