

MA 484 History of Mathematical Thought

Fall Semester 2012

M-W-F 9:00 – 9:50

NSF 1205

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Office Hours: M and W 1:00 – 3:00; F 12:30 – 1:30; other times by appointment.

Required Texts and Materials:

- Burton, David M. *The History of Mathematics: An Introduction*. Sixth Edition. New York: McGraw Hill, 2007.
- Singh, Simon. *Fermat's Enigma*. New York: Anchor Books, 1997.

Course Overview:

Mathematics is the alphabet with which God has written the universe. (Galileo)

Mathematics is an important human creation. It was not handed down from a mountaintop. It was not discovered in polished form or in the form we know it today. Most mathematics developed out of a need to solve problems and out of curiosity about quantitative or spatial relationships. Mathematics develops through intuition, experimentation, curiosity, and creativity. Mathematics is a living body of knowledge; it is not now nor will it ever be “finished.”

This course examines the historical underpinnings of mathematical ideas and the cross-cultural contributions of thinkers who helped shape mathematics. It also explores the close relationship of mathematics to other disciplines, such as astronomy and physics, as well as the ways in which mathematics both depends upon and contributes to historical, cultural, and technological realities of a particular time. The course strives to highlight both the utility and the beauty of the human creation that is mathematics.

In this course students are expected to be active contributors to, not just recipients of, the course content. Assignments will require you to read and do outside research as well as solve problems and develop arguments and proofs. Class sessions will include small and large group discussions as well as formal presentations, and students will be expected to share the results of their investigations with the class.

Course Requirements:

- Attend all classes and participate actively in class discussions and activities. (Attendance is taken daily; absences or tardiness have a negative impact on the course grade.)
- There will be several types of assignments, some involving outside reading and research, some involving mathematical problem solving, and some involving class presentations. Assignments will be described in class. You are expected to complete assignments on time. Written assignments are to be done with a word processor and submitted in hard copy. Assignments that include large amounts of algebraic or geometric symbolism may include hand written algebra or geometric constructions, but **they must be neat, clear, and well organized**. Those that are not will be disregarded and will not receive credit.
- Complete all assigned readings and/or problems prior to the designated class period. Come to class prepared to raise as well as answer questions and otherwise contribute to discussion of the material. You can expect to be called upon in class to report on, present, or explain ideas from your assignments.
- There will be a mid-term and a final exam (for sure) and other quizzes or tests as deemed appropriate. The final exam is scheduled for Tuesday, December 11, 8:00-9:50 a.m. Other test dates will be announced in class; quizzes will ordinarily be unannounced.

Course Objectives:

- To deepen your knowledge and appreciation for the historical roots and “humanness” of mathematics;
- To trace the roots and development of the major “strands” of mathematics as they evolved and intertwined through the centuries leading to the mathematics we know and use today;
- To illustrate how mathematics spans all cultures;
- To stimulate your interest to continue reading and studying the history and culture of mathematics after the course is over.

Course Content:

- From where does our mathematics originate? How do we get our knowledge of early mathematics?
- Development of the major branches of mathematics: arithmetic, number theory, algebra, geometry, analysis, probability, modern mathematics, etc.
- Examination of representative breakthroughs in mathematical thought.
- Solving selected problems that challenged mathematicians in the past.
- Mathematics—still alive and flourishing. A case study of mathematics as a human activity: Pythagoras to Pierre de Fermat to Andrew Wiles.

Grading:

- Points will be assigned for class participation, projects, presentations, assignments, quizzes and tests. Your grade will be determined by the percentage of the total possible points that you earn, as follows:
A = 93–100%; A- = 90–92%; B+ = 87–89%; B = 83–86%; B- = 80–82%; etc.
- **Solutions to mathematics problems must be presented neatly and clearly and must be easy to follow in order to receive full credit. Problem solutions must include a clear statement of the problem, the known information, and the question to be answered. It must be clear from your solution what the problem is without having to read the problem statement from the text or other source. It also must be clear not only what your answer is but, even more important, the process by which you arrived at the solution. “Naked answers” receive no credit—period.**
- **You are expected to communicate in correct and proper English.** Therefore, such things as grammar, spelling, punctuation, and syntax will be considered in the evaluation of your written work.
- Late assignments will have points deducted unless prior arrangements have been made for very good and valid reasons. The prior arrangements must include the due date of the late assignment.
- Learning from one’s mistakes can be a valuable experience. If you are not satisfied with your performance on an assignment, you may re-do it and submit both the original and the revision for additional consideration. But the absolute deadline for resubmission is one week from the day on which the original assignment is returned.

Overview of Assignments

For the most part, there will be four kinds of assignments in this course:

- Reading assignments from the course text provide information about individual mathematicians, societies and cultures, historical contexts, and more. You are responsible for the content contained in the assigned readings.
- Find-out-about assignments for which you will be expected to do outside reading and research on a particular topic to learn what you can and to share that knowledge with the class. (For example, find out about the “birth” of zero and its development in different numeration systems.) Find-out-about assignments include a written summary of what you learned as well as in-class discussion and presentations. For these assignments you should consult multiple sources; sources can include both books/journals and Internet sites, but no more than half of your references should be on-line sources. Your written reports are to include a bibliography of the resources you consulted, including author’s name, title of the book or paper, publication information (for print resources) or URL (for Web resources).
- Do-math assignments that involve solving mathematical problems of historical interest. These solutions or proofs will be written up and handed in. You do not need to type mathematics problems, **but you do need to write neatly and clearly and organize your solutions well.** (See earlier criteria under *grading*, above.)
- Projects, which include papers and formal class presentations on topics related to the history of mathematics. Details will be given in class.

If you have a need for disability-related accommodations or services, please inform the Coordinator of Disability Services in the Dean of Students Office at 2001 C. B. Hedgcock (227-1700). Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation, in accordance with federal, state, and university guidelines.