

Course Outline: Math 3510-001, Spring 03

Introduction

Welcome to History of Math! The history of math is a huge subject, and this course can only introduce you to some of the highlights. In fact, this course will focus on the history of arithmetic, algebra, and geometry. These subjects are ubiquitous both across the globe and throughout time, and so they provide a nice lens to the entire history of math. On the other hand such a focus does not give any perspective on what is perhaps the most important development in the history of math, and that is the development of the Calculus and its wide application to science and engineering.

However, by following the development of algebra and geometry across disparate but interrelated societies and eras I hope we will come to grasp one of the difficult but important truths: that our society and our era is not the culmination of history. We are part of a larger stream. It is too tempting to look back at history and see all of its flow leading to us. It doesn't.

Having said that it must also be said that this is so far the most exciting time and productive era in the entire history of math. There has been more math — and by that I mean both more useful and more beautiful — produced in the last 50 years than in the previous 5000. It is also the era with the most diversity and openness in the study of math. In fact I think we will find that math flourishes in eras where there is wide diversity of opinion and openness of communication, and atrophies in eras where diversity and openness are discouraged.

Text and syllabus

Our textbook is *A History of Mathematics*, 2nd edition, by Victor Katz. The book is arranged chronologically, which is traditional but in my view a bit artificial. Altho there have been many eras where there was significant interchange of mathematical ideas, from a purely chronological perspective it is clear that during most of history mathematical ideas were developed in parallel by several different peoples, with minimal contact between them. One interesting conclusion is that a great many mathematical structures seem endemic to humanity. Much of mathematics reflects the way our brain has evolved. In the lectures I will try to balance the book's chronological organization with a bit more emphasis on an organization by subject. We will try to compare and contrast how different cultures at different eras posed and solved the same sorts of problems.

Nevertheless the text is a joy to read. Katz is one of the most engaging writers of math history. I expect you to read the relevant sections before coming to class. (A detailed calendar appears below.) At the beginning of each week I will post a list of questions based on the reading. We will have a quiz at the beginning of each lecture (except the first), based on this list of questions. I will select two questions at random, and present them in multiple-choice format. In addition, approximately half of the exam questions will come from the list of quiz questions.

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|--------------|------------------|--------|---------------|
| 13 Jan | 1.1, 1.2, 1.3 | 15 Jan | no class |
| 20 Jan | ML King Day | 22 Jan | 1.4, 1.5, 1.6 |
| 27 Jan | 1.7, 1.8, 1.9 | 29 Jan | 2.1, 2.2 |
| 3 Feb | 2.4, 2.5 | 5 Feb | 3.2, 3.3 |
| 10 Feb | 3.4, 3.5 | 12 Feb | 4.1, 4.2, 4.3 |
| 17 Feb | 5.1, 5.2 | 19 Feb | 5.3 |
| 24 Feb | Exam 1 | 26 Feb | 6.5, 6.6 |
| 3 Mar | 6.7, 6.8 | 5 Mar | 6.9 |
| Spring Break | | | |
| 17 Mar | 7.1, 7.2 | 19 Mar | 7.4, 7.5 |
| 24 Mar | 8.1, 8.3 | 26 Mar | 9.1, 9.2 |
| 31 Mar | 9.3, 9.4 | 2 Apr | 10.1, 10.2 |
| 7 Apr | 10.3, 10.4 | 9 Apr | Exam 2 |
| 14 Apr | 11.1, 11.2, 11.5 | 16 Apr | 14.2, 14.3 |
| 21 Apr | 15.2, 15.3 | 23 Apr | 15.4, 15.5 |
| 28 Apr | 17.2, 17.3 | 30 Apr | 18.3, 18.4 |
| | | 7 May | Exam 3 |

Office hours

My office is UH 4080e. The phone number is 419 530 2975. My email address is paul@livetoad.com. The web page for this course can be found at <http://livetoad.com/>. My official office hours: Monday and Wednesday, 6:30 to 7:30 pm, in UH 4080e. This means that you can call or stop at these times without an appointment and I am sure to be there. I am also available at other times, but for these you must make an appointment. Feel free to ask for office hour appointments at other times if you cannot make it to my official office hours. If you call me when I am not in my office then you can leave a voice mail message and I will get back to you as soon as I can. I tend to list to my voice mail messages only on Monday and Wednesday evening before class, so often email is a faster way to get in touch with me.

Assignments, Quizzes, Exams

Each week I will post homework assignments on the web. We will cover these problems during the week following their posting. These will not be turned in for grade. However, approximately half of the exam questions will come from the homework assignments.

As mentioned above, at the beginning of each week I will post a list of questions based on the reading. From this list I will select two questions at random for a multiple-choice quiz. We will have a quiz at the beginning of each lecture (except the first). In addition, approximately half of the exam questions will come from the list of quiz questions.

We will have 3 multiple-choice exams, each worth 50 points. The questions will be taken from the list of quiz questions and the homework assignments. I may change the numbers and other parameters in the questions, and of course I will change the form of the questions to multiple choice.

Space-time posterboards

Because the history of math is so multicultural, we will be encountering an almost bewildering array of peoples and events. I suggest you keep track of this parade by means of a space-time posterboard. Get a large posterboard, and impose a time axis, stretching back 4000 years, along the length of the posterboard. Mark off time with lines spaced at the centuries. In the other direction impose a rough spatial axis, representing the east-west extent of the cultures who populate our story: from Morocco, Spain, and Britain on the left thru India and China on the right. When we encounter a new empire or era, use a colored pencil to indicate its temporal and spatial range on your posterboard. (To get an idea of what I mean, look at Neugebauer's famous diagram, as reprinted on p 2 of *A History of Mathematics*, by Boyer and Merzbach.) Highlight significant events, mathematical and otherwise, by attaching small slips of paper at the appropriate point in your picture of space-time.

Extra credit essay

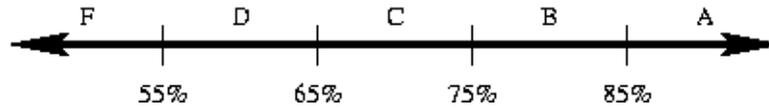
I will post a list of extra credit questions, each accompanied by some of references. You can earn up to 50 points extra credit for writing an essay of 1200–1500 words that addresses one of these questions, using the given references. These are questions with no right or wrong answer.

If you intend to write an essay then you need to start reading the reference books very soon, since I expect a detailed outline of your final essay by Wednesday, 5 March. If you do not turn in an outline on this date then you will not be able to earn any extra credit. The final essay is due Wednesday, 30 April. In addition, you must give a short, 15-minute presentation to the class during finals week. (Date and time to be announced.) At your presentation you must bring your space-time posterboard.

I do not award extra credit points frivolously. If your essay rambles, or does not address the question directly, or does not support your answer with specific citations from the given references, or worse does not demonstrate clearly that you have read the given references, then you will earn 0 extra credit. Do a good job or don't bother with it at all.

Grades and attendance

I will determine final grades from your total points earned, based on the following scale:



Any extra credit points you earn will be added to your total *after* the final grading scale is set.

If you want me to post your grades under a nickname then bring me a 3×5 card with your name, an email address, and the nickname you want to use — preferably something not obvious!

I will not give make-up quizzes under any circumstances. It will not affect your final grade if you miss a quiz or two, since each quiz is only worth 2 points. However, if you are in the habit of missing classes and assignments regularly then probably you will fail. Making up missed quizzes will not help. There will be no exceptions to this rule. Don't ask.

I will give make-up exams only in case of a documented emergency, such as illness or a funeral. If you are sick the day of the exam then you must call or email that same day if you expect to be able to make up the exam. Otherwise you must arrange for a make-up exam ahead of time. If I am not in my office then you can leave a voice mail message. If you fail to show up for an exam and do not contact me about it until afterwards then you will not be able to make up that exam — you will get a 0 for that exam.