

Math 300 - Evolution of Mathematics

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Note about response times:

- Between 10am-7pm Monday-Friday, I will reply within a few hours
- Outside that time, I will reply to every message within 24 hours.

Office Hours (or how to reach me):

- I'll be on Zoom from 9:50am M-F.
- I don't have traditional office hours in the sense of sitting around waiting for people to show up, but emails and messages on Discourse are delivered to my phone, so I'm pretty quick to respond.
- If you want to meet face-to-face on Zoom, send me an email with your suggested time and I'll do my best to make it work.

Before We Get Started - What You Need

This syllabus is long, but I've tried to pack it with as much relevant and useful information to help you succeed in this course. You'll be revisiting it throughout the course. After it loads, use the find function (**Ctrl+f** on Windows/ChromeOS or **Cmd+f** on MacOS) to locate anything you're looking for.

Two Tracks

The summer 2020 courses are all online or virtual remote. Let's accommodate both! Pick one.

- Synchronous Remote Track: If you are available from 9:50am - 11:50am Monday - Friday like the course you originally signed up for, let's get together on Zoom! We will meet, hold small group discussion, class discussions, etc. The daily course will be recorded.
- Asynchronous Online-only Track: If you are not available at 9:50 Monday - Friday, you can choose the fully online version of the course. You will still be expected to do everything of the remote track - daily discussions, daily activities, watching the lecture from the morning, etc. There are many caveats about this track:
 - To be clear, this is a four-week class and we're going to cover a lot of ground in the 20 days we're meeting.
 - You are expected to "come to class" every day and participate. In the online-only track, this means you will be writing *a lot more* because you will be doing your discussions on the forum instead of chatting on Zoom.

- Although there is some flexibility of when you'll engage with the material, this course is only four weeks long. In order to actually complete the course, Monday's class material is expected to be fully completed by Tuesday at 11:59pm, Tuesday's by Wednesday at 11:59, ..., and Friday's by Saturday at 11:59pm.
- A lot is expected of students in this four week class. It's going to be fun, but it's going to be a lot. See the Statement on Credit Hours below, you're expected to spend *a minimum* of 33.75 hours *per week* on this course alone. I will be saying this in the video discussion of the syllabus, but it's important enough to write explicitly in the syllabus:
If you don't plan to work incredibly hard on this course, you will fail.

Class Discussion Forums discourse.math.wichita.edu:

We will be using Discourse for content-specific communications, daily work, discussions, etc. I acknowledge that this adds an additional inbox to check (in addition to your shockers.wichita.edu which should be checked at least daily).

Note: I will be posting blackboard announcements to accompany discourse posts, so there will be entry points both from [Discourse](https://discourse.math.wichita.edu) directly and from Blackboard.

Course Description

A study of mathematics and mathematicians from antiquity to the present, to see how mathematics has developed from human beings' efforts to understand the world and the extent to which mathematics has molded our civilization and culture. Since mathematics is what mathematicians do, the lives of mathematicians from various ages and countries are studied. Not a mathematical skills course.

Measurable Student Learning Outcomes

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

- Trace the development and interrelation of topics in mathematics up through the high school level.
- Solve problems using tools and methods available at the time
- Discuss mathematics in historical context with contemporary non-mathematical events
- Discuss the lives of mathematicians and their contributions to the field
- Identify significant contributions in mathematics from women and from outside of Europe
- Think critically about sources of information for mathematics, history, and teaching

Texts/Readings

Required:

- Math Through the Ages: A Gentle History for Teachers and Others, Second Expanded Edition by William P. Berlinghoff, Fernando Q. Gouvêa
Get it on sale for \$30.25 (at the time of this writing) from [American Mathematical Society](https://www.americanmathematicalsociety.org/) book shop.
- (Older edition) available physically at the [Ablah Library textbook reserves](#).

Other readings:

Will be made available as web links or PDFs on Blackboard/Discourse

Other Materials

We're going to have to be creative for DIY hands on materials. Small things like beans, rice, coins, or Hatchimals, something moldable like modeling clay or wet dirt from your yard, a stick (popsicle or from a tree), ... this is just the first couple days.

Class Protocol

Participation:

This is a math appreciation class. Each day we'll be having a discussion of things that I choose to bring to class as the instructor, and we might deviate to discuss anything that came up in your readings / research. Discussion is encouraged. Participation is required!

Attendance:

Class meets daily for four weeks. Because of the abbreviated timeframe, missing a single class gets you behind quickly. As such, you're expected to attend every class section. If you are to miss class for any reason, you are responsible for any notes or announcements given during class (but since the class is online, just check Blackboard and Discourse. It's literally all there! Watch the videos, do the activities, and keep pace with class).

