

## Math 128: History of Mathematics in the Islamic World General Course Information, Fall 2017

**Professor:** Noah Aydin **Office:** RBH 319 **E-mail:** aydinn@kenyon.edu **Class Times:** MWF:11:10-12, RBH 203

**Office Hours:** MW 1-2; T 9-11; R 10-11, or by appointment

**Course Web Site:** <http://www2.kenyon.edu/Depts/Math/Aydin/Teach/128/index.html>

**Textbooks:** *Episodes in the Mathematics of Medieval Islam*, 2<sup>nd</sup> ed, J. L. Berggren, ISBN 978-1-4939-3778-3; *Islamic Science and Making of the European Renaissance*, G. Saliba, ISBN 978-0-262-19557-7; *Ibn al-Haytham The First Scientist*, B. Steffens, 978-1-59935-024-0; *The Prisoner of Al-Hakim*, B. Steffens, 978-168206-016-2.

**Course Overview:** This course examines an important and interesting part of the history of mathematics, and more generally, the intellectual history of human kind: history of mathematics in the Islamic world. Some of the most fundamental notions in modern mathematics have their roots in this part of the history such as the modern number system, the fields of algebra and trigonometry, the concept of algorithm, foundations of optics and scientific method. These contributions are generally not known, not only in the west but in the Islamic World either. Moreover, there are commonly held misconceptions about the subject. In addition to studying specific contributions of medieval Islamic scholars in the areas of arithmetic, algebra, geometry and trigonometry in some details, we will also examine the context in which the Islamic science and mathematics flourished, and the role of religion this development. We will discuss the reasons behind the lack of awareness in the subject. We will examine the evidence from recent research that challenges and refutes many of the commonly held misconceptions. The rise of Islamic science and its interactions with other cultures (e.g. Greek, Indian and European Renaissance) tells us much about the larger issues of humanities. Thus, this course has both a substantial mathematical component (~60-65 %) and a significant history and social science component (~35-40%), bringing together three disciplines: Mathematics, History and Religion. It is part of the Islamic Civilization and Cultures program, and fulfills the QR requirement. No prerequisite is needed beyond high school algebra and geometry (but a solid knowledge in algebra and geometry is needed)

### Grading and Evaluation Criteria:

Component	Percentage
Written Homework	20
Two Midterm Exams	40
Summary/Response Papers/ Reading Quizzes	8
Participation/Attendance and Enthusiasm	5
Reading Questions	5
Final Project (presentation & paper)	25
<b>Total</b>	<b>103</b>

**Written Homework:** This is a math class after all. As in most math classes, *homework is one of the most important aspects of this course*. Practice is a primary component of the mathematical learning process; thus homework problems will be assigned on mathematical material. Beyond just providing practice, the problems assigned are meant to be *extend* and *deepen* the understanding you have gained from the reading and the class period. The problems are not always easy, but the thought that goes into them always pays off in the long run. I strongly recommend that you start on the homework as soon as possible after the class. That way, if you get stuck on an assignment you can come to see me and get help *before* it is due. *Getting help during office hours (or other times in my office) will be an important part of the learning process in this course*. You should not view this as an exception but the norm. Your homework should be legible, with problem number and final answer clearly indicated. Explanations in **complete sentences** are expected. Random math expressions floating in space will receive no credit.

### Homework Policies:

1. Late homework will not be accepted. If you know that you will be missing class for some reason, you should turn in assignments **BEFORE** you leave. Extensions may be granted under extenuating circumstances, but these should be discussed with me in advance.
2. You may discuss homework problems with others but whatever you submit **must** be your own work and understanding, written by you independently.
3. Homework will be evaluated for neatness, completeness and correctness. Messy work that is difficult to read may receive no credit.

**Daily Reading/Responses:** Reading the textbook before each class is a necessity. You should come to class prepared with questions and comments for discussion. To this end, there will be frequent reading assignments. Reading mathematics is not like reading most other things. You may need to read a section several times before the ideas come together. Please take time to do this. To make sure you have done the reading for a particular class I ask you to submit answers to a few basic questions on the assigned section *before* the next class, by midnight before class. So, the deadline for reading questions is determined by the posting date. Your grade on a reading assignment will be a 0, 1, or 2.

**Summary/Response Papers or Reading Quizzes:** Several times in the semester you will be asked to write short (1-3 pages) response papers summarizing essential ideas in readings. Try to pick out and summarize most important ideas in the readings. You need to type and proof read these papers. In some cases, there will be a short reading quiz on the assigned reading material at the beginning of the class.

