New Course Report



1. General Information

1a. Submitted by the College of: ARTS &SCIENCES

Date Submitted: 10/27/2014

1b. Department/Division: Earth and Environmental Sciences

1c. Contact Person

Name: Dr. Kevin Yeager

Email: kevin.yeager@uky.edu

Phone: 859-257-5431

Responsible Faculty ID (if different from Contact)

Name:

Email:

Phone:

1d. Requested Effective Date: Semester following approval

1e. Should this course be a UK Core Course? No

2. Designation and Description of Proposed Course

2a. Will this course also be offered through Distance Learning?: No

2b. Prefix and Number: EES 345

2c. Full Title: Paleoclimatology: The Science

2d. Transcript Title:

2e. Cross-listing:

2f. Meeting Patterns

LECTURE: 3

2g. Grading System: Letter (A, B, C, etc.)

2h. Number of credit hours: 3

2i. Is this course repeatable for additional credit? No

If Yes: Maximum number of credit hours:

If Yes: Will this course allow multiple registrations during the same semester?

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OFFICE OF THE SENATE COUNCIL

KENTUCKY

New Course Report

- 2j. Course Description for Bulletin: This course focuses on the science behind our understanding of how our planet's climate has changed over time, in particular from 100 million years ago to the present. The most significant processes, astronomical, geological, oceanographic, and atmospheric, are examined with an emphasis on the broad scales of time and space over which they operate, and drive climatic change. Proxy data records are defined in the context of how they record climatic data, and how we "read" them to learn the climatic history they store. Finally, the course brings us into the historical age, where data stores on climate change are the most diverse, but shortest in duration. The ultimate goal is for students to understand how we know what we know about Earth's past climatic changes, so that we can formulate informed strategies moving forward to mitigate our own species' impact on global climate.
- 2k. Prerequisites, if any:
- 21. Supplementary Teaching Component:
- Will this course taught off campus? No If YES, enter the off campus address:
- .4. Frequency of Course Offering: Fall,

Will the course be offered every year?: Yes

If No, explain:

- 5. Are facilities and personnel necessary for the proposed new course available?: Yes If No, explain:
- 6. What enrollment (per section per semester) may reasonably be expected?: 100
- 7. Anticipated Student Demand

Will this course serve students primarily within the degree program?: No

Will it be of interest to a significant number of students outside the degree pgm?: Yes

If Yes, explain: There are currently no courses offered at UK which focus on the subject of paleoclimatology. We anticipate that students in other College of Arts and Sciences units (Anthropology, Geography), as well as units from other Colleges, including the College of Agriculture, Food and the Environment (Entomology, Forestry, Plant and Soil Sciences) and the College of Engineering (Civil Engineering), may enroll in this course. Additionally, we anticipate that students from two interdisciplinary degree programs (Natural Resources and Environmental Science, Environmental and Sustainability Science) will also enroll in this course.

8. Check the category most applicable to this course: Traditional – Offered in Corresponding Departments at Universities Elsewhere,

If No, explain:

- 9. Course Relationship to Program(s).
 - a. Is this course part of a proposed new program?: No

If YES, name the proposed new program:

b. Will this course be a new requirement for ANY program?: No





If YES, list affected programs:

- 10. Information to be Placed on Syllabus.
 - a. Is the course 400G or 500?: No
- b. The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if applicable, from **10.a** above) are attached: Yes

Distance Learning Form

Instructor Name:

Instructor Email:

Internet/Web-based: No

Interactive Video: No

Hybrid: No

- 1. How does this course provide for timely and appropriate interaction between students and faculty and among students? Does the course syllabus conform to University Senate Syllabus Guidelines, specifically the Distance Learning Considerations?
- 2. How do you ensure that the experience for a DL student is comparable to that of a classroom-based student's experience? Aspects to explore: textbooks, course goals, assessment of student learning outcomes, etc.
- 3. How is the integrity of student work ensured? Please speak to aspects such as password-protected course portals, proctors for exams at interactive video sites; academic offense policy; etc.
- 4. Will offering this course via DL result in at least 25% or at least 50% (based on total credit hours required for completion) of a degree program being offered via any form of DL, as defined above?

If yes, which percentage, and which program(s)?

