

### **Description**

In this course we will address the development of mathematics across time, geography, and cultures with attention to the content of school mathematics.

- One focus will be upon a study of the **history of mathematics** in terms of the theoretical content of the discipline, emphasizing significant mathematical problems.
- We will also identify major **mathematicians** and the contributions they made to the development of mathematics across time.
- Another focus will be upon the **cultural aspects of the history of mathematics**, as we identify the contexts in which the significant mathematical problems were based.
- An overall question to guide our study will be: **How did mathematics develop out of cultural factors, and how did mathematics in turn influence cultures?**
- As mathematics educators, we will seek to make **curricular and pedagogical connections arising from historical and cultural foundations of mathematics** to the teaching and learning of mathematics with an emphasis on school mathematics experiences.

### **Goals & Objectives**

1. To deepen our understandings and appreciations of the historical and cultural foundations of mathematics.
2. To explore ways that we can teach mathematics to include attention to historical and cultural foundations of mathematics.
3. To develop our sensitivity to the diversity of cultures contributing to the development of mathematics and to the unique perspectives of students from groups underrepresented in mathematical sciences.
4. To develop and share curricular materials and teaching strategies to promote knowledge and appreciation for historical and cultural foundations of mathematics.

### **Starting Premises & Assumptions**

1. We need to reform school mathematics to emphasize greater understanding by our students of their mathematics and its origin and usefulness---"*...but, why do I have to learn this?*"
2. Mathematics students can engage in deeper thinking and reasoning than is typically expected or allowed, if they are motivated and supported to do so--"*Wow, I got it!*"
3. If approached effectively, applied "real world" situations where mathematics is used will be more appealing and interesting to students--"*Where in the world will I ever use this?*"
4. Students need to be actively involved in "doing" significant mathematics----*a Chinese proverb: "I hear and I forget, I see and I remember, I do and I understand."*
5. Being generative is the essence of being knowledgeable, and we must help our students to learn to be more self-regulative & generative--*Piaget: "To invent and discover is to understand."*
6. Cooperative mathematical activity in various groupings can facilitate student investigations and problem solving----"*I can learn from others, too, if I listen and watch and share."*

7. A teacher's expectations, made clear to students, can greatly affect student effort and productivity----*"If we want more, we have to expect more--of ourselves and each other."*
8. Interpersonal relationships among students and teacher are a critical aspect of "life in classrooms," and teachers must be alert to personality and relationship factors----*"Am I relating in positive ways, are my relationships healthy & balanced, & am I fostering these among students?"*
9. Modern technology tools must be accepted and used routinely in the mathematics classroom to further goals and activities where students actively explore and investigate their mathematics----*"What if....?"*
10. Modern school mathematics must include varied experiences with data (statistics), chance (probability), quantitative reasoning (numbers & operations), patterns (sequences), scales, rates and comparisons (ratio & proportion), change (variables & expressions), growth & decay (functions), size & location (geometry & measurement)---*"Mathematics is a rich tapestry of ideas and processes, a playground of abstraction and generality."*
11. Factors related to cognitive and emotional development of students suggest structured play and "hands-on" explorations are essential foundations to abstracting and generalizing for building personal and shared theories of mathematics---*"The art of teaching is in the act of discovery" (Polya).*
12. Historical emphases should be routinely included in the mathematics curriculum, in order that student's can understand the origins and development of ideas across time--*"What we fail to learn from the past will be repeated in the future."*
13. Cultural origins and connections in the history of mathematics can greatly enhanced student appreciation of significant interactions in and across varying societies, peoples, and locations---*"Attention to multi-cultural aspects can affirm students who are underrepresented in mathematical sciences."*

### **Learning & Teaching Activities**

The activities in our course are chosen to support your attainment of the course goals and objectives.

#### **General Expectations**

1. Attendance is required, since much of the value of the course will be through the experiences that occur during our class sessions.
2. Active participation is expected, a critical assumption for learning anything more deeply. The pedagogy being advocated and modeled through our course is the belief that our students must commit to, and be involved actively in, the problems posed.
3. Thorough preparation for each class session is expected. The better-prepared one is for any experience, the more one will likely benefit from it.
4. Thoughtful reflection following each course experience is expected. "Looking back" at one's experiences can help to review and consolidate what is important to remember. Being reflective can help to sort out the "slag" or discards and find the "gems" to keep. At times, it can help one to evaluate goals and strategies, and make needed changes. In general, a reflective person makes better choices and decisions.
5. Deadlines are goals, which can be altered, as we may need to do so. Flexibility is needed when dealing with humans, who differ in their needs in unique ways.
6. High quality is expected at all times. All participants should be expected to contribute and produce in very high quality ways, striving always to do their very best. This must be especially true of those who would choose to be a teacher of others!