Cell phone use:

Take two hours of your day to enjoy the freedom from being constantly connected! Silence your phone and keep it put away during class. [University policy](#) requires this of you, and I ask that you do so out of courtesy for your classmates.

Plus, since this class requires your computer - you should put your phone AND your computer into Do Not Disturb mode. It's something that I still sometimes forget to do, but since my wife doesn't want her text messages to show up on my screen during class, let's both try to remember and click DND.

Assignments/Projects

There will be a daily reading assignment and problems from the texts or worksheets will be assigned. Homework is due the day after it is assigned. The schedule of activities and major assignments appear at the end of this syllabus. The specifics for each day will be on a post on Discourse. [Here's a sample](#).

Daily: In addition to the problems, as you read, we'll be writing "Intelligent Sentences" - adapted from Professor Judith Grabiner of Pitzer College¹: "Hand in" one intelligent sentence for each assigned reading for the day. These will be handed in at the START of class, peer-discussed,

¹ Inspired by the syllabus found here:

<http://historyofmathematics.org/wp-content/uploads/2014/04/Survey-course-Grabiner.pdf>

then collected by the instructor. The assignment is pass/fail, “yes/no.”

The objective will be a “Read-Write-Pair-Share” activity. Everyone will:

- Read the assigned section(s),
- Write a sentence or two about your thoughts of the text and/or questions that it brought up for you.
- Pair up with a partner to discuss
- Share the ideas/discussion with the whole class.

The idea - (experiment, we’re rolling with this together!) - is to use Zoom breakout sessions to group everyone into small groups of 2-4 and for the small groups to chat about the readings. We’ll then rejoin the main room to discuss globally. This *probably* will work. We’ll experiment on the first couple days, because honestly we can’t know until we try it!

Major Projects: Most of the grade is in the form of papers and presentations!

- Two brief mathematician biographies,
- Super-Brief Historical Summaries,
- Presentations of the mathematicians, and
- Math Through the Ages (MTA) Project

Biographies:

One will be a male mathematician, and one a female (if there is a compelling reason you’d like to cover two male or two female, such as contributions to the same field, or some such thing, ask me) For each of the two biographies, you will choose one mathematician from that you’d like to learn more about. Discuss their personal story, their contributions to mathematics. To do this, we’ll follow the process which is an altered version of project 1 on page 66 of MTA. We will call this person *Your Mathematician* (YM).

1. Is YM mentioned in this book (Math Through the Ages)?
2. Look up YM in the [Dictionary of Scientific Biography \(available electronically from our library\)](#) and Wikipedia. Read the articles and take notes. Note any discrepancies between these sources. How do you decide which is more reliable?
3. Try to find information about YM on the internet. Read the information and compare with what you already know. How do you decide whether what you find on the internet is reliable?
4. ~~Visit the Ablah library and look through books on the history of mathematics (almost all will be cataloged in the QA section on the second floor ([here's an animated map](#))).~~

Our class is online, but this is 2020 and you can visit the Ablah Library online, too! Visit the Library Resources link on Blackboard for more information.

Is YM mentioned? Are there any books by or about YM? Have YMs collected works been published? If so, does the library have a copy?

5. What languages did YM read and write? How do you know? What language did he or she use when writing mathematics?

6. Write a short (3 page) biography of YM. Note, three pages isn't a lot. We're talking three literal pages, not 2.5 pages with margin manipulation.
 7. Include with your biography a complete bibliography, which isn't counted within the three page count.
- A rubric and listing of potential mathematicians will be provided in a separate document.
 - Citation format will be APA.

Presentations:

Each student will be required to present about their mathematicians. This will be two 8-12 (or more) minute presentations which will take place in the second and third week of the class.

- The presentations will be recorded on your computer / phone / etc and then uploaded to the [Math 300 Videos File-drop folder](#) linked here and on the assignment page. [Here's a video showing how to do it](#). **NOTE: Please name your video file with your first and last name so I know whose it is! :-)**
- I will upload the videos to Youtube and create a Discourse thread for each person's video ([here's a sample](#))
- The "audience members" (everyone else in the class) will receive a participation grade for producing an "intelligent sentence"/observation/question/etc about the presentation - a sentence or two about your thoughts of the material/presentation and/or a question brought up. Post this to the video's thread on Discourse.
- Rubric will be posted on Blackboard and the assignment page.

