
MATH 376: History of Mathematics, Spring 2021

Class Meetings: M W 9:15-10:15am via Zoom
F 9:15-10:15 Ford 201
Final Meeting Time: May 8, 8-11 am

Professor: Erin McNicholas @emcnicho@willamette.edu
📍 Ford Hall, Room 211 📞 503-370-6590

Office Hours: <https://sites.google.com/willamette.edu/emcnicholas/home>
In addition to the office hours posted on my website, I'm also available by appointment.

Class Website: Course information, assignments, due dates, and policies are all available on the course website under WISE

Required Course Materials:

Assigned readings will be posted on WISE or Perusall. No textbook purchase is required.

“Mathematics is not a careful march down a well-cleared highway, but a journey into a strange wilderness, where the explorers often get lost. -W.S. Anglin

Student Learning Objectives

Through this course we will gain a greater appreciation of mathematics as a human endeavor, created by a diverse group of individuals. We will examine how their insights and breakthroughs were made possible in part by their circumstances and by the work of generations of mathematicians before them. We will examine the development of conceptual threads in mathematics, using a variety of primary sources and more modern treatments. Connections between mathematical concepts will be explored, as well as the ways in which these connections enlighten, inform, and extend the boundaries of what is known. Applying a historical perspective and the insights gained from close reading of texts, we will analyze the conventions and norms of communication adopted by mathematicians, the messages these norms convey, and their implications for the role of mathematics in society. Through this course you will:

- increase your mathematical reasoning and content knowledge by gaining a better sense of the mathematical context of various discoveries, and insight into how new discoveries are made;
- meaningfully analyze a variety of texts and media;
- strengthen your ability to explain complex mathematical concepts clearly and accurately while engaging diverse audiences; and
- better understand the culture of mathematics and your own identity as a mathematician.

Graded Course Components

Your grade will be based on your level of achievement in each of the following graded course components. Exact grade cut-offs will be determined at the end of the semester, with a grade of 90% and above guaranteeing an A-, 80% and above a B-, and 70% and above a C-.

Assessments^a

- 20% Engagement in Perusall and in-class discussions and activities
- 35% Homework assignments
- 30% Course project (blog, podcast, video or other final product)
- 15% Celebrations of Knowledge (there will be three such celebrations, aka quizzes, throughout the semester)

^aRecognizing the uncertainty that surrounds us, these relative weightings are subject to change

Perusall & In-Class Discussions: Readings (including texts, podcasts, and videos) will be assigned regularly to prepare you for class discussion. Your grade for this component of the course will be based on how meaningfully you have engaged with the sources, as determined by the quality of your Perusall and in-class contributions. Perusall assess how integral your contributions are to the conversation – hence engaging with the Perusall readings early and often will increase your score.

Homework: There will be frequent homework assignments to help you gauge your understanding of the underlying mathematical techniques and concepts. In addition, there will be inquiry based explorations based on primary texts.

Course Project: Throughout the course, you will be working on project that explains in depth some mathematical breakthrough, concept, or technique, while providing historical and mathematical context and considering the needs of your intended audience. This project will go through various revisions based on feedback from the class.

Celebrations of Knowledge: There will be three celebrations of knowledge spread throughout the semester designed to help you gauge your understanding of the covered mathematical concepts.

Tentative Schedule

The following schedule is subject to change.

Week	Topic	Deadlines
1 (WF)	From Tally Marks to Cipherization	
2 (MWF)	Ancient Greek Approaches to the Quadratic	
3 (MWF)	Ancient Islamic & Chinese Algebraic Techniques	
4 (MWF)	Competitive Algebra in Renaissance Italy	Topic Proposal Due
5 (MWF)	Lagrange & the Antecedents of Modern Algebra	Quiz #1
6 (MWF)	Lagrange & the Antecedents of Modern Algebra	
7 (MWF)	Cauchy, Cayley, Abel, & Galois	
8 (MWF)	Cauchy, Cayley, Abel, & Galois	
9 (MWF)	Galois Theory	Quiz #2
10 (MW)	Communicating Mathematics	Rough Draft Due
11 (MWF)	Archimedes & the Seeds of Calculus	
12 (MWF)	Newton, Leibniz & the Battle of Notation	
13 (MWF)	The Rigorization of Calculus	
14 (MF)	Development of Calculus in Asia	
15 (MWF)	Joining the Strands: Robinson & the Resurrection of the Infinitesimal	
16 (S)	Final Project due	

Comments from Previous Students:

I think this course has helped me to develop my mathematical reading skills. Reading through arguments from Euclid, to Galois, to Archimedes and Cauchy forced me to become more comfortable and more trusting in my ability to synthesize an argument, especially one that I do not completely understand. I see this skill carrying over to abstract algebra. When reading complicated proofs out of the textbook I find myself grasping the argument much quicker and with much more clarity than I used to.