**Participation/Attendance/Enthusiasm:** As indicated by the reading requirement I hope that much of the class time will be discussion of reading material and activities that illuminate some of the ideas we explore. Therefore, coming to class regularly and prepared is essential. This component of your grade will be based on: regular attendance, the level of your participation, engagement, and interest.

**Final Project:** In lieu of a final exam, you will complete a project. The project has two components a paper and a presentation. You should work in groups of size 3 for the project. This year the presentation component will be a little different. Instead of presenting it to the class, you will present it at the Noor Islamic and Cultural Center, NICC, (<http://www.noorohio.org/>) in Columbus. You will choose a topic related to the course material and a) give a presentation to the class, and b) write and submit a paper on the topic. Both components contribute to your grade on the final. The presentations will take place during the last week of classes. The final paper will be due at the officially scheduled final exam time for this class (which is Tue Dec 12, 1:30 pm). More information about the project is provided on the course web page. As you think about a possible topic for the final project, please keep in mind it should contain a significant mathematical component. Keep this requirement in mind throughout the semester.

**Academic Honesty:** The rules set forth in the 2017-2018 Course Catalog apply to all aspects of this course. <http://www.kenyon.edu/directories/offices-services/registrar/course-catalog-2/administrative-matters/academic-integrity-and-questions-of-plagiarism/>

In general, any work submitted for credit must result directly from your own understanding, thoughts, and ideas. Presenting the work of others as your own is strictly prohibited. You must follow the guidelines given in this document for presentation problems and mathematics department's guidelines for written homework and take-home exams. If you have any questions or uncertainty, please ask your professor for clarification.

**Disabilities:** If you have a disability which requires an accommodations in this class, please feel free to discuss your concern with me, but you should also consult Ms. Erin Salva, the coordinator of student access and support services ([salvae@kenyon.edu](mailto:salvae@kenyon.edu), x5453). It is Ms. Salva who has the authority and expertise to decide on the accommodations that are proper for your disability. Though I am happy to help you in any way I can, I cannot grant any accommodations without a notification from Ms. Salva.

## **Title IX**

Kenyon College seeks to provide an environment that is free of bias, discrimination, and harassment. If you have been the victim of sexual harassment/misconduct/assault, we encourage you to report this. If you report this to a faculty member, she or he is obligated to notify our college's Title IX coordinator about the basic facts of the incident (you may choose whether you or anyone involved is identified by name). The Title IX coordinator will assist you in connecting with all possible resources both on and off campus. Kenyon College's Title IX and VAWA Policy is available at <http://www.kenyon.edu/directories/offices-services/title-ix/policy/>

## **How to Study for this Class**

- Read the textbook before the class. You may not understand everything in the first reading but that's OK. Do your best. Take notes to ask questions in class.
- Come to the class, and actively participate in class discussions and activities. Do not hesitate to ask questions.
- Try doing homework problems as soon as they are assigned. Do not wait until the last minute.
- Do homework problems regularly. Do a problem or two every day instead of trying to do everything the last night.
- If you get stuck go to the office hours to get help. Also use the tutoring help provided by MSSC.
- Form study groups. Research shows studying in groups is really beneficial. BUT make sure that you write your own solutions independently at the end.

**A Tentative Outline of Weekly Topics** (see the course web site for an up to date schedule and assignments)

**W 1:** Overview and Introduction, The lives and works of selected Muslim scientists: Al-Khwarizmi, Al-Biruni, Omar al-Khayyam, Al-Kashi, Ibn al-Haytham

**W 2-3:** Islamic Arithmetic (Berggren Chapter 2)

**W 4-5:** Geometrical Constructions in the Islamic World (Berggren Chapter 3)

**W 6:** **Midterm Exam I** (week of Oct 2), Saliba Chapters 1 & 2

**W 7:** Saliba Chapters 2 & 3

**W 8-9:** Algebra in Islam (Berggren Chapter 4)

**W 10-11:** Trigonometry in Islam (Berggren Chapter 5)

**W 12:** **Midterm Exam II** (week of Nov 13), Saliba Chapter 4

**W 13:** Saliba Chapters 5,6,7, selected additional topics

**W 14:** Presentations of final projects.

**Final Paper due: Tue, Dec 12, 1:30 pm.**