Historical Timeframe Summaries:

The goal of this project is to provide a broad context of math within the history of the world. Fun fact: woolly mammoths were still alive when the Great Pyramid of Khufu was built²

Inspired by, and adapting, project 2 on page 63:

- For each of your two mathematician biographies, write a brief (one page) paper/outline describing what was going on in the world at the time of history in which Your Mathematician lived. As the goal of this paper is a super-brief overview, Wikipedia-only research is acceptable³:
1. Do not confine yourself to the region of the person or event you chose; consider all parts of the world. Also consider all major history features of the time -- political changes, social trends, scientific breakthroughs, religious movements, literature, art, etc.
 2. Then discuss how (if at all) the mathematics of Your Mathematician influences and/or was influenced by the historical situation you described. You may present your own opinions, but they should be accompanied by supporting arguments based on the historical evidence.

²

<https://web.archive.org/web/20150630060405/http://www.heritagedaily.com/2013/11/mammoths-still-walked-the-earth-when-the-great-pyramids-were-being-built/100307>

³ If you want to dive deeper into the research, please do!

MTA Project:

- You will choose one or two projects from the end of a sketch in Math Through the Ages (MTA). I've selected several that seemed interesting to me and [collected them as a list here](#).
- 1. Complete the project as specified in the textbook. Plan to correspond with me over email / discourse about it.
- 2. We'll share it with the class in whatever means is relevant - some projects are written, many lend themselves well to be a presentation (post a video like we did above), others have you physically construct things which could be shown by pictures or video.
- 3. Deadline is any time during the semester - the sooner you get it done, the better. The hard deadline is by Tuesday of week 4. When it's completed, email me your projects (if uploading a video, post it to the Math 300 Video Drop folder)

Math 531 Students/Dual-Enrolled:

Students who are dual-enrolled to receive credit for Math 531, Introduction to the History of Mathematics have an additional assignment. The student will be required to present, for a length of 30 minutes or more, a historical mathematical topic of their choice, perhaps related to their mathematicians. This will be done during the third or fourth week of classes.

- Basically, it's like a mini lecture - like how I presented about the *yupana* or details of Arab algebra. Feel free to use slides, manipulatives, ...
- Discuss your choice with me in advance, and I can help with the details.
- An example: Perhaps you want to present on Buffon's Needle Problem. You can give an overview of the question, maybe have students perform the experiment with a small number of 'needles' (toothpicks?), then discuss using trigonometry why the probability is what it is. Share the mind-blowing conclusion.

Grading

Late / returned papers

For each day that a paper is late, and for each time that an assignment or paper is returned for correction, 10% will be deducted from the grade. Example: if a paper is three days late and is returned for correction once, the paper will receive 60% of the assigned rubric grade (if the rubric comes out to 18 of 20 points, then the paper's grade is 54%).

Grading: Points Distribution

Intelligent Sentences / readings:	10%
Discussion/Participation	15%
Presentation participation	5%
Papers and projects:	55%
Presentations: _____	15%
	100%

"This is the hardest 'easy A' class ever." ~ a former student.

Grading: Grading Scale

The following grading scale will be used for the course:

93-100 A	<i>The A range denotes</i>	73-76 C	<i>The C range denotes</i>
90-92 A-	<i>excellent performance</i>	70-72 C-	<i>satisfactory performance</i>
87-89 B+		67-69 D+	
83-86 B	<i>The B range denotes</i>	63-66 D	<i>The D range denotes</i>
80-82 B-	<i>good performance</i>	60-62 D-	<i>unsatisfactory performance</i>
77-79 C+		0-59 F	

Additionally Syllabus Information

Academic Integrity:

Students at Wichita State University are expected to uphold high academic standards. WSU will not tolerate a lack of academic integrity. Students are responsible for knowing and following the [Student Code of Conduct](#) and the [Student Academic Honesty policy](#). Any breaches will be reported to the Office of Student Conduct and Community Standards.

My addendum:

- If you cheat on an assignment, you will receive a zero on that assignment.
- If you plagiarize your paper, you will immediately fail the course. Discuss any concerns *before* you submit your paper. [Here's the Library's Guide on plagiarism and how to avoid it.](#)

Statement on Credit Hours

Success in this 3 hour credit course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction and preparation/studying or course related activities for a total of 135 hours.

In the four week course, that's 33.75 hours per week.

Additional Syllabus Information from the university

[You can find it here.](#)

About this Syllabus

This syllabus is not a contract. The instructor reserves and retains the right to alter the course requirements and/or assignments based on new materials, class discussions, current events, or other legitimate pedagogical objectives.

Schedule of Activities

General Idea/Course Design:

We're (almost) all future teachers and will be planning your own classes in the future, so here's a look behind the curtain. Beware: many "scare quotes" follow. The history of

mathematics is an incredibly broad area that spans thousands of years. As I have to choose, I've settled on this line of thinking for our brief class - we'll follow the structure of Math Through the Ages; reading cover-to-cover the historical sketches and the "nutshell" historical overview.

Peeking further behind the curtain, this course has never been online. Normally we get together every day where we all chat about math history, I lecture some, we do some activities, we chat more, more lecture, ... for two hours. This goes on for four weeks.

