

Course Information

Course Number:	STEM 3305
Course Name:	Perspectives in Science and Mathematics
CRN:	28203
Location:	MCS 213
Class Hours:	4:05pm-6:35pm Tuesdays
Textbook:	<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
Prerequisites:	EDUC 1301

Instructor Information

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


Office Hours: By appointment or walk-in. Designated walk-in times are:

Monday	10:00am
Tuesday	10:00am
Wednesday	10:00am*
Thursday	10:00am

*The office hours on Wednesday are in the MRC

Question: Can I only come during office hours?

Answer: You can come anytime! I am typically in my office from 8am until 4pm; office hours are merely designated times that I avoid scheduling meetings or running errands.



Tentative Course Topics

Class	Topic
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 a 5E Lesson Plan of 1200 words. You will select the subject of these lesson plans from a variety of options. (Detailed instructions will be distributed separately.) The lesson plan project will consist of a proposal, draft, and final lesson plan. In the lesson plan proposal you will give a college-level lecture on the content and how you would plan to engage secondary level students to the content. The draft and final lesson plan shall consist of a detailed guide for how the lesson would be taught to secondary level students.

The course includes a midterm and final 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.

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"> • Reading confirmation quizzes • Participation in class and weekly section discussions • Mid-term and final exam responses
describe several analytic frameworks for understanding the history of science and mathematics.	<ul style="list-style-type: none"> • Reading confirmation quizzes • Participation in class and weekly section discussions • Mid-term and final exam responses
analyze the history and content of evolutionary theory.	<ul style="list-style-type: none"> • Reading confirmation quizzes • Participation in class and weekly section discussions • Written responses to questions high school students are likely to raise about evolution • Mid-term and final exam responses • 5E lesson plans
express ideas and opinions clearly and effectively in formal writing.	<ul style="list-style-type: none"> • 5E lesson plans • Various writing assignments
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"> • Participation in class and weekly section discussions • Research skills workshop with university librarian • 5E lesson plan citations
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"> • 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. • Teaching 5E lesson plan to peers • Feedback to peers on 5E lessons
reflect on and critique their own work, particularly lesson plans, and that of others.	<ul style="list-style-type: none"> • 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. • Teaching 5E lesson plan to peers • Feedback to peers on 5E lessons

Assignments/Grading Policy

Activities	Points
Class Participation.	20
Knowledge from Readings	20
Lesson Plan Proposal	10
Lesson Plan Draft	5
Final Lesson Plan	15
People and Places of History Portfolio	10
Midterm Exam	10
Final Exam	10
TOTAL	100

Grading Scale

90 -- 100 = A

80 -- 89 = B

75 -- 79 = C

70 -- 74 = D

Below 70 = F

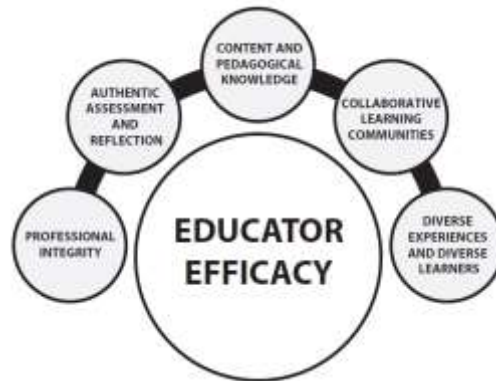
Attendance: Due to the small class size, if you miss more than one class day, you should contact the instructor to reschedule class to another time that week.

Class Participation: Please note that class participation is an integral part of this course. We will have discussions on each of the course topics. Much of the learning process takes place during this dialog, and so it is expected that you will contribute to toward this ends.

UCA Core - UD Diversity

This course will be designated [D] (pending paperwork) which means it satisfies your Diversity component of the Upper Division Core. Diversity courses promote the ability to analyze familiar cultural assumptions in the context of the world's diverse values, traditions, and belief systems as well as to analyze the major ideas, techniques and processes that inform creative works within different cultural and historical contexts. For more information, go to <http://uca.edu/core>.

Conceptual framework



The UCA Educator Preparation Programs (EPP) will promote every educator's sense of professional efficacy. Professional efficacy affects an educator's sense of responsibility and competence to contribute to the growth and development of all learners and is grounded in:

- content and pedagogical knowledge,
- guided clinical experiences with diverse students in diverse settings,
- collaborative learning communities,
- authentic assessment and reflective decision making,
- professional integrity including leadership, collaboration, and service.

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.

Various standards this class satisfies:

INTASC #4: Content Knowledge: The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make these aspects of the discipline accessible and meaningful for learners to assure mastery of the content

INTASC #5: Application of Content: The teacher understands how to connect and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues

NSTA Standard 1 (Content Knowledge): Effective teachers of science understand and articulate the knowledge and practices of contemporary science. They interrelate and interpret important concepts, ideas, and applications in their fields of licensure

NSTA Standard 2 (Content Pedagogy): Effective teachers of science understand how students learn and develop scientific knowledge. Preservice teachers use scientific inquiry to develop this knowledge for all students.

NSTA Standard 3 (Learning Environments): Effective teachers of science are able to plan for engaging all students in science learning by setting appropriate goals that are consistent with knowledge of how students learn science and are aligned with state and national standards. The plans reflect the nature and social context of science, inquiry, and appropriate safety considerations. Candidates design and select learning activities, instructional settings, and resources--including science-specific technology, to achieve those goals; and they plan fair and equitable assessment strategies to evaluate if the learning goals are met.

ISTE Standard 1: Facilitate and inspire student learning and creativity: Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.

ISTE Standard 5: Engage in professional growth and leadership: Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.