

*Course Information*

<b>Course Number:</b>	STEM 3305
<b>Course Name:</b>	Perspectives in Science and Mathematics
<b>CRN:</b>	28203
<b>Location:</b>	MCS 213
<b>Class Hours:</b>	4:05pm-5:20pm
<b>Textbook:</b>	<i>The Truth about Darwin's Finches, Einstein's Wife, and Other Myths and The Cults of Pythagoras: Math and Myths</i> , by Alberto Martinez
<b>Prerequisites:</b>	EDUC 1301

*Instructor Information*

<b>Name:</b>	Dr. Jeffrey Beyerl
<b>Office Location:</b>	MCS 237
<b>E-mail:</b>	jbeyerl@uca.edu
<b>Phone:</b>	501-450-5652

**Office Hours:** My office hours for each week will be posted outside my office during that week. Typically I am available between 7am and 4pm on school days whenever I'm not otherwise obligated. In particular, I anticipate being available before and after most class sessions.

**Course Topics**

<b>Class</b>	<b>Topic</b>
Topic 1	Course Orientation
Topic 2	What Is Science? What Is Mathematics?
Topic 3	Plato's Philosophy of Mathematics
Topic 4	Revolutions in Astronomy
Topic 5	Paradoxes of Division
Topic 6	Minus Times Minus Is What?
Topic 7	Radical Puzzles
Topic 8	Species, Monsters, and Things in Between
Topic 9	Darwin's Path to Evolution
Topic 10	Questions and Evidence on Evolution
Topic 11	Secrets of the Alchemists
Topic 12	Impossible Chemistry
Topic 13	Discovery of the Electron
Topic 14	Infinitely Small
Topic 15	Prisoners of Probability
Topic 16	The Age of the Earth
Topic 17	Non-Euclidean Geometry
Topic 18	Philosophies of Math: Choose or Sleepwalk

### **Course Description (Catalog)**

This course in the STEMteach sequence explores a selection of topics and episodes in the history of science and mathematics and prepares candidates to broaden their approach to mathematics and science instruction so that they might captivate and retain the interest of all students. By conveying particular human stories about why and how various branches of science and mathematics have originated and evolved, candidates gain insights into the critical thinking processes that lead to scientific creativity.

### **Course Description (Extended)**

This upper-division history course explores a selection of topics and episodes in the history of science and mathematics. The specific objectives and expectations in the table following this section are part of four broad, interlocking goals:

- to provide you with an overview of the history of science and mathematics;
- to enable you to put these historical perspectives and context to work in pedagogy;
- to promote intellectual curiosity and sharpen your critical thinking skills; and
- to improve your presentation and writing skills.

As a key component of this course, you will design and prepare two 5E Lesson Plan of 1200 words each. You will select the subject of these lesson plans from a variety of options. (Detailed instructions will be distributed separately.) Once graded, you will incorporate corrections into your lesson plan and electronically post the revised product for an opportunity to improve your grade. Additionally, you will give a formal presentation of one of your lesson plans to a group of peers, and participate in critiquing presentations of others.

The course includes a midterm exam designed to test the extent to which you have followed, engaged, and learned from the topics discussed in class, as well as from assigned readings. And as a final exam, you will compose in one of the final class periods an essay of about 800 words.

The assigned readings for this course vary in length, and you are encouraged to read thoughtfully in all cases. Lightly skimming the material will not adequately prepare you for the level of critical thinking and engagement you are expected to display in class discussions. Some of the readings are from primary sources (such as writings by prominent scientists), other readings are from secondary texts (such as by historians). You are also required to do additional research and reading to inform your lesson plans. (Keep this in mind when budgeting your time for this course.)

Classes are conducted as a mixture of lecture and discussion. Accordingly, attendance and participation are important, as you can see from the grading distributions, below. Attendance will be taken daily, and will be used in evaluating your overall grade for class participation. You are encouraged ask questions at any time during lectures, as well as to speak up and offer thoughts, ideas, and opinions during class discussions.

