

# ES 200 Course Syllabus

## ES 200 – Climate Change and Sustainability

### Section 001

Fall 2019

3 Credit Hours

### Course Description

ES 200 explores climate change and sustainability from interdisciplinary perspectives. Discussions of climate change extend from past millennia to future projections. Climate change influences both human well-being and the functioning of ecosystems. Concepts of sustainability include the prospects for helping people thrive while using less energy and utilizing natural resources more efficiently. We explore human-caused changes to Earth's cycles of energy, water, and nutrients, the effects of these changes on natural and managed ecosystems, and the potential of socio/economic/political systems to advance sustainability.

### Learning Outcomes

1. Explain the fundamental flows and budgets of energy that determine Earth's climate.
2. Understand key feedbacks in the climate system and how they are affected by humans.
3. Interpret recent and expected future changes in the climate, including impacts on natural and human systems in the context of past climatic change.
4. Understand broad patterns of the evolution of life on Earth, and how it was affected by and affected concurrent atmospheric and climatic conditions.
5. Examine the distribution, composition and productivity of current terrestrial and aquatic/marine ecosystems, and the services they provide to society, correlated to the recent climate history.
6. Review the science on ecophysiological responses of major world ecosystems to recent changes in primary drivers of productivity, and explore implications for future society.
7. Identify the characteristics of societies that respond resiliently and sustainably to climate change; provide current and historical examples.
8. Understand how the costs of climate change are calculated and influenced by underlying assumptions.
9. Review policy frameworks for mitigating and adapting to climate change at scales from international to local.
10. Examine the impacts of the private sector and personal lifestyles on climate change and sustainability.
11. Participate knowledgeably and constructively in civic discussions about appropriate societal responses – mitigation & adaptation – to climate change.

### Course Structure

Grading includes daily in-class quizzes/activities, attendance, three section tests, and a cumulative final exam or an honors poster. The four tests cover the major subdivisions of the course, and include questions that require a majority of multiple choice questions (~70%) and remainder true/false questions (~30%). Exams will be given on paper with answers recorded on Scantron forms, and in-class quizzes via TopHat utilizing personal devices. **If you notice an error in your test grade, have trouble logging in to TopHat, or have a question about the test/quiz, you must notify the instructor and the TA within one week of receiving your test/quiz grade.**

Honors poster: Students with an average of 80 % or better on Exams 1 and 2 will be eligible to take part in an Honors Poster activity in place of the final exam. Students will work in groups

of four to create a scientific style poster on an approved topic related to climate change and sustainability. Because this is a group project in which team members rely on one another to succeed, withdrawing is not possible once the teams have been formed. Posters will be presented at a “workshop” during the final exam time slot, and evaluated by peers, as well as the instructors. Limited to the first 50 students to apply. Designed to provide experience researching a topic and presenting results in a scientific format. Suitable for students interested in careers in research, science communication, education, etc.

## Instructors

**Prof John S. King** - *Instructor*

**Email:** [john\\_king@ncsu.edu](mailto:john_king@ncsu.edu)

**Phone:** 919-513-7855

**Office Location:** 1019 Biltmore Hall

**Office Hours:** email for appointment

**Prof Erin Sills** - *Instructor*

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**Phone:** 919-515-7784

**Office Location:** 3110 Jordan Hall

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**Prof Michael J. Vepraskas** - *Instructor*

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**Phone:** 919-515-1458

**Office Location:** 3413 Williams Hall

**Office Hours:** email for appointment

## Graduate Teaching Assistant

**Jennifer Omoyemeh Ile** - *Graduate Teaching Assistant*

**Email:** [ojile@ncsu.edu](mailto:ojile@ncsu.edu)

**Office Location:** 1025 Biltmore Hall

**Office Hours:** By appointment

## Course Meetings

### Lecture

**Days:** T Th

**Time:** 11:45am - 1:00pm

**Campus:** Main

**Location:** 117 Witherspoon

*This meeting is required.*

## Course Materials and Approach

Due to the broad diversity of topics relevant to climate change and sustainability, students should expect variation in teaching styles, content, and use of supplementary materials between the three sections of the course. Lecture slides, required readings, videos, website links, or other course materials will be posted to the course Moodle site prior to each day’s lecture or shortly thereafter. The range of disciplines, subject material, approaches, and learning resources used by the teaching team, including the use of supplementary materials and guest speakers, brings diversity, breadth and interest to the course representative of the challenging complexity that climate change poses to society. It is therefore expected that students will adapt to changes in the course over time, take responsibility for understanding the requirements of each section, and ask for guidance when needed. Expectations for each section of the course will be communicated on the syllabus, in class, on the Moodle site and on exam study guides. **IF YOU ARE UNCLEAR ON ANYTHING RELATED TO EARNING A GRADE IN ES 200, PLEASE DO NOT HESITATE TO ASK.** Questions posed in class are best, because everyone will benefit from the ensuing discussion.

