College of Arts and Sciences, Department of Chemistry and Mathematics
Course Introduction
MHF 4404/MAT 5932 History of Mathematics
CRN 81492/82369, 3 semester hours
Fall 2013

Meeting time:	Thursday 5:00 -- 7:45 pm
Location:	Whitaker Hall, room 101 (WH 101)
Instructor:	Dr. Chuck Lindsey, Ph.D., Associate Professor of Mathematics
Office:	Academic Building 7, room 412 (inside Dean's suite)
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Email:	clindsey@fgcu.edu (please do not leave subject line blank!)
Office Hours:	Thursday 4:00 -- 5:00 pm Other times by appointment
Textbook:	*The History of Mathematics, Brief Version*, by V. Katz. ISBN 0-321-16193-9 Available in the bookstore and the usual online outlets.
Prerequisite:	MAC 2312 (Calculus II) or equivalent
Course Description:	(from FGCU catalog) The evolution of mathematical thought and methods from antiquity through the Renaissance. Topics include development of the concepts of number, quantity, and magnitude, algebraic techniques and symbolic notation, solution of polynomial equations, the evolution of the concept of proof, development of numeration systems, history of number theory and congruences, and notions of infinity and infinitesimals. Mathematical ideas and practice in European, African, Mesoamerican, and Asian cultures will be considered.
Web Site:	This course will have a presence on Canvas. To access the course home page on Canvas, go to http://canvas.fgcu.edu to log in.
Twitter:	Sign up to follow **@proflindsey** to receive course updates via Twitter.

Student Learning Outcomes

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

1. Describe the major features of Babylonian and ancient Egyptian mathematics.
2. Name and explain the major accomplishments of the Pythagoreans.
3. Describe the difference between commensurable and incommensurable magnitudes, and to explain Eudoxus' theory of proportion.
4. Explain the influence of the main schools of Greek philosophy on the development of mathematics

in ancient Greece, and on the introduction of rigor in mathematics.
5. Describe and explain the main features of Greek geometry, including the synthetic method and the distinction between number and magnitude.
6. Describe the characteristics and main achievements of Chinese, Hindu, and Islamic mathematicians in algebraic methods, geometry, astronomy, and combinatorics.
7. Trace the development of the Hindu-Arabic numeration system.
8. Trace the evolution of algebraic notation from rhetorical to symbolic.
9. Describe the steps in the transmission of mathematical knowledge from the Greeks to the Arabs to the Europeans.
10. Name some milestones reached in the medieval universities in Italy, France, and England in the development of mathematics.
11. Explain the main achievements of the following mathematicians: Pythagoras, Archimedes, Euclid, Ptolemy, Zhang Quijan, Qin Jiushao, Aryabhata, Brahmagupta, Bhaskara, al-Khwarizmi, Thabit ibn Qurra, Omar Khayyam, Fibonacci, Oresme, Cardano, Viete, Kepler, Galileo, Napier.
12. Describe the influence of problems in astronomy, surveying, business, art, navigation, and geography upon the development of mathematics through the Renaissance.
13. Describe the development of Viete's approach to algebraic equations and its influence on later methods of doing algebra

Overview of Course

In order to understand mathematics, it is important to know something of its history and evolution. Mathematics, like any other human activity, is influenced by the cultural, political, philosophical, and social contexts within which mathematicians work. We will study the development of mathematics from the early writings through the Renaissance, with an eye toward placing mathematical discoveries in their historical settings and examining how the above-mentioned contexts influenced and guided the development of mathematical knowledge and the formation of mathematics as a discipline. We want to understand why mathematics developed the way it did, how current mathematical practice evolved, and how mathematics came to have the characteristics that distinguish it from the (other) sciences.

For this reason, the main emphasis will be on the development of mathematics in Europe and the Middle East. However, developments in Europe, particularly in the Middle Ages and afterward, depend heavily on the mathematical work of several other cultures, so some attention will be paid as well to the practice of mathematics in China, India, and the Arab world. We will also look at the mathematics of pre-Columbian Americans, most notably the Maya.

