

# Math 4033, History of Mathematics

Course Information

Spring 2016

**Professor:** Dr. Lisa Mantini, 410 Math Sciences

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- ▷ Course Times: TR 2:00 – 3:15 PM in 514 MSCS.
- ▷ Instructor's office hours: MW 2:30–3:30 PM, F 1:00–2:00 PM, and by appointment.

**Course Objectives:** The aims of this course are to

- ▷ Describe the development of mathematical ideas and techniques over time, particularly the contributions of its most significant practitioners and from diverse cultures including Arab, Indian, Chinese, and others;
- ▷ Facilitate the use of historical ideas and perspectives in the teaching of mathematics at the secondary level;
- ▷ Develop skill in critical reading, research, and analysis as expressed through formal writing;
- ▷ Reflect on and critique your own work and that of other students particularly as it relates to the reading and to planning and presentation of lessons.

**Prerequisites:** Math 2153, Calculus II, is the official prerequisite for this course. We will use ideas from high school algebra and geometry throughout the course.

**Text:** *A History of Mathematics: Brief Edition*, by Victor J. Katz.

**Course Requirements:** The requirements for this course are as follows:

ITEM	DATE	POINTS	WEIGHT
Weekly Reading w/peer review	Tuesdays	90 pts	14%
Homework	Thursdays	80 pts	13%
Midterm Projects (two)	To be selected	80 pts	13%
Final Project with presentation	Tues 3 May	125 pts	20%
Exam 1	Thurs 25 Feb	100 pts	16%
Exam 2	Thurs 14 Apr	100 pts	16%
Attendance	Daily	50 pts	8%
TOTAL		625 pts	100%

**Grading:** There are 625 total points available in the course. Preliminary grade cutoffs, which I reserve the right to lower, are as follows:

- 560 points (89.6%) guarantees an A in the course
- 498 points (79.7%) guarantees a B
- 435 points (69.6%) guarantees a C
- 375 points (60%) guarantees a D

**Graduate Credit:** A graduate student wishing to earn graduate credit for this course will complete two additional projects in addition to those described in this syllabus. One will be a book review of an approved book treating an aspect of the history of mathematics, and one will be a review of three articles concerning aspects of the history of mathematics such as articles found in the MAA's on-line journal *Convergence*. Graduate students should discuss these projects with me at their earliest opportunity.

**Weekly Reading:** Weekly reading of approximately 25–30 pages from the text will be assigned, to be completed before the Tuesday class in that week. The assignment on the reading each week is for you to write and type neatly *Three Intelligent Sentences* relating to different aspects of the reading. These sentences should comment critically and thoughtfully on different aspects of the reading, convincing a reader that you completed the reading assignment and that you understood it. The last 10 minutes of class on Tuesdays will be spent on peer review of these sentences. Students will exchange papers and will assign grades of A through F to each other's paper. Each assignment is worth 9 points: 2 points per sentence written, 1 point per sentence reviewed on a classmate's paper.

- A Interesting sentences which clearly explain and/or comment critically on different aspects of the reading.
- B Sentences that deal with substantive issues but which need editing for scope, correctness, or clarity.
- C Factual sentences that don't indicate a critical understanding of what was read.
- D Sentences which only relate to the titles of sections and subsections, not to the actual reading.
- F Assignment was not completed.

**Homework:** Ten weekly homework assignments will be made from the problems in the text or related problems. These will be due generally on Thursdays. Each assignment is worth 10 points. Students will be responsible for turning in 8 of these 10 assignments. An assignment is not required on a Thursday in which a team is presenting a midterm project, though completion of the problems on the homework assignment is highly recommended before the exams.

**Midterm Projects:** The class will be divided into five teams of 3–4 students each for the midterm projects. Each team will complete and present two projects, one before Exam 1 and one before Exam 2. One project will be a lesson for the class on a computational tool from history. The second presentation will be on biographies of four notable mathematicians from the current time period. Teams will sign up for the weeks in which they will present, with one team presenting each week. Presentations should be about 20–25 minutes long.

