Syllabus of History of Mathematics (MHF 3404)

Fall 2015

Prerequisites: Calc. II with a grade of "C" or better.

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Course Justification

Our system of numbers and the mathematics that we know today came to us along paths that twist through many centuries and cultures. The development of mathematics is intertwined with the development of physics and astronomy and its history is fascinating and inspiring to students of different disciplines. This course surveys major mathematical developments beginning with the accomplishments of the ancient Egyptians and traces the development up to the 17th century, when the basis of modern Calculus was set, and how these developments have been influenced by the cultures and needs of different civilizations.

Learning outcome.

Upon completion of the course, the students will be able to

1) demonstrate knowledge of how the most significant developments in Mathematics originated as global answers to interrelated problems posed by different cultures and civilization through the centuries.
2) conduct a multi-perspective analysis of the economical and sociological reasons of different approaches to mathematics through history and nowadays.
3) provide modern solutions to ancient mathematical problems and compare their solutions with the modern ones.
4) understand and interpret the interrelation between certain techniques in mathematics and the needs that the civilizations where such techniques were used and developed had at the time.

Quality Enhancement Program International/Global Component

- GOAL I: Global Perspective. *Recognition of one's own perspective and the diversity of other perspectives.*
  Students will be able to assemble a multi-perspective analysis of an issue related to the development of Mathematics

- GOAL II: Global Awareness. *Knowledge of local, global, international, and intercultural issues, trends, and systems*
  Students will be able to demonstrate an understanding of the interrelatedness of local, global, international, and intercultural issues, trends, and systems in the development of Mathematics.

- GOAL III: Global Engagement. *Willingness to address local, global, international, and intercultural issues.*
  Students will demonstrate willingness to address local, global, international, and intercultural issues within the context of the history of Mathematics.

Textbook and other course material

-J. Suzuki,"*A history of Mathematics*", Prentice Hall. **ISBN-13:** 978-0130190741

- The NOVA video "The infinite secretes" that follows the 1,000-year-long journey of the Archimedes' lost manuscript, and watches as modern technology makes the erased text reappear.

- Notes provided through my web sites.

Course Description:

- Mathematics in ancient Egypt
- Mathematics in ancient Mesopotamia
- Mathematics in ancient Greece: Phythagoras, Euclid and "the Elements"
- Mathematics in the Roman Empire
- Mathematics in India and China and the origin of our system of numbers
- Mathematics in the Arab world
- Mathematics in the 16^{th} century and the History of Calculus.

Assessment tools

This will be a "working course": there will be a strong focus on doing representative homework problems that will clarify and illustrate the development of Mathematics through history. In

addition, students will be required to take two midterms and a final which will be composed of problems and essay questions. A group project related to class themes will also be required as assessment tool.

Specifically, we will have

- Two Tests at 100 points per test (at the end of Weeks 5 and 10)
- Homework worth 100 points (every 2-3 weeks).
- A group project for up to 30 extra credit points
- Comprehensive Final Exam worth 200 points.

Total Points Possible: 500 = 100%

Group project: You will be placed in groups. Each group will be assigned a topic of history of Mathematics. The grade for this assignment is based on **the group's** ability to

- understand and interpret the interrelation between the specific topic in mathematics and the needs that the civilizations where such techniques were used and developed had at the time.
- demonstrate knowledge of how the specific topic in Mathematics originated as global answers to interrelated problems posed by different cultures and civilization through the centuries.
- conduct a multi-perspective analysis of the economical and sociological reasons of different approaches to the specific topic of mathematics through history and nowadays.

The group will be assessed through group discussion.

ADA: If you need accommodations because of a disability, if you have emergency medical information
to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately.
Please see me privately, after class or in my office (location and office hours above).

Assistance: In addition to the office hours listed above, you may make an appointment to see me, or call if you have a quick question. I will be available as much as I can, especially before the exams!
I will post on my web page the additional important material and the information

that can be useful for you, so check my web page regularly.

Attendance: It is your responsibility to attend classes, **and be punctual**. I may refuse admittance to students who are 10 minutes late or more.
In particular, you **MUST** come to class when there is a test, (see "makeup" below).

Beepers and cell phones: They are to be silenced prior to entering the class and are to be kept silent until you have left the class. No excuse. And **I will expel from class any student who is caught at sending text messages during my lectures.**

Homework: It is part of your evaluation and is extremely important to keep the pace with the course and do well at the tests.
I will provide details in class or through my web page.

Honesty: Misconduct, academic or otherwise, will not be tolerated, and will be dealt with in accordance with the Code of Student Conduct.

Letter Grades: Letter grades will be assigned *approximately* as follows;

A 86-100%, B 75-85 %, C 62-74 %, D 45-61 %, F 0-44%.

(+'s and -'s will be used). I will set the official scale at the end of the semester, after all grades are in, but I may announce a new approximate scale after each exam.