- 5. How are students taking the course via DL assured of equivalent access to student services, similar to that of a student taking the class in a traditional classroom setting?
- 6. How do course requirements ensure that students make appropriate use of learning resources?
- 7.Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.
- 8. How are students informed of procedures for resolving technical complaints? Does the syllabus list the entities available to offer technical help with the delivery and/or receipt of the course, such as the Information Technology Customer Service Center (http://www.uky.edu/UKIT/)?
- 9. Will the course be delivered via services available through the Distance Learning Program (DLP) and the Academic Technology Group (ATL)? NO

If no, explain how student enrolled in DL courses are able to use the technology employed, as well as how students will be provided with assistance in using said technology.

10.Does the syllabus contain all the required components? NO



New Course Report

11.!, the instructor of record, have read and understood all of the university-level statements regarding DL.

Instructor Name:

SIGNATURE|MOKER|David P Moecher|EES 345 NEW Dept Review|20140404

SIGNATURE|RHANSON|Roxanna D Hanson|EES 345 NEW College Review|20140429

SIGNATURE|JMETT2|Joanie Ett-Mims|EES 345 NEW Undergrad Council Review|20141031

Request Tracking

New Course Form

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		•	(*denot	es required fiel	ds)		
1. G	eneral	Information					_
	a. *	Submitted by the College of: ARTS & SC	IENCES	▼ Sub	mission Date: 10/27	12014	
	b. *	Department/Division: Earth and Environ	mental Sciences	×			
	C.						7 5404
		Contact Person Name:	Dr. Kevin Yeag	jer Email: k Email:	evin.yeager@uky.edu	Phone: 859-257 Phone:	-5431
		Responsible Faculty ID (if different from				Fliotic.	•
	d. *	Requested Effective Date: Semester	r following approval OR	○ Specific Term/	rear 1	!	
	е.	should this course be a UK Core Course					
		YES, check the areas that apply:	· O Yes W No				
				*			
		Inquiry - Arts & Creativity	Composition & Com	munications - II		•	
		Clinquiry - Humanities	Quantitative Founda	tions		•	
		Inquiry - Nat/Math/Phys Sci	Statistical Inferential	Reasoning			
		☐ Inquiry - Social Sciences	U.S. Citizenship, Co	mmunity, Diversity	/		
٠.		☐ Composition & Communications - I	Global Dynamics				
			ALLECO .				
2. 0	_	ation and Description of Proposed Co Will this course also be offered through		∕oo 4 iĝi No			
			Distance Learning?				
	b. *	Prefix and Number: EES 345				:	-
	c. *	Full Title: Paleoclimatology. The Science	e				
	d. T	Franscript Title (if full title is more than 40) characters):				
		To be Cross-Listed ² with (Prefix and Nu					
	f. *	*Courses must be described by at least		ns below. Include	number of actual con	tact hours ³ for ea	ach meeting patterr
		3 Lecture	Laboratory ¹		Recitation		Discussion Practicum
		Indep. Study	Clinical		Colfoquium Seminar		Studio
		Research Other I	Residency f Other, Please explain:	.			
		1 - 7	,	,			
		* Identify a grading system: • Letter (A, B, C, etc.)					
		① Pass/Fail					
		Medicine Numeric Grade (Non-medic	al students will receive a	letter grade)			
		Producte School Grade Scale					
		 ⊙ Graduate School Grade Scale * Number of credits: 3 	<u> </u>				

