MAT 336: History of Mathematics

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Welcome to MAT 336

MAT 336 is called "History of Mathematics." A better name for it might be "Mathematics, and its History." Throughout this course, we will be studying some of the most beautiful and timeless mathematical problems (theorems), their solutions (proofs), and their discoverers, as well as the historical developments that lead to each breakthrough. Rather than going **deeply** into a single complete theory as we understand it today, in this course the material is drawn from a **broad** variety of sources and topics, and arranged roughly chronologically. One should leave this course with a bird's-eye view of many developments in mathematics up to the 20th century. So this is what makes the course both (I hope) fun and interesting, and (I hope) challenging.

The prerequisites for the course are MAT 200 or AMS 310.

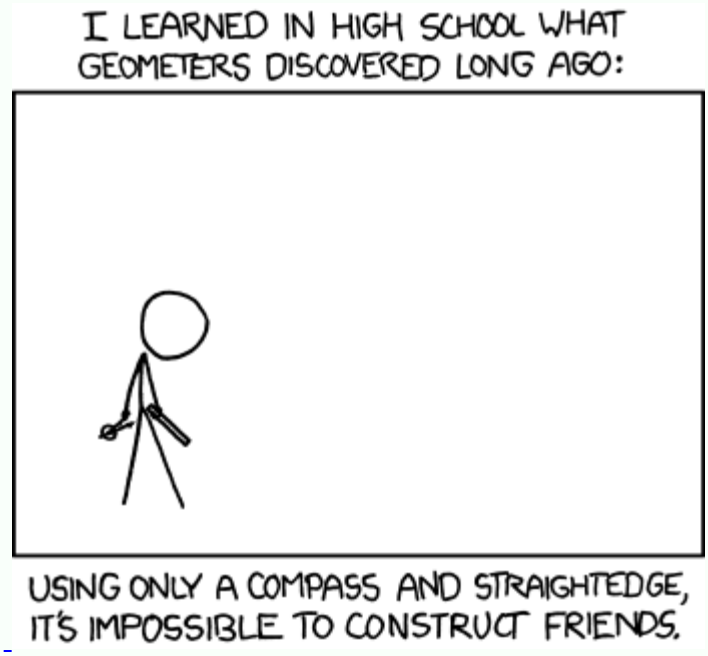
There are weekly homework assignments, six quizzes, two midterms, one in-class presentations, and a final exam. Suggestions for presentations are available at this page.

For more information, see the course info page.

Important dates:

Feb 9	Deadline to sign-up for in-class presentation topics
Mar 2	Midterm 1
Apr 6	Midterm 2 or (W) Paper Due
May 23	Final Exam, 2:15-4:15 pm

There will be no make-ups. Anyone absent from a quiz, exam, or presentation will receive a zero for that portion.
To consider an exceptional circumstance requires a letter from a Dean.



(Thanks to Yousuf for the link.)

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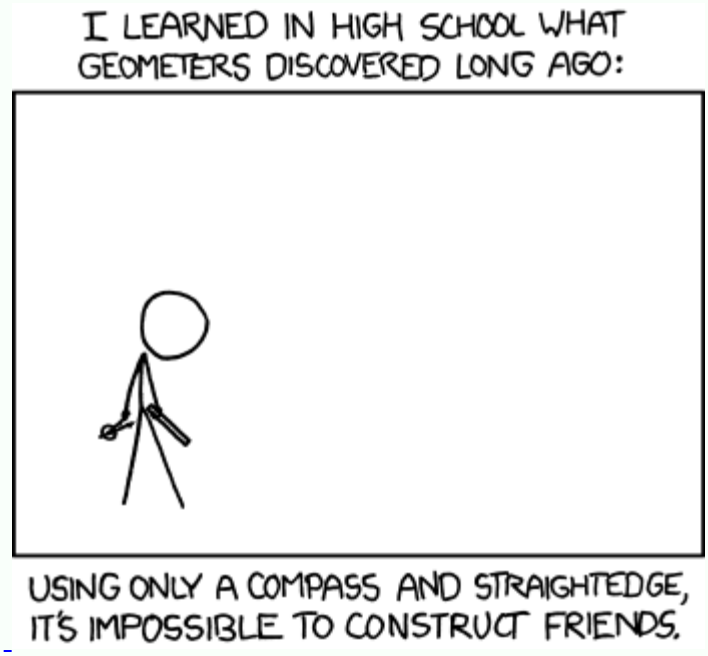