The class helped to solidify my interest in and advocacy for interdisciplinary classes...Humanizing all these amazing mathematicians helped empower me as a student of color in the math department. I feel surer I 'belong', and am more motivated to prove to myself I can do math... remembering that mathematicians are also people is an important objective for a history of math class. The most important objective, in my opinion, is to demonstrate different ways of thinking to promote and validate creativity and diversity in math. I feel that I got a good balance of both history and math in this class...Along with my roles at WU and OMA, this class has helped me develop a new passion for teaching math.

This class helped me think through a different lens... The crucial skill I learned was that patience is sometimes the only way to get something done...The most important objective for a math history course, for math majors, would be re-learning material in the way that [those results] were discovered. This 'rediscovery' will help with tying the different fields of math together...Being able to understand how to do a problem in a way other than the standard could help with new discoveries.

I feel like what I got most out of [this class] was an increased ability to set aside my assumptions and begin to immerse myself in a new mathematical system. The class required that I adapt often, however I think that it definitely strengthened my ability to look at concepts from multiple different angles.

I have gained a new perspective, specifically on the communication aspect. How I have seen my field and expressed it to others is different now because of this class. In the past, I have seen this field as unattainable knowledge that is for a select few and that Math has very limiting jargon. I refrained from talking about math outside the community. However, I now explain how math is a beautiful language that has been crafted and refined over many, many years.

It was really cool to attempt to do mathematics with one hand tied behind your back, so to speak. Getting inside the minds and attempting to do mathematics how mathematicians did back then was one of the more interesting things we did throughout the class.

For me, learning about all of this history makes me feel more connected to the field, and it makes the concepts more accessible and human. The class as a whole broadened my perspective on what it means to be a mathematician and the specific contexts that go into what we learn in our other math classes.

I think the most influential part of the class was the meta conversations about math, who does math, how is our study of math biased, etc. I am a very opinionated person; I felt that I was missing having a strong opinion about mathematics. Your class has allowed me to formulate opinions, thoughts, and feelings towards math, and I feel a lot more comfortable with the math now because of that.

The blog post was by far the longest thing I had formally written up that was completely about math (and pretty high up there in my non-math writings too). Since it was written to flush out a specific topic while attempting to keep the reader engaged it really challenged me to be critical of my mathematical writing. It definitely made the top five in my list of most enjoyable assignments I was given at Willamette.

I think the thing I took most out of this class were our discussions on how math is communicated, and the different ways math is seen from the outside. My favorite classes were the ones we just spent talking about competitive math in Italy, or stereotypes of mathematicians and breaking through to what we really mean about that. The skill most tested/worked in this class was math communication. I enjoyed learning the history, but in a lot of ways it felt like we were playing a particularly annoying game when doing math in the style of one time period of another.

Course Policies

Student Responsibility: You are all adults and responsible for your own education. I will do everything in my power to help you learn. You should always feel free to stop by my office or make an appointment to meet with me if you have questions or concerns. This will be primarily a student-lead course, through discussion and investigation. I have worked hard to find activities and readings that will interest and inspire you, and which provide a variety of perspectives. It is up to you to make the most of this experience by coming to class prepared and ready to engage in discussion.

Inclusivity Statement: Willamette University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. My goal is to create a learning environment that is effective, equitable, inclusive, and welcoming. If there are aspects of the instruction or design of this course that result in barriers to your inclusion, assessment of your work, or your achievement, please notify me as soon as possible.

I will gladly honor your request to address you by your affirmed name or gender pronoun. Please advise me of this at any point in the semester so that I may make appropriate changes to my records. If I accidentally use an incorrect gender pronoun when addressing you, please feel free to let me know, in whatever manner makes you comfortable, what pronouns you use so that I can make every effort to correct that error.

Students with disabilities are encouraged to contact the Accessible Education Services office in Matthews 103 at 503-370-6737 or disb-info@willamette.edu to discuss a range of options to removing barriers, including accommodations.

I know how important personal events and religious traditions can be, and will do my best to accommodate your personal needs. If you anticipate missing class for religious or other reasons, please contact me.

Health: As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may diminish your academic performance and reduce your ability to participate in daily activities. Willamette services are available and treatment does work. If you think you need help, please contact Bishop Health as soon as possible at <http://willamette.edu/offices/counseling/>. Crisis counseling is available 24/7 at WUTalk: 503-375-5353 and Campus Safety is available at 503-370-6911. Emergency resources are also available from the Psychiatric Crisis Center at 503-585-4949 and the National Suicide Prevention Lifeline at 1-800-273-8255.

