Math 128: History of Mathematics in the Islamic World
General Course Information, Fall 2019

Professor: Noah Aydin **Office:** RBH 319 **E-mail**: aydinn@kenyon.edu **Class Meetings**: MWF: 9:10-10 in RBH 203
Office Hours: MWF: 11:10-12; TR: 3:10-4, or by appointment. See my weekly schedule on course web site.
Course Web Site: http://www2.kenyon.edu/Depts/Math/Aydin/Teach/128/index.html

Textbooks: *Episodes in the Mathematics of Medieval Islam*,2nd 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 Description: 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 Classical Narrative). 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)

Learning Goals and Objectives: https://www2.kenyon.edu/Depts/Math/Aydin/Teach/128/LearningGoals.pdf

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
Total	**103**

Written Homework: This is primarily a math class. As in most math classes, *homework is one of the most important aspects of this course*. Practice is an essential 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 in advance, turn in assignments BEFORE you leave. Extensions may be granted under extenuating circumstances, but these should be discussed with me in advance.
2. Homework will be will be evaluated for neatness, completeness and correctness. Messy work that is difficult to read may receive no credit.
3. If you work with others on assignments, you must follow Math Department's guidelines on healthy collaboration

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, the midnight before. 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. Send your answers through Piazza.

Summary/Response/Commentary Papers or Reading Quizzes: Several times in the semester you will be asked to write short (1-3 pages) response papers summarizing and commenting on 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. Contributing to the discussions on Piazza will be an important part of class participation.

Attendance and Tardiness Policy: Regular attendance is an essential part of this course and is expected. After one unexcused absence, each unexcused absence will lower your overall course grade by $(n-1)*0.5\%$ where n is the number of unexcused absence. A total of 9 absences (whether excused or not) will result in expulsion from the course. Tardiness and walking out of the classroom are really distracting for everyone. Unless there is a real emergency, please do not leave the classroom before the class is over. Two tardiness or leaving the room during the class will count as an unexcused absence. See Math Dept's Class Attendance Policy.

Final Project and Community Engaged Learning Component: 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 2 or 3 for the project. You will present your final project at the Noor Islamic and Cultural Center, NICC, (http://www.noorohio.org/) in Columbus to a live audience. Both components contribute to your grade on the final. The presentations will take place in Week 13. The final paper will be due at the officially scheduled final exam time for this class, Wed Dec 18, 6:30 pm. More information about the project is provided on the course web page. Keep this requirement in mind throughout the semester.

Academic Honesty: The rules set forth in the 2019-2020 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 in general and mathematics department's guidelines for written homework in particular. If you are have any questions, 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, 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.

Statement on Title IX

Kenyon College seeks to provide an environment that is free of bias, discrimination, and harassment. If you have experienced any form of harassment/misconduct/assault, interpersonal violence, or stalking we encourage you to report it. If you report the incident to a faculty member, they must to notify Kenyon College's Civil Rights and Title IX coordinator of any information about the incident you provide. More information can be found at https://www.kenyon.edu/directories/offices-services/ocr/discrimination/

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. Follow Math Dept's guidelines on healthy collaboration.

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 7), *Prisoner of al-Hakim*
W 7: Saliba Chapters 1-3
W 8-9: Algebra in Islam (Berggren Chapter 4)
W 10: Saliba Chapters 4-7
W 11: Review, **Midterm Exam II**
W 12: Berggren 5.1-5.4
W 13: Presentations of Final Projects
W 14: Berggren 5.5, 5.6   **Final Paper due: Wed, Dec 18, 6:30 pm.**