**Final Projects:** Students will complete the final project in pairs rather than teams of four. These will be presented during Pre-finals week and during our final exam period on May 3 from 2:00–3:50 PM. The final project will be the development of a 5E lesson

plan using the history of mathematics in an appropriate content area; other ideas may be substituted for students who are not pursuing teaching certification.

**Exams:** Students will complete two exams, on Thursday, February 25, covering chapters 1–7, and on Thursday, April 14, covering chapters 8–12. These exams will contain mathematical questions in the style of the homework, short answer questions, and short essay questions. Exam review questions will be provided. Makeup exams will be given **only** for very serious and unavoidable extenuating circumstances and **only** if you notify me before or as soon as possible after the missed exam.

**Attendance:** Attendance is required and is worth 8% of your grade, or 50 points. After the first class, and with exception of the exam days, you will earn 2 points for each day you are in attendance. The maximum score of 50 points is earned after attendance at 25 class periods.

**Drop Policy:** The last day to drop the course with no grade and no fees is Tuesday, January 19. The last day to drop the course with no grade and a partial fee refund is Friday, January 22. The last day to drop the course with an automatic grade of W is Friday, April 8.

**Special Accommodations:** If any member of this class feels that he/she has a disability and needs special accommodations of any nature whatsoever, I will work with you and the Office of Disabled Student Services, 326 Student Union, to provide reasonable accommodations to ensure that you have a fair opportunity to perform in this class. Please advise me of such a disability and the desired accommodations at some point before, during, or immediately after the first class.

**Academic Integrity:** All members of the Oklahoma State University community are entrusted with academic integrity, which encompasses the fundamental virtues of honesty, trust, respect, fairness, and responsibility. Therefore, you are expected to demonstrate academic integrity through

- understanding and upholding the University’s academic integrity guidelines;
- presenting only your own work for evaluation;
- appropriately citing the words and ideas of others;
- protecting your own work from misuse;
- accepting responsibility for your own actions.

The minimum penalty for a first violation for an undergraduate is no credit for that assignment. The minimum penalty for a second violation, even if the first violation occurred in a prior year or in a different course, is the grade of “F!” (F-shriek) on the transcript. Further violations may warrant suspension from the University. Please read the policies at <http://academicintegrity.okstate.edu> very carefully.

**Note:** Especially for future teachers of mathematics, do not sell your textbook. It has so many cool facts in it that you will want to keep it for future reference.

**Math 4033 Calendar, Spring 2016:** Here  $WR_n$  refers to Weekly Reading assignment number  $n$ , and  $H_n$  refers to Homework assignment  $n$ .

Day	Date	Topic	Due	Project
Tues	1/12	Course intro		
Thurs	1/14	Egypt/Babylon	WR0: Ch 1, pp 1–25	
Tues	1/19	Greek math	WR1: Ch 2, pp 29–54	
Thurs	1/21	Greek math	H1: Ch 2, p. 63: 2, 5, 7, 10, 12	Proj 1A
Tues	1/26	Greek math	WR2: Ch 2 pp 55–62; Ch 3 pp 67–84	
Thurs	1/28	Greek math	H2:	Proj 1B
Tues	2/2	Greek math	WR3: Ch 3 pp 84–99; Ch 4 pp 104–113	
Thurs	2/4	Greek math	H3:	Proj 1C
Tues	2/9	China, India	WR4: Ch 5 pp 116–134; Ch 6 pp 138–156	
Thurs	2/11	China, India	H4:	Proj 1D
Tues	2/16	Islamic math	WR5: Ch 7 pp 161–188	
Thurs	2/18	Islamic math	H5:	Proj 1E
Tues	2/23	<b>REVIEW</b>		
Thurs	2/25	<b>EXAM 1</b>		
Tues	3/1	Medieval Europe	WR6: Ch 8 pp 192–210; Ch 9 pp 213–222	
Thurs	3/3	Medieval Europe	H6:	Proj 2A
Tues	3/8	Galileo	WR7: Ch 9 pp 222–251, <b>OU Field trip</b>	
Thurs	3/10	Renaissance	H7:	Proj 2B
Tues	3/22	Precalculus	WR8: Ch 10 pp 257–278; Ch 11 pp 282–293	
Thurs	3/24	Precalculus	H8:	Proj 2C
Tues	3/29	Calculus	WR9: Ch 11 pp 293–323	
Thurs	3/31	Calculus	H9:	Proj 2D
Tues	4/5	18 <sup>th</sup> cent analysis	WR10: Ch 12 pp 329–359	
Thurs	4/7	18 <sup>th</sup> cent analysis	H10:	Proj 2E
Tues	4/12	<b>REVIEW</b>		
Thurs	4/14	<b>EXAM 2</b>		
Tues	4/19	19 <sup>th</sup> & 20 <sup>th</sup> cent		
Thurs	4/21	19 <sup>th</sup> & 20 <sup>th</sup> cent		
Tues	4/26	<b>PROJECT</b>	<b>PRESENTATIONS</b>	Final
Thurs	4/28	<b>PROJECT</b>	<b>PRESENTATIONS</b>	Final
Tues	5/3	<b>PROJECT</b>	<b>PRESENTATIONS</b>	Final