Grading

Grades in this course will be assigned based on a combination of midterm and final exams, homework, and two extended problem analyses. The specifics are as follows:

Exams

There will be a midterm exam and a final exam, given on the following dates:

Midterm: week of October 6
Final: week of December 9

Both exams will consist of short-answer questions and essay questions, and will be done online in

Canvas, outside of regular class time. These two exams will be worth 45% of your final average.

Homework

There will be a series of approximately 10 homework assignments given during the course of the semester. Each homework assignment will consist of several problems, with a subset of 3 or 4 problems designated as "turn-in" problems for grading. Turn-in problems will be graded on a scale of 0 to 10 points, according to the correctness, completeness, and clarity of the solution (see *Guidelines for Submitting Homework* for specific criteria and definitions) Solutions to homework problems will be graded as if they were being presented to an outside audience, not as a set of keywords to be displayed for a teacher who already knows how it will all turn out. It is important--as important as doing the problem itself--for you to develop the ability to present your results to a lay audience (possibly a classroom of students) so that they can follow your reasoning. You must be orderly, write in complete sentences, and not use notation or terms that have not been introduced in advance (this is the mathematical equivalent of the "avoid jargon" rule). Neatness counts: sheets of paper containing scratchouts or other messes may be ignored by the grader when reading. Homework problems are due two weeks after being assigned, unless otherwise stated on the assignment. Late homework will be accepted up to one week late, for half credit.

Your average on the homework problems, computed as points earned out of the maximum possible, will be your homework average and will count for 40% of your final average.

Problem Analyses

You will be assigned over the course of the semester two extended analyses of problems from ancient and medieval mathematics. Each of these will consist of a more detailed analysis and solution of a problem or related group of problems from the subject matter of the course. These should be approximately the length of short essays (2-3 pages); further detailed instructions will be given along with the first assignment. Your average of the scores on the two problem analyses will count for 15% of your final average. As with homework, problem analyses are to be turned in by the due date. Late submissions will be accepted for half credit, up to one week after the due date.

Letter grades will be assigned based on the following scale:

Total Points	**Letter Grade**		**Total Points**	**Letter Grade**
92.00 and up	A		78.00 -- 79.99	C+
90.00 -- 91.99	A-		70.00 -- 77.99	C
88.00 -- 89.99	B+		60.00 -- 69.99	D
82.00 -- 87.99	B		below 60	F
80.00 -- 81.99	B-			

There is no automatic "rounding up" of final averages. Consideration may be given in borderline cases* to factors such as regular attendance and participation in class, and other evidence of effort.

Course Attendance Policy

Attendance in the class will not be taken regularly, nor is there a minimum attendance/participation requirement included as a formal part of your grade. However, as noted above, consideration in assigning final grades may be given in borderline cases* to factors such as regular attendance and participation in class, and other evidence of effort.

*Note: a *borderline case* is one where a student's final average is a fraction of a point away from the next letter grade, but less than a full point. A final average of 89.4 is a borderline B+/A-. A final average of 88.7 is not.

A Note About Homework

Homework will be assigned more or less each class. It is extremely important for you to do, or at least attempt, all the assigned problems in order to master the material. Some of the problems assigned are intentionally more challenging; I try to indicate which these are. This should not scare you off, but should alert you that these problems will take some effort--and sometimes some creativity--to figure out.

