

Climate Change in STEM Secondary Education
ECO 690CC
Summer 2016
Course Syllabus

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Office hours:

Class time and place: One in-person meeting July 12, 2016 from 1:00 - 3:00pm (Holdsworth 308); Online through Moodle
CPE Summer Session 2: July 11, 2016 - August 19, 2016

Credits: 3 semester credit hours

Course Description:

In this professional development course for secondary education teachers, we will delve into the subject of teaching students about climate change through various STEM disciplines. Climate change is an inherently complex subject that incorporates multidisciplinary and interdisciplinary approaches and solutions. While climate change is frequently in the media and increasingly is the paradigm in which we base modern scientific research, it is often known to the public in general terms, at superficial levels, and is sometimes misunderstood. Students in secondary schools may lack the foundational knowledge to understand the scientific evidence of climate change, critically analyze arguments that attempt to refute climate change, and importantly, understand the breadth of solutions available to society to mitigate climate change. In this course, participants will first review the fundamentals behind climate science and the relevance to physical and natural sciences, and then examine in-depth solutions to mitigate climate change. We will delve into sharing a step by step case-study teaching approach in which real-world challenges are used to engage and instruct topics and knowledge in science and math. We will employ two case studies as examples in which we work to understand and develop solutions that address climate change in the fields of energy and forestry. Each case study will take place over a two-week period and emphasize the ways that teachers can teach about their particular STEM field in the context of a case study.

Our approach and pedagogical offering:

We will introduce some innovative teaching methods that lend themselves well to this subject area, such as case-study development, contemplative practices, and active student-centered teaching approaches. Participants may choose to adopt any of these methods in developing their curricula elements or utilize other methods that best fit participant classroom needs and teaching styles.

Learning objectives:

1. *Participants are invited to engage the subject of climate change from their unique disciplinary perspective while learning from teachers in other STEM disciplines.*
2. *Participants will develop and expand upon content knowledge, tools, and methods related to teaching about climate change.*
3. *Development of curriculum elements that can be implemented practically in secondary education STEM courses.*
4. *Increase confidence in teaching climate change content through case studies and other class activities.*

Course format: One in-person introduction meeting on campus (July 12th, 1-3pm) at UMass Amherst, and online.

Projects and grades:

Assignments	Percent of grade
Online weekly forum discussions	40%
Climate Solutions 1: Energy Case Study	15%
Climate Solutions 2: Forests and the Carbon Cycle Case Study	15%
Final Curricula Element Design	30%
Total:	100%

Online platform: Moodle online learning platform will be used for the course website.

Required material: All materials will be freely available through the course Moodle website.

General schedule of subjects:

Week #	Week start date	Subjects
1	7/11/16	Introduction Refresher on climate science such as greenhouse effect, climate forcing, feedback loops, and scientific evidence. Current issues with climate change in the media, and misinformation/disinformation campaign. Ecological effects in major ecosystems. NOTE: In-person meeting at UMass: Tuesday, July 12 from 1:00 - 3:00pm, in 308 Holdsworth Hall. Laptop recommended (participants should contact course instructors by July 1 if unable to attend in person).
2 & 3	7/18/16	Climate Solutions: Energy Case Study Mitigation of climate change through greenhouse gas reductions from fossil fuels, comparisons among energy sources, resource potential in Massachusetts, energy options in your community, and solutions in your home.
4 & 5	8/1/16	Climate Solutions: Forests and the Carbon Cycle Case Study Mitigation of climate change through carbon sequestration is an important strategy for reducing CO ₂ in the atmosphere. Biology, chemistry, physics, ecology and mathematics are all inherent in understanding carbon sequestration..
6	8/15/16	Final Projects: Curricula Element Design for your Classroom Participants will design a disciplinary climate change project that can be implemented this year in the classroom. Includes presentation (online) and opportunity for both disciplinary and interdisciplinary peer feedback.

* **Note:** The schedule may evolve slightly as we go through the semester.

Academic Honesty: You are expected to do your own work on all individual assignments, per the [University Policy on Academic Honesty](#).

Course Website: A Moodle site is set up for the course (<https://moodle.umass.edu>); please refer to it for reference materials, assignments, links to readings and videos, relevant announcements, and the most up-to-date information. You will need a UMass Spire ID to login.

Numerical score to letter conversion table:

Grade	Low	High
A	93.00 %	100.00 %
A-	90.00 %	92.99 %
B+	87.00 %	89.99 %
B	83.00 %	86.99 %
B-	80.00 %	82.99 %
C+	77.00 %	79.99 %
C	73.00 %	76.99 %
C-	70.00 %	72.99 %
D+	67.00 %	69.99 %
D	60.00 %	66.99 %
F	0.00 %	59.99 %

Mandated Reporting: It is important for students to know that as employees at UMass all instructors are mandated reporters. Please review the Dean of Students Office website for further details.

Communication: Email will be used routinely for announcements, reminders, and resources. Please check your email regularly and carefully. **You are responsible for any email content.**

Disability Statement: The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services or the Center for Counseling and Psychological Health, you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements.