

Course Syllabus

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MATH 232 | Discrete Models for Middle-Level Teachers Fall 2020

General Information

Scheduled Class Time: None (Course is asynchronous)

Location: Online Learning Management System (Canvas)

Course Information Session: Thursday, September 10th, 4-5PM on Zoom.

(A recording will be posted on Canvas for those who cannot attend.)

Instructor: Dr. Emilie Hancock (she/her/hers)

Email: emilie.hancock@cwu.edu

Office: Samuelson 218C

Phone: 509-963-2402

Drop-in Student Hours: Tu, Th 4-5pm (Hosted in Zoom, No Appointment Necessary)

Schedule an Appointment: If you can't make it to drop-in hours due to work, scheduled class, family care, or other major time commitments, email me to schedule a meeting M, T, Th, F 12-5pm (as appointments are available)

Email Correspondence: I will respond to student communications during business hours (M-F, 8am-5pm). You can typically expect a reply within approximately 24 hours, not including weekends. If you email me with questions about specific problems, I can be more helpful if you send pictures of what you've tried so far.

Teaching Assistant: Espi Artiles

Espi is a Middle Level Mathematics and Middle Level Science double major and in the Teach STEM program. She will pop into problem-solving working group sessions to help push your thinking forward via Socratic questioning. She has also graciously made herself available to answer quick content-related questions via email.

Email: Esperanza.Artiles@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), 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/), (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/), 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. Middle-level 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 high school 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:

- Demonstrate understanding of fundamentals of discrete mathematics including elements of combinatorics (e.g. counting, combinations, and permutations), graph theory (e.g. graphs, trees, and critical path analysis), and recursion (e.g. recurrence relations and induction).
- Model real-world situations using fundamental ideas of discrete mathematics.
- Reason deductively using the language and structures of discrete mathematics to investigate, represent, and solve problems.
- Use appropriate technology to investigate, represent, and apply discrete mathematics concepts and methods.

Required Course Materials

- A **Computer** (or iPad) with a **Webcam** for small-group problem-solving sessions
- Decent **Internet** connection
- A **method to convert images to PDF**. If you write anything by hand and need to submit to Canvas, you may not have access to a scanner and need to take photos of your work. There are phone apps like CamScanner that will convert photos to PDF. You can also send photos to your computer and use your computer or an online tool to convert to PDF.
- **Zoom Access**: The course information session and weekly drop-in student hours will be held on Zoom. There is a 'Zoom' tab in the lefthand menu in Canvas, but you can also download Zoom directly to your computer, tablet, or phone. If you haven't used Zoom before, CWU has created a [Zoom Tutorial handout](#)  to help you get started. The [Zoom website](https://support.zoom.us/hc/en-us/categories/200101697) (<https://support.zoom.us/hc/en-us/categories/200101697>) also has some helpful articles and videos. After trying these resources, feel free to reach out to me with any questions! You will need the following login information to access Zoom drop-in hours this quarter:

Meeting ID: 962 4836 7511

Meeting Password: 4L356f

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:

70% Problem-Solving Working Group

30% Pedagogical Content Knowledge (PCK) Portfolio

Emergency Pass/Fail Grades (Fall 2020)

To help you do your best work in this time of unusual stress and change, CWU is providing a grading option called Emergency Pass/Fail (EP/EF) Grades.

- You may elect EP/EF conversions on a course-by-course basis. Upon such election, letter grades of C- or higher shall be converted to a passing grade of EP; grades of D+ or lower shall be converted to EF.
- You will have 3 days after the date on which final grades are due to choose to retain the assigned letter grade or to choose an EP/EF grade. This choice will be available on a course-by-course basis.
- Credits earned with a grade of EP/EF are not included in the computation of grade point averages. Credits earned with a grade of EP shall count toward program-specific passing requirements and general education requirements. Moreover, a grade of EP shall satisfy the prerequisites of subsequent courses.
- Transcripts that show a grade of EP/EF shall include a statement indicating that a state of campus emergency existed during the quarter in which the grade was posted. Credentialing for some programs/scholarships may require you to select the graded option.
- **Consult with your major advisor before choosing the EP/EF grade.**

Covid-19 Exigency: Late Work Policy

Usually "excused" and "unexcused" absences are used to justify modifications for missed deadlines. Excused absences are valid and verifiable, requiring documentation. However, getting documentation right now could be difficult and potentially unsafe, so I am not keeping track of "excused" and "unexcused" absences this quarter. Your default assumption should be that **late assignments will not be accepted**. However, if you will miss an assignment deadline due to illness, bereavement, or school-related activities for which turning assignments in early is not feasible, you should communicate with me as soon as possible so that we can determine an appropriate course of action.