Makeup: There is no makeup for exams.
If you miss an exam and (1) you inform me before the exam, and (2) you are able to provide written verification for missing the exam for a legitimate reason, then you will receive the percentage scored on the final for the missed exam grade. If either of (1) or (2) is not satisfied, you will get a zero on the exam.
The above procedure can be applied only once.
The Final Exam must be taken to earn a passing grade in the course.

Global Learning Student Learning Outcome Addressed

Assessment Method

Assessment Results

Global Awareness: Students will be able to demonstrate knowledge of the interrelatedness of local, global, international, and intercultural issues, trends, and systems.

Assessment Activity/Artifact:

1) Essay type questions in homework and in tests
2) Analysis of specific problems in class discussions
3) Individual or group research project (optional).

Evaluation Process:

The instructor used a rubric applied to students' written work including homework exams and class projects to assess students' global awareness.

Minimum Criteria for Success:

The minimum total score from all rubric is 8; the minimum score for each rubric is 2.

Sample

All students will be assessed.

15 out of 18 students enrolled (83% of the total) demonstrated adequate knowledge of global and intercultural issues related to the history of Mathematics. This result is slightly better than last year's – probably because this year's students had a better attendance record than last year's students.

I used essay type questions in the homework and embedded questions in the tests as an assessment tool. I encouraged students to prepare presentations on topics of interest, but only 2 students responded. 8 students scored 4 In the rubric, 7 students scored 3, and 3 students scored 2.

Course Learning Outcome

Learning outcome. Students will demonstrate knowledge of how the most significant developments in Mathematics originated as global answers to interrelated problems posed by different cultures and civilization through the centuries.

Use of Results for Improving Student Learning

Class discussions on selected topics of history of Mathematics were more productive than last year's; I learned how to frame questions and how to adequately provoke students into participating on the discussions. Like last year, I noted that some of my weakest students did very well with the in class discussion, and some of my best students did not contribute enough. I decided to keep the discussions informal and spontaneous, and not to frame them as formal events. I feel that "scripted" discussions could make students feel self-conscious and not spontaneous; moreover, if they prepare discussion topics in advance, they may end up regurgitating sentences and ideas read on the Internet instead of producing their own,

Global Learning Student Learning Outcome Addressed

Assessment Method

Assessment Results

Global Perspective: Students will be able to develop a multi-perspective analysis of local, global, international, and intercultural problems.

Assessment Activity/Artifact:

4) Essay type questions in homework and in tests
5) Analysis of specific problems in class discussions
6) Individual or group research project (optional).

Evaluation Process:

The instructor used a rubric applied to students' written work including homework exams and class projects to assess students' global perspective.

Minimum Criteria for Success:

The minimum total score from all rubric is 8; the minimum score for each rubric is 2.

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Course Learning Outcome

Learning outcome. Students will be able to conduct a multi-perspective analysis of the economical and sociological reasons of different approaches to mathematics through history and nowadays.

Use of Results for Improving Student Learning

Class discussions on selected topics of history of Mathematics were more productive than last year's; I learned how to frame questions and how to adequately provoke students into participating on the discussions. Like last year, I noted that some of my weakest students did very well with the in class discussion, and some of my best students did not contribute enough. I decided to keep the discussions informal and spontaneous, and not to frame them as formal events. I feel that "scripted" discussions could make students feel self-conscious and not spontaneous; moreover, if they prepare discussion topics in advance, they may end up regurgitating sentences and ideas read on the Internet instead of producing their own,

Global Learning Student Learning Outcome Addressed

Assessment Method

Assessment Results

Global Engagement: Students will be able to demonstrate willingness to engage in local, global, international, and intercultural problem solving.

Assessment Activity/Artifact:

7) Essay type questions in homework and in tests
8) Analysis of specific problems in class discussions
9) Individual or group research project (optional).

Evaluation Process:

The instructor used a rubric applied to students' written work including homework exams and class projects to assess students' global engagement.

Minimum Criteria for Success:

The minimum total score from all rubric is 8; the minimum score for each rubric is 2.

Sample

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Course Learning Outcome

Learning outcome: **1.** Students will be able to provide modern solutions to ancient mathematical problems and compare their solutions with the ancient ones.

2. Students will be able to understand and interpret the interrelation between certain techniques in mathematics and the needs that the civilizations where such techniques were used and developed had at the time.

Use of Results for Improving Student Learning

Class discussions on selected topics of history of Mathematics were more productive than last year's; I learned how to frame questions and how to adequately provoke students into participating on the discussions. Like last year, I noted that some of my weakest students did very well with the in class discussion, and some of my best students did not contribute enough. I decided to keep the discussions informal and spontaneous, and not to frame them as formal events. I feel that "scripted" discussions could make students feel self-conscious and not spontaneous; moreover, if they prepare discussion topics in advance, they may end up regurgitating sentences and ideas read on the Internet instead of producing their own,

To be entered at end of course