

Math 181: History of Mathematics

Instructor: Jesse Leo Kass

Winter 2024

Description

Did Fermat really have a proof of his famous last theorem? Who discovered calculus? Was Leonhard Euler really the greatest mathematician of all time?

Did Pythagoras really prove the theorem you learned in high school? What mathematics is in Euclid's book *Elements*? What mathematics did the ancient Mesopotamians create? The Incans?

In this class, we will NOT answer these questions (for the most part). Instead, we will develop tools so that YOU can answer them and, just important, pose new questions. The class will culminate with everyone using these tool to research a topic of personal interest.

A major goal will be to develop tools for exploring topics traditionally under-explored in the subject. The history of mathematics has its origins in the preservation and recovery of “great books” by ancient Greek elites like Archimedes, and the result is a toolkit that applies very well to the mathematics produced at American and European universities but is of more limited use in other contexts. The result is a history that often neglects the role of women, of non-Western peoples, and of groups within the West who have historically been excluded from the field such as African-Americans and Hispanics. Even in the traditional realm of Greek mathematics, we'll see that introducing more tool sheds new light on old (and important) topics.

Description from the Course Catalogue

A survey from a historical point of view of various developments in mathematics. Specific topics and periods vary yearly.

Prerequisites

Math 19B / Math 20B; Math 100 is strongly recommended for preparation.

Instructor's e-mail

jelkass@ucsc.edu.

Instructor's Office Hours and Location

Office hours are scheduled for the hour after class at 1:05 pm on Monday and Wednesday. If you want to come to office hours, just stick around after class! I'll go to my office at McHenry 4174 after class if nobody sticks around.

Textbooks

The required books are the following:

1. Katz, Victor. *A History of Mathematics (Classic Version)*, Ed. 3.
2. Wardhaugh, Benjamin. *How to Read Historical Mathematics*.
3. Netz, Reviel and Noel, William. *The Archimedes Codex*.
4. Stedall, Jacqueline. *The History of Mathematics: A Very Short Introduction*.

All textbooks should be available at the student bookstore.

These resources will be supplemented by documents that are freely available online.

Meeting times

Class meets Monday, Wednesday, and Fridays from 12:00 pm to 1:05 pm. Class will be held in Cowell Classroom 131.

Policy on electronic devices in the classroom

I will record classes using the Lecture Capture Service and posting the recordings to Canvas. If you want to record the class in a different way, please contact me.

Course requirements and grading

Grades will be entirely based on homework and presentations with grades assigned.

Students who chose a Pass/Fail option will receive a Fail if their numerical grade is 69 or lower and otherwise will receive a Pass.

Course grades will be computed as follows: Homework: 70% Final Exam: 20% Final paper: 10%.

Last time I taught this class, roughly 45% of the students for an A, 35% got a B, 6% got a C, and 14% got a failing grade.

Homework

Homework will be collected on a weekly basis. Homework is due at the beginning of class. Homework submitted during class but after the start of class will be marked LATE and the grader may invoke a penalty. Once class has ended, no homework will be accepted. If you can't make it to class on a day that a homework is due, the correct procedure is to submit the homework before class in my mailbox on the 4th floor of McHenry (by the main office).

To address various situations where you are unable to submit a homework, I will drop the lowest homework grade you received when computing final grades. For example, if you received a zero on the first homework and full credit on all subsequent homework, then you will receive the full 70% of the homework component of your course grade.

Final Exam

There will be a cumulative Final Exam. The exam is scheduled for Wednesday, March 20, 2024 from 12:00–3:00 p.m.

Final paper

There will be a final paper due towards the end of the quarter. We'll finalize the details later in the quarter.

Tentative schedule

The schedule is *tentative*.

January 8 Introduction to the course.

January 10 Discussion about Fermat's Last Theorem. Read Chapter 1, "Mathematics: myth and history" in the Stedall book.

January 12 Discussion of T. E. Hart. Read Chapter 2, "What is mathematics and who is a mathematician" in the Stedall book.

January 17 Continued discussion of T. E. Hart. Overview of his mathematical work. Read selection from Robinson's textbook *Elements of Geometry, Plane and Spherical*.

January 19 Discussion of Robinson's *Elements of Geometry, Plane and Spherical* and its relation to Euclid's *Elements*. Read Chapter 3, "How are mathematical ideas disseminated" in the Stedall book.