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.

Descriptions of Evaluation Components

Problem-Solving Working Group (70%)

You will meet weekly (in a virtual format) with a team of students to work 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. See Canvas for working group assignments and deadlines.

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 meetings with your working group 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 working group sessions 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.

What if I can't make a working-group session?

First, attempt to reschedule the session for *later in the same week*. You do not need to contact me if your group can handle the rescheduling internally.

If you will miss your group's weekly session, (1) communicate with me and your group as soon as possible, and (2) get information from your team about what will happen/happened in the session and how you will get caught back up.

Pedagogical Content Knowledge (PCK) Portfolio (30%)

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) [_ \(http://www.cwu.edu/resources-reports/cwur-2-90-040-academic-and-general-regulations#Academic%20Dishonesty\)](http://www.cwu.edu/resources-reports/cwur-2-90-040-academic-and-general-regulations#Academic%20Dishonesty)_, [CWUR 2-90-040\(24\)](http://www.cwu.edu/resources-reports/cwur-2-90-040-academic-and-general-regulations#Academic%20Dishonesty) [_ \(http://www.cwu.edu/resources-reports/cwur-2-90-040-academic-and-general-regulations#Academic%20Dishonesty\)](https://apps.leg.wa.gov/WAC/default.aspx?cite=106-125-020)_, and [WAC 106-125-020](https://apps.leg.wa.gov/WAC/default.aspx?cite=106-125-020) [_ \(https://apps.leg.wa.gov/WAC/default.aspx?cite=106-125-020\)](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> [_ \(http://www.cwu.edu/wecare\)](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) [_ \(http://www.cwu.edu/resources-reports/cwup-2-35-equal-opportunity-policies-and-programs#Harassment\)](http://www.cwu.edu/resources-reports/cwup-2-35-equal-opportunity-policies-and-programs#Harassment)_: Sexual Harassment. Faculty are required to

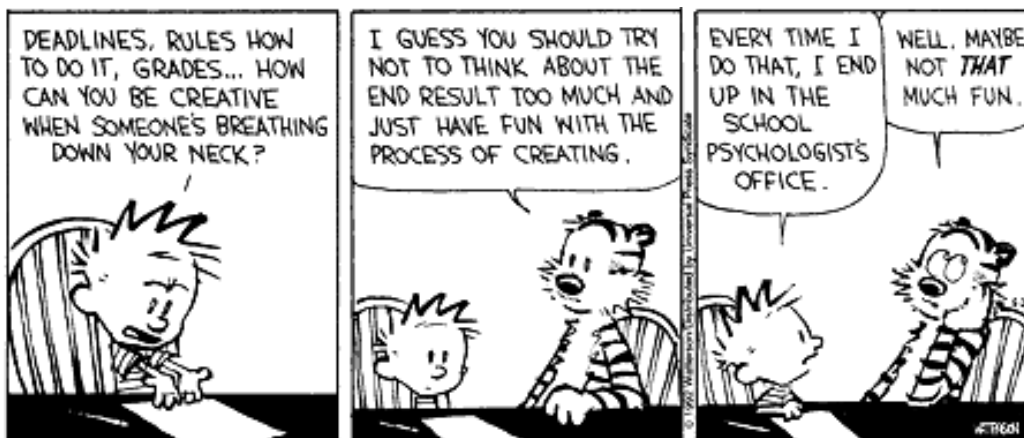
report information regarding sexual misconduct or related crimes. Students may speak to someone confidentially by contacting the CWU Wellness Center, 509-963-3213, or the CWU Student Counseling Clinic, 509-963-1391.

Disability Support Services

Central Washington University is committed to creating a learning environment that meets the needs of its diverse student body. If you anticipate or experience any obstacles to learning, contact Disability Services to discuss a range of available options to removing barriers, including accommodations. Student Disability Services is located in Hogue 126. Call (509) 963-2214 or email ds@cwu.edu (<mailto:ds@cwu.edu>) for more information.

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.