7. Enjoy while you are learning. Find positive energy in our course. Deal with your anxieties or fears of mathematics. Strive to reach a new state of awareness and peace, as you achieve one more step in being an outstanding mathematics teacher!

### Specific Productions & Assignments

1. **Readings**----

A major activity will be your reading and study of assigned references. These will focus on the classic textbook---

Eves, Howard W. *An Introduction to the History of Mathematics (Sixth Edition)*. Brooks Cole (ISBN 0-03-029558-0),

A variety of other professional sources will also be used. For particular items (to be announced), you should complete a "Readings Notebook" entry. Each should clearly identify the item, give a very brief summary of a couple of presented ideas that seemed important to you, and then give a brief commentary. The commentary can state your reactions and opinions, how you connect these ideas to other ideas, or how you might use these ideas in your teaching of mathematics.

2. **Reflections**----

At the end of each week (each of the four weekends), you should write about your experiences in the course (be sure to note the date with each entry). First, very briefly reflect on the events in the past week as you recall them. Then, mainly reflect on what you did, and what it meant to you. Include your interpretations, reactions and intentions. These written reflections, presented chronologically, should be included in your course portfolio.

3. **Historical Problems**----

A variety of problematic situations will be posed.

- (a) Some of these will be solved for presentation in your portfolio. Of these, some can be worked on with a partner, while a few will be done independently.
- (b) A few "historically significant problems" will be posed for separate groups to solve. On three different Fridays, brief presentations of these problems and how the group approached (and possibly solved) them will be given.

4. **Special Foci**----

Related to our cultural emphases, four "Special Focus" topics have been identified---

- (a) International Comparisons of Mathematical Education
- (b) Women in Mathematics
- (c) "Ethnomathematics" A (yet to be decided)
- (d) "Ethnomathematics" B

You will be assigned to one of four "focus" groups. In your group, you will collaboratively research and develop ideas related to the focus, and as a group be prepared to lead the class session on the scheduled date (see course calendar). A one-page handout should be developed; it will be copied for distribution to everyone.

5. **Midterm Exam**----

There will be one "take-home, open-book" examination, due on June 26<sup>th</sup>. It will be released on Thursday, June 22<sup>nd</sup>, but it will deal with ideas addressed through Friday, June 23<sup>rd</sup>.

6. **Group Project**----

An important learning activity of our course involves the development of a classroom implementation. This will be done as a group project, with each group working on a separate topic (to be approved). While the group will collaborate to develop overall plans for the treatment of the topic, each person will develop a separate paper within that topic. Details to specify this activity will be provided separately and discussed. On July 6<sup>th</sup> (in lieu of a Final Exam) each group will complete a 20-minute sharing and discussion of the projects. The written report must be submitted at the start of your group's presentation.

7. **Course Portfolio**----

On Wednesday, July 5<sup>th</sup> you will submit a 3-ring notebook with the following sections---

- Readings Notebook
- Reflections
- Historical Problems
- Special Focus materials
- Midterm Exam

**Assessment & Evaluation**

1. Assessment will be a shared, on-going activity. We will assess in a variety of contexts and ways. You are asked to be self-assessing as you work on assigned tasks and determine your need for help or guidance, and as you engage in reflective analysis and journal writing. The major purpose of on-going assessment is to help you learn and grow, and to help us work with you more effectively.
2. The Course Portfolio will be graded as follows (up to **250 points**).

<b>Readings Notebook</b>	<b>50 pts.</b>
<b>Reflections</b>	<b>25 pts.</b>
<b>Historical Problems</b>	<b>50 pts.</b>
<b>Special Focus Presentation &amp; Materials</b>	<b>25 pts.</b>
<b>Midterm Exam</b>	<b>100 pts.</b>

3. The Course Project will involve up to **150 possible points**.

<b>Written report for group project</b>	<b>25 pts.</b>
<b>Individual written course project report</b>	<b>100 pts.</b>
<b>Oral group project report</b>	<b>15 pts.</b>
<b>Group report handout</b>	<b>10 pts.</b>

4. All participants must complete a course evaluation to be provided by the instructor, which will include a self-evaluation section.

**Instructors**

Dr. Larry L. Hatfield  
105 Aderhold Hall  
Office Hours:  
Samuel Obara

lhatfiel@uga.edu  
(706) 542-4550  
by appointment  
[sobara@uga.edu](mailto:sobara@uga.edu)