	-	*Course Description for Bulletin: This course focuses on the science behind our understanding of how our planet's climate has changed over time, in particular from 100 million years ago to the present. The most significant processes, astronomical, geological, oceanographic, and atmospheric, are examined with an emphasis on the broad scales of time and space over which they operate, and drive climatic change. Proxy data records are defined in the context of how they record climatic data, and how we "read" them to learn the climatic history they store. Finally, the course brings us into the historical age, where data stores on climate change are the most diverse, but shortest in duration. The ultimate goal is for students to understand how we know what we know about Earth's past climatic changes, so that we can formulate informed strategies moving forward to mitigate our own species' impact on global climate.
	Ł	Prerequisites, if any:
	κ.	relequisies, a diff.
		en de la companya de
	l.	Supplementary teaching component, if any: Community-Based Experience Service Learning Both
3.	* Will	his course be taught off campus? ③ Yes ⑨ No
	If YES	enter the off campus address:
4.	Frequ	ency of Course Offering.
	a.	* Course will be offered (check all that apply): ☑ Fall □ Spring □ Summer □ Winter
	b.	* Will the course be offered every year? ◎ Yes ② No
		If No, explain:
_	* ^	acilities and personnel necessary for the proposed new course available? Yes No
ο.		explain:
		\cdot
	:	
6.	* Wha	t enrollment (per section per semester) may reasonably be expected? 100
7.	Antici	pated Student Demand.
	a.	* Will this course serve students primarily within the degree program? ○ Yes ⑨ No
		* Will it be of interest to a significant number of students outside the degree pgm? Yes No
	υ.	If YES, explain:
		There are currently no courses offered at UK which focus on the subject of paleoclimatology. We anticipate that students in other College of Arts and Sciences units (Anthropology, Geography), as well as units from other
8.	* Che	ck the category most applicable to this course:
		ditional – Offered in Corresponding Departments at Universities Elsewhere
	□Re	latively New – Now Being Widely Established
	No	t Yet Found in Many (or Any) Other Universities
9.	Cours	se Relationship to Program(s).
	a.	* Is this course part of a proposed new program? Yes No
		If YES, name the proposed new program:
	b.	* Will this course be a new requirement ⁵ for ANY program? ① Yes ⑩ No
		If YES ⁵ , list affected programs::
n	Infor	nation to be Placed on Syllabus.
٠.		* in the course 400G or 5002 © Yes ® No
		If YES, the differentiation for undergraduate and graduate students must be included in the information required in 10.b. You must include: (i) identical additional assignments by the graduate students; and/or (ii) establishment of different grading criteria in the course for graduate students. (See SR
	b.	☑* The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if appl
		10.a above) are attached.

University Senate Syllabi Guidelines Review Checklist Course: EES 345 **General Course Information** Course prefix, number and section number Full and accurate title of the course Scheduled meeting day(s), time and place Departmental and college prefix Instructor Contact Information (if specific details are unknown, "TBA" is acceptable for one or more fields) Office address Instructor name UK email address Contact information for teaching/graduate Times of regularly scheduled office hours and if assistant, etc. prior appointment is required Preferred method for reaching instructor Office phone number **Course Description** Reasonably detailed overview of the course Student learning outcomes Course goals/objectives Required materials (textbook, lab materials, etc.) Outline of the content, which must conform to the Bulletin description Summary description of the components that contribute to the determination of course grade $igstyle{igstyle}$ Tentative course schedule that clarifies topics, specifies assignment due dates, examination date(s) | Final examination information: date, time, duration and location For 100-, 200-, 300-, 400-, 400G- and 500-level courses, numerical grading scale and relationship to letter grades for undergraduate students ceil For 400G-, 500-, 600- and 700-level courses, numerical grading scale and relationship to letter grades for graduate students. (Graduate students cannot receive a "D" grade.) ☑ Relative value given to each activity in the calculation of course grades (Midterm=30%; Term Project=20%, etc.) $oxedsymbol{oxed}$ Note that undergraduate students will be provided with a Midterm Evaluation (by the midterm date) of course performance based on criteria in syllabus Policy on academic accommodations due to disability. Standard language is below: If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities. **UGE Review** (5/19/14) **Course Policies** Attendance Excused absences

- Grading scale is not equivalent to undergraduate scale.				
,				
Committee Review ()			
Comments			•	
			•	

EES 345 – PALEOCLIMATOLOGY: THE SCIENCE

Class time Location TBD [M-W-F schedule assumed] Slone Research Building (SRB) 303

Instructor

Dr. Kevin M. Yeager

Slone 107 (859) 257-5431

kevin.yeager@uky.edu Office hours: TBD

Course Overview

This course focuses specifically on the science behind our understanding of how our planet's climate has changed over time, in particular from 100 million years ago to the present. The most significant processes, astronomical, geological, oceanographic, and atmospheric, are examined with an emphasis on the broad scales of time and space over which they operate, and drive climatic change. Proxy data records are identified and defined in the context of how they record climatic data, and how we "read" them to learn the climatic history they store. Finally, the course brings us into the historical age, where data stores on climate change are the most diverse, but shortest in duration. The ultimate goal is for students to understand *how we know what we know* about Earth's past climatic changes, so that we can formulate informed strategies moving forward to mitigate our own species' impact on global climate.