If you are having trouble with homework:

First of all, that's not necessarily bad. Some of the homework problems are more difficult than others, and some of them are ***supposed*** to stretch you a bit--that's how you get better. However, if you have been working on the same problem for a long time and are still stuck, then it's time to seek help. You have a few ways to get help:

1. Find one of your classmates who got the problem, and ask them for a hint. I encourage students to help each other with homework: the person getting help gets a hint, and the person giving help reinforces his/her understanding by having to explain it to somebody else.
2. Take advantage of the tutoring services offered by the university. The Center for Academic Achievement in McTarnaghan Hall offers free tutoring for most mathematics courses, including this one.
3. Ask me about it. This doesn't necessarily mean coming to office hours--usually I can give you a hint by email. I won't just tell you how to do the problem, though--that's just like watching me work another example, and it doesn't help you much. Expect enough of a boost to get you over the part where you are stuck, and hopefully you'll be able to finish from there.

There are answers to selected problems in the back of the textbook, to help you out some. The best way to use these is to do a couple of problems first, and then check your answers. If you start out with the answer to the problem, you will not get the full benefit of figuring out the answer on your own. This may get you through the homework faster, but it will not help you at test time.

General Course Policies

1. Attendance in class is not required for this course, and will not be evaluated formally as part of your grade (however, see the note above about grades in borderline cases).
2. Please be on time to class. It is very bothersome to your fellow students to be interrupted by late arrivals. If you must leave class early, please have the courtesy to sit near the door to minimize the

disturbance.

3. Your student records, including all graded papers, are protected by the Family Educational Right to Privacy Act (FERPA), also known as the Buckley Amendment. I cannot return graded papers to anyone but you, without your written permission to do so. Please do not ask anyone else to pick up graded quizzes or tests for you without also giving them a written, signed note authorizing it. Without that permission, it is a violation of federal law for me to give them your paper, and I will refuse to do so.
4. During class time, all cell phones, PDAs, pagers, etc. must be set to OFF or vibrate only. If you take a call during class time, I will assume it is an emergency and will stop class until you can get your things together and leave the room.
5. All notes, books, phones, and other electronic devices except for your calculator must be off the desktop at test time. Presence of cell phones/pagers/etc. during a test will create a presumption of cheating.
6. If you need to see me outside of scheduled office hours, the best thing to do is call or (better) email me for an appointment. If you just drop by the office and I'm there, I will be happy to talk to you, but if I'm not there, you will have made the trip for nothing. If it's a simple question, you can probably just email me anyway.

Academic Behavior Standards and Academic Dishonesty

All students are expected to demonstrate honesty in their academic pursuits. The university policies regarding issues of honesty can be found in the FGCU Student Guidebook under the ***Student Code of Conduct*** and ***Policies and Procedures*** sections. All students are expected to study this document which outlines their responsibilities and consequences for violations of the policy. The FGCU Student Guidebook is available online at http://studentservices.fgcu.edu/judicialaffairs/new.html

Disability Accommodations Services

Florida Gulf Coast University, in accordance with the Americans with Disabilities Act and the university's guiding principles, will provide classroom and academic accommodations to students with documented disabilities. If you need to request an accommodation in this class due to a disability, or you suspect that your academic performance is affected by a disability, please contact the Office of Adaptive Services. The Office of Adaptive Services is located in Howard Hall 137. The phone number is 239-590-7956 or TTY 239-590-7930

Note: If you have a documented disability for which you require accommodations, I expect to be notified before completion of the first graded assignment in the course.

Student Observance of Religious Holidays

All students at Florida Gulf Coast University have a right to expect that the University will reasonably accommodate their religious observances, practices, and beliefs. Students, upon prior notification to their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith. Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence. Students shall not be penalized due to absence from class or other scheduled academic activity because of religious observances. Where practicable, major examinations, major assignments, and University ceremonies will not be scheduled on a major religious holy day. A student who is to be excused from class for a religious observance is not required to provide a second party certification of the reason for the absence.

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This is not an official FGCU web page.