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Course Information

INSTRUCTION

Professor Alex Kontorovich
Office: Math Tower 3-120
E-mail: alexk@math.sunysb.edu
Office Hours: Mondays 1-2pm, Wednesdays 11:30 am - 12:30 pm, or by appointment

Grader: Evan Wright
Office: Math Tower 2-104
E-mail: evanpw@math.sunysb.edu
Office Hours: Tuesday 1-2pm in 2-104; Tuesday 2-3pm and Wednesday 12-1pm in the MLC

LECTURES

MW 2:20-3:40pm, Chemistry 128

ATTENDANCE

Attendance is mandatory. You are responsible for all information presented in every lecture, including material presented by your peers.

TEXTS

Journey through Genius: The Great Theorems of Mathematics by William Dunham
History of Mathematics: An Introduction by David Burton

WEEKLY ASSIGNMENTS

Every week there will be required reading and homework assignments, which are collected on Wednesdays at the beginning of class. The detailed list is available on the syllabus page. Late homework will not be accepted under any circumstances.

QUIZZES

We will have periodic quizzes on accumulated material (lectures, reading, homework, and student presentations). See the home page for policy on missing quizzes.

PRESENTATIONS

Each of you is responsible for one in-class presentation on a topic of your choosing. These are to be selected from the list found here. A detailed outline of your presentation is due in class **one week** before your scheduled presentation. Your choice of topic is due on **Feb 9th**. See the home page for policy on missing your scheduled presentation.

WRITING OPTION

Students wishing to receive credit towards the writing requirement must notify me by Feb 9 via email. Only a reply email confirms that you are taking the "writing option", denoted by (W) throughout. If this is the case, you will write a **15 page** paper on the topic of your presentation. A complete draft is due on March 14th and will be returned with comments/suggestions. The final paper is due on April 6th, in lieu of the second midterm, and will be graded as such.

EXAMS

There are two midterms and one final. The dates are:

Midterm 1: March 2nd
Midterm 2: April 6th
Final Exam: May 23rd

For those taking the writing option (W), the important dates for the paper are:

First Draft Due: March 14th
Paper Due: April 6th

See the home page for policy on missing exams or paper deadlines.

GRADING

Your course grade will be computed as follows:

Final Exam: 30%
Midterm 1: 15%
Midterm 2/(W)Paper: 15%
Quizzes: 20%
Presentation: 10%
Homework: 10%

CHEATING

Any work suspected of being copied or otherwise fraudulently represented will immediately result in a **failing grade for the course**, and will be persecuted to the highest extent allowed by University Policy.

HELP OUTSIDE CLASS

The Math Learning Center is located in Math Tower S-240A and offers free help to any student requesting it. It also provides a locale for students wishing to form study groups.

AMERICANS WITH DISABILITIES ACT

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. (Note that we cannot make special arrangements for students with disabilities except for those determined by DSS.) All information on and documentation of a disability condition should be supplied to the professor in writing at the earliest possible time.

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Course Syllabus

Readings are assigned from:
Dunham: *Journey through Genius: The Great Theorems of Mathematics*
Burton: *History of Mathematics: An Introduction*

Assignments will be posted one week in advance of their due date, so make sure you press Ctrl-R to reload!