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## Student Enrollment and General Education Program (GEP)

ES 200 is open to all students, and it satisfies General Education Program requirements for Interdisciplinary Perspectives and Global Knowledge courses. The course is managed consistent with NC State policies for incomplete grades, late assignments, attendance, makeup work, integrity, honesty, discrimination, and accessibility.

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## Grading

*Points Earned and Grading Scale (with slight rounding)*

<u>Exercise</u>	<u>Points</u>	<u>Percent</u>
Attendance:	84	15
In class activity/quiz:	84	15
Exam 1:	100	18
Exam 2:	100	18
Exam 3:	65	12
Final exam/Poster:	124	22
Total:	557	100

There will be 7 in-class activities/quizzes in each section of the course, worth 4 points each. Quizzes will be based on lecture material from the previous day's class to allow time to prepare, and activities will be based on some form of assigned material such as videos, topical websites, popular media/news, scientific readings, etc. Assigning quizzes or activities is at the discretion of the professor in each section of the course. Exams are weighted differently to reflect the proportionality of the number of class days in each section, with the Final having proportionately more points for the last section of the course (e.g. human dimensions). Your lowest exam grade will be replaced with the Exam 4 grade, if that improves your overall class grade (does not apply to Honors Posters). Other opportunities to improve your grade may be available as extra credit questions on exams.

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## Letter Grades

**This Course uses the Following Letter Grading Scale:**

<b>Percent/Grade</b>	<b>Points (557 total)</b>
97 ≤ <b>A+</b> ≤ 100	540-557
93 ≤ <b>A</b> < 96.9	518-539
90 ≤ <b>A-</b> < 92.9	501-517
87 ≤ <b>B+</b> < 89.9	484-500
83 ≤ <b>B</b> < 86.9	462-483
80 ≤ <b>B-</b> < 82.9	445-461
77 ≤ <b>C+</b> < 79.9	429-444
73 ≤ <b>C</b> < 76.9	406-428
70 ≤ <b>C-</b> < 72.9	390-405
67 ≤ <b>D+</b> < 69.9	373-389
63 ≤ <b>D</b> < 66.9	351-372
60 ≤ <b>D-</b> < 62.9	334-350
<b>F</b> < 59.9	<334

## Requirements for Credit-Only (S/U) Grading

In order to receive a grade of S, students are required to take all exams and quizzes, complete all assignments, and earn a grade of C- or better. Conversion from letter grading to credit only (S/U) grading is subject to university deadlines. Refer to the Registration and Records calendar for deadlines related to grading. For more details refer to

<http://policies.ncsu.edu/regulation/req-02-20-15>.

## Requirements for Auditors (AU)

Information about and requirements for auditing a course can be found

at: <http://policies.ncsu.edu/regulation/req-02-20-04>.

## Policies on Incomplete Grades

If an extended deadline is not authorized by the instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at <http://policies.ncsu.edu/regulation/req-02-50-3>.

## Attendance Policy

For complete attendance and excused absence policies, please see

<http://policies.ncsu.edu/regulation/req-02-20-03>.