Willamette is a community committed to fostering safe, productive learning environments, and we value ethical sexual behaviors and standards. Title IX and our school policy prohibit discrimination on the basis of sex, which regards sexual misconduct including discrimination, harassment, domestic and dating violence, sexual assault, and stalking. We understand that sexual violence can undermine students academic success, and we encourage affected students to talk to someone about their experiences and get the support they need. Please be aware that as a mandatory reporter I am required to report any instances you disclose to Willamette's Title IX Coordinator. If you would rather share information with a confidential employee who does not have this responsibility, please contact our confidential advocate at confidential-advocate@willamette.edu. Confidential support also can

be found with SARAs and at the GRAC (503-851-4245); and at WUTalk - a 24-hour telephone crisis counseling support line (503-375-5353). If you are in immediate danger, please call campus safety at 503-370-6911.

Missed Classes: Please make every effort to attend all classes and be an active participant in class activities and discussions. Much of your learning and understanding of new mathematical ideas will come from thinking and talking about them in class. I expect everyone to attend all classes and turn in all assignments. If for some reason you are unable to attend class or turn in an assignment, please let me know as soon as possible, preferably *before* the missed class or assignment.

Time Commitment: Willamette's Credit Hour Policy holds that for every hour of class time there is an expectation of 2-3 hours of work outside of class. You should anticipate spending approximately 9 hours outside of class engaged in course-related activities.

Cell Phone/Screen Policy: Unless specifically stated for class use, no laptops, iPads, or other devices which take your eyes off your fellow classmates and the class discussion are allowed. Electronic devices such as cell phones, laptops, etc. must be turned off during class meetings. *If your cell phone goes off, or it is clear that you are using one of these devices during class, you will be responsible for bringing treats for the entire class at the next class meeting.*

Academic Integrity: Students of Willamette University are members of a community that values excellence and integrity in every aspect of life. As such, we expect all community members to live up to the highest standards of personal, ethical, and moral conduct. Students are expected not to engage in any type of academic or intellectually dishonest practice and encouraged to display honesty, trust, fairness, respect, and responsibility in all they do. Plagiarism and cheating are especially offensive to the integrity of courses in which they occur and against the College community as a whole. These acts involve intellectual dishonesty, deception, and fraud, which inhibit the honest exchange of ideas. Ignorance of what constitutes plagiarism shall not be considered a valid defense. Plagiarism and cheating may be grounds for failure in the course and/or dismissal from the College. For more information, see <http://willamette.edu/cla/catalog/policies/plagiarism-cheating.php>. If you are unsure of what constitutes cheating, please ask me. These are the practices I expect you to follow in each of the components of the course:

on the reading and homework: You may, and are encouraged to, discuss the homework with fellow students, and get help from your professor, textbook, notes, or calculator. However, your submitted written work should be your own. Copy/pasting sections of another assignment, reading and paraphrasing another source, or providing your assignment to be copied by others, are violations of university policy.

on the course project: Be sure to accurately attribute all quotes and sources, even when paraphrasing. The majority of your work should consist of your own conclusions and insights.

on celebrations of knowledge (aka quizzes): We will conclude each topic thread with an individual quiz. Your work on these quizzes should be your own, and you may not receive help from any source other than your professor (unless directed otherwise).

on group work: All members of your group should contribute to producing all components of your project. Writing your name on work written by others is a violation of university policy.

Intellectual Property & Privacy: Class materials and discussions including recorded lectures are for the sole purpose of educating the students enrolled in the course. The release of such information (including but not limited to directly sharing, screen capturing, or recording content) is strictly prohibited, unless the instructor states otherwise. Doing so without the permission of the instructor will be considered an Honor Code violation and may also be a violation of other state and federal laws, such as the Copyright Act.

DACA/Undocumented Student Advocate: Willamette is committed to supporting our DACA/Undocumented students in a variety of ways. This year, Delia Olmos-Garca is the contact person for all DACA/undocumented students can provide those students with a number of external and internal resources that are available. Her contact information is email: dolmosga@willamette.edu, Office: FAW 232B, Phone: 503-370-6371.

SOAR Center Offerings: Food, Clothing, and School Materials The Students Organizing for Access to Resources (SOAR) Center strives to create equitable access to food, professional clothing, commencement regalia, and scholarly resources for WU and Willamette Academy students. The SOAR Center is located in the Putnam University Center's third floor (in the former Women's Resource Center and across from the Harrison Conference Room). The space houses the Bearcat Pantry, Clothing Share, and First-Generation Book Drive and is maintained by committed students and staff and faculty advisers. Hours of operation are M-F, 9am-5pm and weekends from 12-2pm. The Center opens for fall semester 2019 on Labor Day, Monday, Sept. 2 at 12pm.

Land Acknowledgement: We are gathered on the land of the Kalapuya, who today are represented by the Confederated Tribes of the Grand Ronde and the Confederated Tribes of the Siletz Indians, whose relationship with this land continues to this day. We offer gratitude for the land itself, for those who have stewarded it for generations, and for the opportunity to study, learn, work, and be in community on this land. We acknowledge that our University's history, like many others, is fundamentally tied to the first colonial developments in the Willamette Valley. Finally, we respectfully acknowledge and honor past, present, and future Indigenous students of Willamette.