Guidelines for Submitting Homework
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The guidelines below apply to all homework and other problems submitted for grading. Homework submitted for grading should contain solutions to problems, not just answers. Generally speaking, a solution to a problem is a presentation of a logical process, culminating in an answer to the question asked, that allows your reader to easily follow the process used. A solution to a homework problem should be thought of as a short essay or presentation. All solutions to homework problems must meet the following guidelines:

General Grading Criteria:

All solutions for all parts of all problems must contain sufficient explanation to enable the reader to follow the reasoning and process used. This (almost) always includes words that explain what you are doing. Look at the solutions to examples in your textbook(s) for samples of such work. One way to tell if your solution is properly written is to read it out loud; if it makes sense to someone listening, then it is probably OK. If you cannot read it out loud because it has strange marks that cannot be translated into words (such as arrows pointing in various directions), then those marks do not belong there.

- Any variables used in the solution must be explicitly defined before they are used. Undefined variables are symbols without meaning and cannot be considered a valid part of any solution.
- Any nonstandard notation (i.e. other than that used in the textbook or other than what is in common use) must be defined before it is used. If you are in doubt as to whether a particular notation is in common use, then it probably is not.
- Some problems will ask you specifically to use ancient notation and/or numeration methods. If a problem does not specifically state to use the ancient notation methods, you may write things the modern way (e.g. use the usual algebraic notation and symbols).
- Written solutions and proofs are subject to the same rules for plagiarism as any other essay. If you get all or part of a solution from some outside source, it must be properly cited. Quotations belong in quotes. If you change "Thus" to "Therefore" and copy the rest of the paragraph it is still a quotation. A good rule of thumb is that if you used the "Copy" and/or "Paste" commands, then you have something that needs to be cited (and probably needs to be put in quotes as well).

Technical Specifications:

An assignment submitted that does not conform to the specifications below will be returned without grading.

- Do not put work for more than one problem on the same sheet of paper. For instance, when you finish problem 1, start your solution to problem 2 on a new sheet of paper. If you are submitting multiple problems or parts, put them in order.

- The main reason you have extended time for homework, and only have to hand in a few problems, is so that your solutions can be written up neatly for submission. Sheets containing scratchouts, irrelevant work or other messes will be returned to the student without being graded and will not count as part of any valid solution. I want to see work that is part of a valid solution; although you may want to show the effort you put in on a problem, including your false starts and errors is not a good way to do that.

- IMPORTANT: ***Any assignment submitted as an email attachment must be in one electronic file in Adobe Acrobat PDF format. Multiple attachments or file formats other than PDF will be returned without reading.*** There are several free apps for phones and tablets that will convert other formats (e.g. images) to PDF.

Failure to follow these guidelines may result in your homework submissions being returned without grading. The score on that homework set will be a zero until solutions are submitted that follow the above guidelines.

Topic Outline for MHF 4404/MAT 5932
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Date	Topics
Week 1 August 22	Course Introduction, number systems, Egyptian mathematics (Chapter 1)
Week 2 August 29	Mesopotamian mathematics (Chapter 1)
Week 3 September 5	PreSocratics, Pythagoras, Plato, Aristotle, Zeno (Chapter 2)
Week 4 September 12	Construction problems; Euclid and the *Elements* (Chapter 2)
Week 5 September 19	Archimedes and Apollonius (Chapter 3)
Week 6 September 26	Ptolemy; Ancient Astronomy (Chapter 3)
Week 7 October 3	Calendar systems (supplemental)
Week 8 October 10	Ancient and Medieval China (Chapter 5)
Week 9 October 17	Ancient and Medieval India (Chapter 6)
Week 10 October 24	Mathematics of Medieval Islam (Chapter 7)
Week 11 Oct. 31	Mathematics of Medieval Europe (Chapter 8)
Week 12 November 7	Mathematics of Renaissance Europe (Chapter 9)
Week 13 November 14	Algebraic symbolism, solution of cubic equations; development of algebra (Chapter 10)
Week 14 November 21	From algebra to calculus: Fermat, Descartes, Galileo (Chapter 11)
Week 15 December 5	Fluxions and differentials: development of calculus (Chapter 11)