## Attendance Policy and Absences

University regulations (NCSU REG 02.20.03) for 200 level courses require attendance be taken. Attendance is tracked via TopHat in conjunction with the in-class quizzes/activities and therefore, it is required that students attend all regular lecture classes, worth 4 attendance points each. It is the student's responsibility to work out a time for making up excused absences with the TA. Excused absences should be approved in advance. The NCSU Attendance Policy, with explanations of excused absences, is at the above link. Excused absences may be granted for family emergencies, medical reasons, and travel for University approved sports/academic activities. Contact the Graduate Teaching Assistant to request an excused absence, preferably before class and definitely within 10 days of the absence. Requests are not accepted beyond the 10-day period. To request an excused absence, send an email to the TA with "ES 200 Excused Absence Request for [date]" as the subject line. Students who have an excused absence and would like to get credit for the missed in-class quiz/activity (worth 4 points) need to contact the TA to schedule a make-up within 2 class periods of the excused absence. Two *unexcused* absences are allowed, for which attendance points will not be deducted. However, make up quizzes/activities will not be given for unexcused absences (loss of 4 points each). Beyond the two allowed unexcused absences, each additional unexcused absence will cost 8 points (-4 for attendance, -4 for the missed quiz/activity). Undocumented illnesses will be treated as unexcused absences (e.g. included in the limit of 2 above), for which a note from Student Health or a doctor will be required in order to be excused.

## Academic Integrity

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at <http://policies.ncsu.edu/policy/pol-11-35-01>

See <http://policies.ncsu.edu/policy/pol-11-35-01> for a detailed explanation of academic honesty.

## Honor Pledge

Your name on any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment."

## Accommodations for Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Services Office at Suite 2221, Student Health Center, Campus Box 7509, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01) (<https://policies.ncsu.edu/regulation/reg-02-20-01/>). If you qualify for additional time, reduced distraction, or other accommodation for the exams, you should register to take them through the Testing Center at the beginning of the semester, to ensure that you get a seat on the exam days.

## Non-Discrimination Policy

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at <http://policies.ncsu.edu/policy/pol-04-25-05> or [http://www.ncsu.edu/equal\\_op/](http://www.ncsu.edu/equal_op/). Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148. In an effort to affirm and respect the identities of transgender students in the classroom and beyond, please contact the instructor if you wish to be referred to using a name and/or pronouns other than what is listed in the student directory.

## Course Schedule (*The course schedule may be modified.*)

Date	Topic	Instructor
Th - 8/22	Introduction – What is climate and how is it changing?	Vepraskas
T - 8/27	Introduction – Human dimensions: mitigation and adaptation	Sills
Th - 8/29	Introduction – What are ecosystems and why do they matter?	King
T - 9/3	Earth’s climate history – deep time and recent	Vepraskas
Th - 9/5	How climate works: Energy flows and balance	Vepraskas
T - 9/10	Climate change: Forcings (Guest speaker, Dr. Kevan Minick)	Vepraskas
Th - 9/12	What makes climate change: Feedbacks and sensitivity	Vepraskas
T - 9/17	Climate models	Vepraskas
Th - 9/19	Human impacts: Land use, agriculture and urbanization	Vepraskas
T - 9/24	Human impacts: Carbon and GHG cycles (Guest speaker: Dr. Matt Ricker)	Vepraskas
Th - 9/26	Human impacts: Energy systems, adaptation and mitigation	Vepraskas
T - 10/1	<b>Exam 1 – Science of Climate and Climate Change</b>	Vepraskas
Th - 10/3	Past climates and life on Earth	King
T - 10/8	Current climate/ecosystem distributions (Guest speaker, Dr. Kevan Minick)	King
Th - 10/10	Fall break – No class	
T - 10/15	Ecosystems in transition – evidence of a changing climate	King
Th - 10/17	The Oceans	King
T - 10/22	Coastal systems and wetlands	King
Th - 10/24	Forests and woodlands	King
T - 10/29	Drylands and high latitudes	King
Th - 10/31	Commodity production	King
T - 11/5	<b>Exam 2 – The Ecology of Climate Change</b>	King
Th - 11/7	Costs of climate change	Sills
T - 11/12	Avoiding the costs of climate change: international policy frameworks for mitigation	Sills
Th - 11/14	Avoiding the costs of climate change: mitigation at local and state levels in the US	Sills
T - 11/19	Sustainability: personal responsibility for mitigating climate change	Sills
Th - 11/21	Sustainability: private sector responsibility for mitigating climate change (Guest lecture by Jessica Thomas)	Sills
T - 11/26	<b>Exam 3 – Human Dimensions of Climate Change</b>	Sills
Th - 11/28	Thanksgiving holiday – No class	
T - 12/3	Reducing the costs of climate change: science and international policy frameworks for adaptation	Sills
Th - 12/5	Reducing the costs of climate change: adaptation at national, state, local and personal levels in the US	Sills
T - 12/10 8:00-11:00 AM	<b>Final Exam or Honors Poster Session</b>	Ile, King, Sills, Vepraskas