

**Winter 2022 Math 499S**  
**3:00 - 3:50 TTh**

**Instructor:** Dr. Jim Bisgard

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**Office Hours:** M-Th 11:00 am to noon and by appointment.

**Course Goals:** The goal of this class is to reflect on the math major: what have you learned, what do you wish you have learned, and how (if at all) has your thinking about mathematics changed. In addition, this class gives you an opportunity to assemble a portfolio demonstrating various types of proofs, as well as an example of an application of mathematics. Finally, you will read a mathematical article and prepare a written and oral summary of that paper.

For the first few weeks, we will be learning and practicing how to read and summarize a math paper. After that, we will hopefully have some former students speak with us. I would also like to have some discussion about issues relevant to mathematics and society. As graduates with math degrees, people will listen to you and believe you when you talk about mathematics. From that point of view, it is worthwhile and important to consider issues that affect mathematics and society. For example, what mathematics should people learn? How should mathematics be taught in the K-12 system? Who should be teaching mathematics? What is the role of mathematics in making decisions that affect society as a whole? (See for example the various predictions made by mathematical models of the spread of Covid-19 and how policy makers reacted to those predictions.) For these discussions, you may be assigned some reading, and there will be some questions to answer and some questions whose intent to start a discussion. (See for example what mathematics should people learn?)

**Grading:** You will be required to complete the following assignments:

- Complete a portfolio demonstrating a non-trivial example of each of the following types of proof: (50 points)
  1. Direct Proof
  2. Contrapositive Proof
  3. Proof by Contradiction
  4. Proof by Cases
  5. Proof by Mathematical Induction
- A 3-5 page paper on “An Application of Mathematics” (25 points).

The application should be at the calculus level or higher, and may use ideas from any area of mathematics. As you look for a topic, I suggest that you talk to faculty, either in the math department or in another department! A sign that of a good application is that you can make a good “elevator pitch” for the application. That means, you should be able to say what the problem is clearly and concisely — the details of how math solves that problem are what will fill in the rest of the paper.
- A paper summarizing a mathematical article (25 points)

This is likely the most difficult assignment for this class, because learning to read and summarize a mathematical article is quite difficult. We will spend the first few weeks practicing how to read and summarize a math paper. A good place to begin looking for an article is the mathematics faculty and mathscinet!
- A presentation summarizing a mathematical article (20 points)
- Class Participation (10 points) (participating in class discussions, as well as writing a one-paragraph summary for each speaker)

- Final Portfolio: containing the proof portfolio and the two papers (200 points).

## Deadlines

- Application to graduate at the end of Spring 2022 must be done before January 14.
- The portfolio must be completed **AND** submitted by March 18, 4 pm.
- The application paper has the following due dates (at beginning of class):

Topic: January 27

Draft: February 10

Final Draft: February 24

- The article summary paper has the following due dates (at beginning of class):

Choice of article: February 3

Draft: February 22

Final Draft: March 10

- The presentations on the articles will occur on the last four class days, so you should be prepared to present beginning March 1.
- Proofs may be submitted whenever you'd like and revised as often as you'd like. Please make sure to include definitions of relevant terms and a clear statement of what you're trying to prove.

**You must submit your entire portfolio (including the proofs, the application paper, and your article summary paper) into canvas no later than 4 pm on March 18. Failure to do so will result in failing the class! Failing this class means you will not graduate!**

**Speakers and Participation:** We will try to have a few of our math graduates to give talks during the quarter. I am hoping that we will have at least three of them. Attendance for these talks is mandatory, and you are expected to type a one-paragraph summary of each talk. This summary is due at the beginning of the following class. To prepare for your own presentations, in addition to your summary you should also write down two things that you liked about the talk, and two things you didn't like about each talk.

## 1 General Class Policies

Come to class when you are able! If you aren't, please let me know ahead of time. In addition, if something comes up that may affect your ability to succeed in this class, please let me know — even if you are unsure if there will be any effect on your performance in class.

**Face Coverings and Social Distancing:** Face coverings **MUST** be worn indoors by all CWU students, employees, and visitors, **regardless of vaccination status**. The mask must cover both the mouth and nose, fitting as snugly as possible against the sides of the face. Students not wearing a mask will be asked to put one on, if they refuse, students will be asked to leave the classroom and building. Your mask protects me; my mask protects you. Masks with one-way valves for exhalation do not provide protective value for others — please don't use them as your face covering for any in-person interactions. Thank you for helping keep all of us safe!

**Class Recordings:** Attendance is considered mandatory, and you should plan to attend on an ongoing basis. Because of the ongoing pandemic, class will be recorded and posted on Canvas. It will not be edited, and I may point to portions of the board that aren't in the view of the camera.

(Everybody in class is able to see the entire board, unlike the restricted viewing angle of the camera.) We all benefit from the conversations in-class, and they will be richer for having you there! One of the points of attending classes is to have an expert in the content area provide you with guidance in that content area, and be able to respond to any questions you may have. In addition, we may have some period of class where you will work with your neighbor to solve problems. If you do not attend, you miss out on the substantial benefit these small group interactions provide.

When attending virtually, please turn on your camera if that is reasonable given your situation, bandwidth issues, etc. If you cannot turn on your camera, please use a profile picture on Zoom that matches your profile picture on Canvas (and please put one up on Canvas).

**Academic Honesty:** Consult university policies (CWUP 5-90-040(22), CWUR 2-90-040(22), and WAC 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.

**Inclusivity Statement:** 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.**

**Classroom 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: WAC 106-125-020) will be referred to the Dean of Student Success. Refusal to wear a face-covering will be considered disruptive conduct.

**Disability Support 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

**Religious Obligations and Schedule Conflicts:** 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 exams, 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 or questions.

**Communication:** If I (and/or a substantial proportion of class) need to quarantine during the quarter or if CWU decides that the safest way to conduct classes is completely online, class will be run as a **synchronous** online course, which will meet at the regularly scheduled days and time using Zoom. In this case, we will use the Zoom link posted in Canvas. Please let me know if something comes up that might affect your ability to attend or participate in class — you don't need to give me any details, but if you let me know, I can usually work with you to make sure you can turn assignments in and get information about class.

I reserve the right to change the policies contained in this syllabus as dictated by developments during the quarter.