January 22 More on Euclid. Read sections 3.1 and 3.2 in the Katz textbook.

January 24 Archimedes. Read chapters 1 and 2 of *The Archimedes Codex* by Netz and Noel.

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- January 26** Archimedes. Read chapters 3 and 4 of *The Archimedes Codex* by Netz and Noel.
- January 29** Archimedes. Read chapters 5 and 6 of *The Archimedes Codex* by Netz and Noel.
- January 31** Archimedes. Read chapters 7 and 8 of *The Archimedes Codex* by Netz and Noel.
- February 2** Archimedes. Read chapters 9, 10 and 11 of *The Archimedes Codex* by Netz and Noel.
- February 5** Discussion of mathematics at The Citadel military academy in the 1800s. Read Chapter 4, “Learning mathematics” in the Stedall book.
- February 7** Introduction to Horner’s theorem. Read Chapter 1 in Wardhaugh’s *How to Read Historical Mathematics*. Read Horner’s original paper.
- February 9** Introduction to Horner’s theorem. Read Chapter 2 in Wardhaugh’s *How to Read Historical Mathematics*. Read short biography of Joseph Ficklin.
- February 12** Read Chapter 3 in Wardhaugh’s *How to Read Historical Mathematics*. Read lecture notes of Charles H. Judson
- February 14** Read Chapter 4 in Wardhaugh’s *How to Read Historical Mathematics*. Read Ficklin’s textbook.
- February 16** Read Chapter 5 in Wardhaugh’s *How to Read Historical Mathematics*.
- February 21** Read Chapter 5, “Mathematical Livelihoods” in the Stedall book.
- February 23** Introduction to the Plimpton 322 tablet and Babylonian mathematics. Read Chapter 6, “Getting Inside Mathematics” in the Stedall book.
- February 26** More on the Plimpton tablet. Read the section on “Mesopotamia” in the Katz textbook.
- February 28** Finish the Plimpton tablet. Read the article “Words and pictures: new light on Plimpton 322” by Robson.
- March 1** Discussion of the historiography surrounding the Plimpton tablet. Read Chapter 7, “The evolving historiography of mathematics” in the Stedall book. Read section 20 on pages 36 to 40 of Neugebauer’s *The Exact Sciences in Antiquity*.
- March 4** In class peer-editing.
- March 6** How to use material culture to study mathematics? Discussion of Greek abaci. Possible visit to the Special Collections in McHenry library.

March 8 Linguistics as historical evidence.

March 11 More on linguistics as historical evidence.

March 13 Linguistic evidence and transmission from Egypt to Greece. Read “The Egyptian origin of the Greek alphabetic numerals” by Stephen Chrisomalis.

March 15 Review for exam.

Collaboration Policy

With each week’s homework, you must turn in a one-paragraph description of all the resources you used on that homework. You must mention any person you talked to about the problems, any book you looked at, any online resource (Wikipedia, Chegg,...) that you used. A sample paragraph is

On this week’s homework, I worked on the problem set collaboratively with Gauss and Grothendieck. We found an Alex Jones video (<http://youtube.blah.com>) that gave a really clear explanation of excellent rings. We compared our solutions against a solution key that we found on the /commutativealgebra/ board of 4chan (<http://blah.blah.edu>). We also got really stuck on Problem 5, and so we DM-ed the Twitter account “catturd2.” Turns out, he doesn’t know any math or history, so I went to Chegg.com and paid an online tutor (“Zariski”) \$50 to solve the problem for me.

This paragraph is required even if you work entirely on your own and only reference the course textbook. You could just write something like: “This week I did not work with any other students and relied entirely on course notes, and the Katz textbook.”

It is acceptable to use any and all resources that you would like (including Alex Jones videos and Chegg), but failure to include this paragraph may result in a reduced grade and may raise honor code concerns.

Academic integrity

Cheating will not be tolerated. Honor code violations will be addressed according to university guidelines.

Accessibility

If you are a student with a disability who requires accommodations to achieve equal access in this course, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me privately during my office hours or by email, preferably within the first two weeks of the quarter. You can contact the DRC by phone at 831-459-2089 or by email at drc@ucsc.edu.