WEEK	LECTURE 1	LECTURE 2	TOPICS	READING	HOMEWORK
Week 1 1/31, 2/02	Introduction, Overview		Notion of Number, Counting, Base 60 arithmetic Irrationality, Quadrature	Burton: Chapter 1	Burton: 1.2 #1-7,11-13 1.3 #1-5 Given that V=1/3 ha^2 for a square pyramid, prove V=1/3 h(a^2+ab+b^2) for a frustum. **due 2/09**
Week 2 2/07, 2/09		**Presentations Signup Quiz 1**	Quadrature of the Lune Squaring a Circle Trisecting an angle Doubling a cube Algebraic/Transcendental Numbers	Dunham: Chapter 1 Burton: Chapter 3.1-3.3	Burton: 3.2 #2,3,5,6 3.3 #2-5 (*)Find a polynomial with integer coefficients so that it has a root at Sqrt[2]+Sqrt[3]. (**)Another chance at the frustum problem. **Due 2/16**
Week 3 2/14, 2/16		BBC: The Story of Maths	Pythagorean theorem Figurative numbers	Dunham: Chapter 2 Burton: Chapter 4.1-4.2	Burton: 4.2 #1-10 Give a formula for Cos(5x) given Cos(x) **Due 2/23**
Week 4 2/21, 2/23	**Quiz 2** Presentations 1, 2	Presentations 3, 4	"Elements" Book I Parallel postulate	Dunham: Chapter 2/3 Burton: Chapter 2.4-2.6	STUDY!!!
Week 5 2/28, 3/02	Presentations 5, 6 Review	MIDTERM 1	Infinitude of primes	Burton: Chapter 4.3	Burton: 4.3 #10, 11, 12, 13, 15, 17, 18 **Due 3/09**
Week 6 3/07, 3/09			Non-Euclidean geometries Furstenberg's infinitude of primes	Dunham: Chapters 3/4 Burton: Chapter 4.5	Burton: 4.5 #1, 2, 3, 4, 5 (*) Prove that if 2^n-1 is a (Mersenne) prime, then N= (2^n-1)2^(n-1) is perfect. (**) Show that the set {0,1} is closed in Furstenberg's topology. [Hint: find a (possibly

					infinite) collection of arithmetic progressions whose union is Z-{0,1}] **Due 3/16**
Week 7 3/14, 3/16	**(W)Rough Draft Due**	**Quiz 3** Presentations 7, 8, 9, 10	Archimedes Circular area Spherical volume Computations of Pi (see Chudnovksy brothers)	Dunham: Chapter 4 Burton: Chapter 4.4, 5.3, 5.5	Burton 4.4 #1, 2, 3, 4, 5, 6 Optional: Burton 4.5 #6, 10, 11 **Due 3/23**
Week 8 3/21, 3/23	Presentations 11, 12	Presentations 13, 14	Heron's formula Eratosthenes seive	Dunham: Chapter 5 Burton: Chapters 5.1-5.3	Burton 5.3 #1-6 **Due 3/30**
Week 9 3/28, 3/30	**Quiz 4** Presentations 15, 18, 19, 21	Presentations 23, 24	Cardano, Tartaglia Solving cubics, quadratics Complex numbers	Dunham: Chapter 6 Burton: Chapters 7.1-7.3	STUDY! Burton 7.3 #1a, 1b, 3a, 3b, 5, 6, 7 Optional: #15, 16 **Due Monday 4/04**
Week 10 4/04, 4/06	Presentation 22 Review	MIDTERM 2 or: **(W) Paper Due**	Ruffini, Abel, Galois	Burton: Chapter 7.4	Burton 7.4 #1, 2 **Due 4/13**
Week 11 4/11, 4/13	Presentation 25		Descartes, Pascal Fermat, descent Newton, binomial theorem Approximation to Pi Leibnitz, calculus	Dunham: Chapter 7 Burton: Chapter 8.1-8.3, 10.2	Burton: 8.3 #1, 3, 4 8.4 #1, 3, 8, 10 10.2 #1 (*) Prove that x^4+y^2=z^4 has no non-trivial solutions in the integers. **Due 4/27**
Week 12	SPRING	BREAK			
Week 13 4/25, 4/27	Presentations 27, 29, 30	**Quiz 5** Presentation 31	Bernouillis harmonic series	Dunham: Chapter 8 Burton: Chapter 8.4-9.3	Burton 8.4 #6, 9 9.2 #1f, 2, 4, 9, 10a 9.3 #8 **Due 5/04**
Week 14 5/02, 5/04	Presentations 32, 33	Presentations 34, 35	Euler, zeta(2)	Dunham: Chapter 9 Burton: Chapter 10.1-10.2 Chapter 13.1	Burton 10.2 #2, 3, 4, 6, 10 **Due 5/11**
Week 15 5/09, 5/11	**Quiz 6** Presentation 36	Presentations 37, 38 Review	Euler, sum of reciprocals of primes Gauss, 17-gon, prime number theorem Riemann, hypothesis	Dunham: Chapter 10 Burton: Chapter 10.3	STUDY!!!
May 18th	Review	Session	11:30 am - 1:30 pm	Location:	Math Tower 5-127
MAY 23rd	FINAL	EXAM	2:15-4:15 PM	LOCATION:	LIBRARY E4320