**Midterm Project 1:** Each group of 3–4 students will select a date from the list below and a topic related to the content of that week (or a nearby week) for their first Midterm Project. The presentations should be designed to take roughly 20–25 minutes. Try to find ways to actively engage members of the class in the topic you are presenting. As the written component of the project, each group will submit their PowerPoint slides in the Project 1 dropbox on our D2L page by Tuesday of the following week. The selected dates and topics are in the table below.

Date	Team	Members	Topic
Jan 21		Friedl, Gentry, Lane, Mukina	Straightedge & compass
Jan 28		Fields, Jackson, Selby, Williams	Biographies
Feb 4	Jumping Noodles	Akinwale, Crews, Dixon, Oakes	Calculations of $\pi$
Feb 11	The Outlets	Cain, Kruithof, Maher, Nakvinda	The abacus
Feb 18		Campbell, Taylor, Townsend, Young	Power sum formulas

**Midterm Project 2:** Each group of 3–4 students will select a date from the list below and a topic related to the content of that week or a nearby week for their second midterm project. The presentation should take roughly 20 minutes. Many topics may relate to information, history, or scientific instruments that we view in the Galileo exhibit at the OU History of Science Collection, so many groups may wish to wait to plan their topic until after our field trip. Topics include: Music and Mathematics (rational numbers and pitch); The Inclined Plane and Gravity; Napier’s Bones and Logarithms; Beginnings of Machine Computation: Babbage and the Analytical Engine, or Turing and the Turing Machine; The Solar System and Trigonometry; and many others. Teams may suggest their own topics that relate to chapters 8–12 in the text as well. The written component of each project will be a paper submitted into the Dropbox on D2L. Guidelines will be distributed shortly.

Date	Team	Members	Topic
Mar 3			Biographies: Copernicus, Kepler, Galileo
Mar 10			
Mar 22			
Mar 24			
Mar 29			
Mar 31			
Apr 7			

**OU Field Trip:** On Tuesday, March 8, we will be taking an optional field trip to the History of Science collection at OU to visit their exhibit on Galileo. This exhibit includes the history of Galileo's life and work and that of others whose work influenced Galileo; it includes old documents written by Galileo and others; and it includes ancient scientific instruments and other artifacts. It is wonderful! Members of the class who wish to participate will be responsible for their own transportation to Norman. The tour of the exhibit will begin at about 2:00 PM, so groups should leave Stillwater by 12:30 PM or slightly earlier if possible. We should return to Stillwater by 5:00 PM. I will pass around a car pool list and a map in order to help facilitate transportation for all students; I will suggest a donation of about \$2 to your driver to help pay for gas. Students who do not wish to attend or who are not able to be gone from campus for that amount of time will be able to complete a substitute assignment. **Note:** For students attending the field trip, I will provide a letter for you to give your other professors if you will miss class or other events on that Tuesday, indicating the nature of the trip and asking other faculty members to accommodate you in making up any missed work. It is, however, your responsibility to work with your other professors regarding making up any missed work.