## Course Objectives and Expectations

Course Objectives and Evidence of Student Learning and Engagement	
<i>Students will...</i>	<i>Evidence</i>
describe the historical development of aspects of science and mathematics relevant to future teachers.	<ul style="list-style-type: none"> <li>• Reading confirmation quizzes</li> <li>• Participation in class and weekly section discussions</li> <li>• Mid-term and final exam responses</li> </ul>
describe several analytic frameworks for understanding the history of science and mathematics.	<ul style="list-style-type: none"> <li>• Reading confirmation quizzes</li> <li>• Participation in class and weekly section discussions</li> <li>• Mid-term and final exam responses</li> </ul>
analyze the history and content of evolutionary theory.	<ul style="list-style-type: none"> <li>• Reading confirmation quizzes</li> <li>• Participation in class and weekly section discussions</li> <li>• Written responses to questions high school students are likely to raise about evolution</li> <li>• Mid-term and final exam responses</li> <li>• 5E lesson plans</li> </ul>
express ideas and opinions clearly and effectively in formal writing.	<ul style="list-style-type: none"> <li>• 5E lesson plans</li> <li>• Various writing assignments</li> </ul>
develop skills in searching for, retrieving, and evaluating the provenance and reliability of, source materials, on- and offline, including specific resources available to teachers.	<ul style="list-style-type: none"> <li>• Participation in class and weekly section discussions</li> <li>• Research skills workshop with university librarian</li> <li>• 5E lesson plan citations</li> </ul>
integrate approaches and material learned in the course with independent research and science or math content to design middle and high school science and math lessons	<ul style="list-style-type: none"> <li>• Two 5E lesson plans designed for middle or high school students that address standards and integrate approaches and material learned in the course with independent research and science or math content.</li> <li>• Teaching 5E lesson plan to peers</li> <li>• Feedback to peers on 5E lessons</li> </ul>
reflect on and critique their own work, particularly lesson plans, and that of others.	<ul style="list-style-type: none"> <li>• Two 5E lesson plans designed for middle or high school students that address standards and integrate approaches and material learned in the course with independent research and science or math content.</li> <li>• Teaching 5E lesson plan to peers</li> <li>• Feedback to peers on 5E lessons</li> </ul>

### Expectations

1. Everyone is expected to attend class. You have one free absence without consequences. After that you must provide written medical proof of illness, or another acceptable exemption, otherwise, you will lose 0.5 percentage points for each absence.
2. Work turned in late without an extension negotiated at least a week in advance will be penalized one full letter grade.
3. Alongside the present syllabus, you should soon have a handout titled "Avoiding Plagiarism in History Courses," which has been prepared by the University of Texas to help prevent this problem. Accordingly, university policies on plagiarism and academic dishonesty will be enforced in this class.
4. Some readings are in the textbooks, some will be handed out in class, and others will be available online (from reliable sources). All readings will be announced on a weekly basis; if for whatever reason you miss a day of class, you are responsible for obtaining the assignment.

### Assignments/Grading Policy

Activities	Points
<b>Class Participation and Attendance.</b>	10
<b>Reading Confirmation Quizzes.</b> There will be short quizzes each day for any reading assignments.	16
<b>First Lesson Plan.</b>	16
<b>Midterm Exam.</b>	16
<b>Second Lesson Plan.</b>	16
<b>Presentation.</b>	10
<b>Final Exam.</b> This is a comprehensive final in essay format, sampling from all that we have talked about.	16
<b>TOTAL</b>	<b>100</b>

### Grading Scale

- 90 -- 100 = A
- 80 -- 89 = B
- 75 -- 79 = C
- 70 -- 74 = D
- Below 70 = F

**Late Work Policy:** Assignments must be submitted on the dates indicated on the course outline. In general, late work will not be accepted. One half of the assigned points will be deducted for work that is submitted after the due date if there is a legitimate excuse.

**Dropping the Course:** A student may not drop a course after the registration period has ended unless there is good cause (e.g., health or serious personal problems, or a demonstrated need to work more hours).

**Academic Integrity Statement**

The University of Central Arkansas affirms its commitment to academic integrity and expects all members of the university community to accept shared responsibility for maintaining academic integrity. Students in this course are subject to the provisions of the university's Academic Integrity Policy, approved by the Board of Trustees as Board Policy No. 709 on February 10, 2010, and published in the Student Handbook. Penalties for academic misconduct in this course may include a failing grade on an assignment, a failing grade in the course, or any other course-related sanction the instructor determines to be appropriate. Continued enrollment in this course affirms a student's acceptance of this university policy.

**Americans with Disabilities Act Statement**

The University of Central Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this Act due to a disability, please contact the UCA Office of Disability Services, 450-3613.

**Sexual Harassment and Academic Policies Statement**

All students are required to familiarize themselves with the University of Central Arkansas policy on sexual harassment and on academic policies. These policies are printed in the Student Handbook.

**Building Emergency Plan Statement**

An Emergency Procedures Summary (EPS) for the building in which this class is held will be discussed during the first week of this course. EPS documents for most buildings on campus are available at <http://uca.edu/mysafety/bep/>. Every student should be familiar with emergency procedures for any campus building in which he/she spends time for classes or other purposes.