It's worked really well for the last five or six years I've taught this class, but I don't see it working here. To that end, I have the following "Online Evolution of Mathematics™" ideas:

- The synchronous remote class will get online at 9:50am every weekday. We'll spend the first couple minutes with idle chit-chat while everyone connects - I have not attended a Zoom meeting in which everyone was on time...
- Around 9:52ish we'll start the daily reading discussion. This will (likely) go on for about 5-6 minutes of small groups and another 5-6 perhaps all together.
- We'll come back together and then do one of two things:
 - If our conversations sparked a new interest - we'll do our best to follow that, or
 - I'll "lecture" over the topic by discussing a few things from the reading in more depth, supplementing the reading, or discussing something related to the reading.
 - There may be a class activity directly related, or the "class activity" may be something done outside of "class time"
- We'll repeat the conversation / "lecture" process for the sections of the day's readings.
- If class is over before 2 hours, that works. We'll go until we cover all the material of the day.

I think that on-average, we'll be doing the same amount of class time as a normally seated section; we just won't necessarily be doing our "class time" portion of the class between 9:50 - 11:50.

Specific Listing: (subject to change)

Note that this is just the expected reading list and "major" assignments. Check the daily Discourse post in order to see the specific questions, videos, etc, that are assigned for that class period.

Week 1	Reading Assignment Before Class	Major Thing Due *be sure to check Discourse at least daily!*
June 1	(nothing assigned)	"About Me" post on Discourse
June 2	Sketch 1: page 67 Keeping Count: Writing Whole Numbers	

	"Nutshell" pages 5-25	
June 3	Sketch 2: Reading and Writing Arithmetic: The Basic Symbols Sketch 4: Broken Numbers: Writing Fractions	
June 4	Sketch 12: A Cheerful Fact: The Pythagorean Theorem	
June 5	Sketch 7: Measuring the Circle: The story of π	Choice of Mathematicians for Biographies is Due (update the spreadsheet and email by 9pm)
Week 2	Reading Assignment	Major Thing Due *be sure to check Discourse*
June 8	Sketch 9: Linear Thinking: Solving First Degree Equations	
June 9	Sketch 28: Any Way You Slice It: Conic Sections Sketch 10: A Square and Things: Quadratic Equations	
June 10	Sketch 5: Less than nothing?: Negative numbers Sketch 11: Intrigue in Renaissance Italy: Solving Cubic Equations	First Mathematician Presentation Due
June 11	Sketch 17: Impossible, Imaginary, Useful: Complex numbers Sketch 29: Beyond the Pale: Irrational Numbers	

June 12	Sketch 14: On Beauty Bare: Euclid's Plane Geometry Sketch 13: A Marvelous Proof: Fermat's Last Theorem	First mathematician biography (Email to me by 9pm)
Week 3	Reading Assignment	Major Thing Due *be sure to check Discourse*
June 15	Sketch 3: Nothing Becomes a number: The Story of Zero	History timeline overview due (Email by 9pm)
June 16	"Nutshell" 26 - 66	
June 17	Sketch 15: In Perfect Shape: The Platonic Solids Sketch 16: Shapes by Numbers: Coordinate Geometry	Second Mathematician Presentation Due
June 18	Sketch 18: Half is better: Sine and Cosine Sketch 27: Counting Ratios: Logarithms	
June 19	Sketch 26: Out of the Shadows: The Tangent Function Sketch 30: Barely Touching: From Tangents to Derivatives	Second mathematician biography (Email to me by 9pm)
Week 4	Reading Assignment	Major Thing Due *be sure to check Discourse*
June 22	Sketch 21: What's in a Game? The Start of Probability Theory Sketch 22: Making Sense of Data: Statistics become a science	History timeline overview due (Email by 9pm)
June 23	Sketch 23: Machines that Think? Electronic Computers	MTA Projects Due

	Sketch 24: The Arithmetic of Reasoning: Boolean Algebra	
June 24	Sketch 19: Strange New Worlds: The Non-Euclidean Geometry Sketch 20: In the eye of the beholder: projective geometry	
June 25	Sketch 6: By tens and tenths: Metric Measurement Sketch 25: Beyond Counting: Infinity and the Theory of Sets	
June 26	(nothing assigned at the moment)	

Assessments:

- Homework problems and class activities assess solving problems using tools and methods available at the time.
- Biography papers assess discussing the lives and contributions of mathematicians, male and female as well as identifying reliable sources of information for mathematics, history, and teaching
- Historical timeline outlines and class activities assess tracing the development and interrelation of topics in mathematics up through high school mathematics
- Class activities assess discussing mathematics in historical context with contemporary non-mathematical events