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PRESENTATIONS

Starting in week 4 (February 21), each class will include two 15-minute student presentations.
You will sign-up for a presentation in class on **February 9th**. Topics will be determined by choice; collisions will be resolved by a lottery.
A detailed outline of your presentation is due in class **one week** before, so if your presentation is on Feb 21, the outline must be submitted on Feb 14.

PLAGIARISM

In collecting information for your outline and presentation, you will undoubtedly look through a vast number of resources. These must **all** be included in a bibliography, submitted with your outline. The source of every piece of information must be clearly delineated.

GRADING

Your presentation will be graded out of 10 points, according to the following rubric:

(1 point) Outline Content (due the week before)
(1 point) Outline Bibliography (due the week before)
(1 point) Time Management (no less than 10 mins, no more than 15)
(1 point) Speaking in a Clear, Easily-Audible Voice
(1 point) Historical Content
(1 point) Creativity/Originality of Presentation
(4 points) Mathematical Content

Presentation Topics and Schedule

WEEK	PRESENTER & TITLE
Week 4 (2/21, 2/23)	1. Reezan (W), *Rhind Papyrus, Rosetta Stone* 2. Melissa, *Egyptian Multiplication and Unit Fraction Tables* 3. Sophia, *Egyptian Approximation to Area of the Circle* 4. Sheila (W), *Plimpton 322*
Week 5 (2/28, 3/02)	5. Jared, *Twin Primes Conjecture* 6. Ze Chen, *Dirichlet's Theorem*
Week 7 (3/16)	7. Sugjae (W), *Archemedes's Cattle Problem* 8. Qi, *Chang Ch'iu-chien* 10. Anielisa, *Bhaskara*
Week 8 (3/21, 3/23)	11. Yousuf, *al-Khwarizmi* 12. Humberto (W), *Abu Kamil and Thabit ibn Qurra*

	13. Peter (W), *Apollonius: Point/Point/Point and Line/Line/Line* 14. Alex S, *Apollonius: Point/Point/Line*
Week 9 (3/28)	15. Rose, *Apollonius: Point/Line/Line* 18. Ren, *Apollonius: Line/Line/Circle* 19. Christian, *Huygens* 21. Sean, *Apollonius: Circle/Circle/Circle*
Week 9 (3/30)	23. Leon, *"Liber Abaci" and "Liber Quadratorum"* 24. Nazia, *Jordanus de Nemore*
Week 10 (4/04)	22. Christina (W), *Descartes' Circle Theorem*
Week 11 (4/11, 4/13)	25. Haolong, *Galileo*
Week 12 (4/18, 4/20)	SPRING BREAK
Week 13 (4/25, 4/27)	27. Douglas (W), *Brahe and Kepler* 29. Jenna, *Graunt* 30. Adam (W), *Pascal* 31. Ashley (W), *De Mere*
Week 14 (5/02, 5/04)	32. Hao, *Maurolico* 33. Mikhail (W), *Formal Proofs* 34. Alex C, *De Moivre* 35. Jose (W), *Laplace*
Week 15 (5/09, 5/11)	36. Natalie (W), *Somerville* 37. Corey, *Poisson* 38. Huo, *Chebyshev*