Student Learning Outcomes

By taking this course and applying what you have learned, you will be able to

- Explain how Earth's climate is always changing, and describe how these changes are driven by many different kinds of natural and anthropogenic processes;
- Analyze the scientific basis for our understanding of how Earth's climate has changed in the deep past, through to the present day;
- Describe what climatic proxy data are, how varied they are, and how they are able to record information about the climate during the time they were formed/modified, etc.;
- Explain the concepts of abstraction and uncertainty in terms of climatic data sets and models, and how to critically evaluate these in the contexts of time scales and/or spatial extents; and
- Describe how humans, apart from natural processes, have made our own impact on Earth's climate, particularly over the last several hundred years.

Course Goals and Objectives

Despite considerable media attention focused on contemporary climate change, little attention is given to two critically important areas; (1) the scientific basis for climate change (contemporary or otherwise), and (2) the context of contemporary climate change in terms of what we know about climate change on Earth over long periods of time (100 million years or more). The goal of this course is to introduce students to the scientific basis for climate change (now or in the past), so that they can appreciate for themselves the context of modern climate change. To accomplish this, a number of critical subjects will be addressed as objectives, which in summary will include:

- Geologic time and major climate system components;
- Paleoclimatic data, and how they are placed in time;
- Greenhouse gases: Sources and change over time;

- Plate tectonics and long-term climate change on Earth;
- Relationships between global climate and sea level;
- Greenhouses and icehouses: How warm and cold has Earth been?;
- Astronomical processes: Some factors are literally out of this world;
- The last major Ice Age: Megafauna, migrations and man;
- The human factor: Preindustrial versus postindustrial human impacts on global climate;
- Contemporary climate change and what's next for global climate?

Prerequisites

There are no prerequisites for this course, but a basic knowledge of geography, high school chemistry, and algebra as expected for admission to UK will be assumed (see http://www.uky.edu/Admission/precollege-curriculum). Also, a basic understanding of statistics, as developed in the UK Core requirement STA 210, will be assumed.

Blackboard Course Page

You can access the Blackboard (Bb) page at https://elearning.uky.edu. The course page will eventually contain a copy of this syllabus, lecture PowerPoints (uploaded AFTER they are presented in class), and other information. I often use Bb to communicate important announcements to the class.

Textbook

One text is **required**: Earth's Climate: Past and Future, 2nd Edition (2007), by William F. Ruddiman.

Lectures are designed to coincide with material in the text, however there will be additional
information incorporated into lectures that will not be found in the text.

Policies

Attendance

Regular attendance and active participation are expected; while they are not factored into your final grade, the best way to succeed in this class is to attend. If you miss a lecture, get the PowerPoint lecture from Blackboard and any missed notes from one of your classmates; you do not need to notify me about absences from regular lectures.

Excused absences for missed quizzes and exams may be granted for:

- 1. Significant illness of the student or serious illness of a member of the student's household (permanent or campus); formal verification must be furnished to allow a makeup.
- 2. The death of a member of the student's household (permanent or campus) or immediate family; formal verification must be furnished to allow a makeup.
- 3. Trips for members of student organizations sponsored by an academic unit, trips for University classes, and trips for participation in intercollegiate athletic events. When feasible, the student must notify the instructor prior to the occurrence of such absences, but in no case shall such notification occur more than one week after the absence. Formal notification from appropriate university personnel is required to document participation in such trips and to allow a makeup.
- 4. Major religious holidays; students are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day for adding a class.

Missed quizzes and exams

Requests for makeup quizzes and exams must be made in writing (by email) to Dr. Yeager within 1 week of the missed quiz or exam (except where prior notification is required). To find out if you missed an unannounced ("pop") quiz, either ask a fellow student or check the Blackboard grade book; after a quiz is given, the date of the quiz will appear next to it (e.g., "Quiz 1 (2/15)"). In your email, be sure to mention the course number (EES 345), the specific quiz or exam you missed, and the reason you are requesting a makeup. If the reason fits one of the criteria above, Dr. Yeager will arrange for you to take the makeup during his office hours, or at another time if you have a time conflict. You must bring the necessary documentation with you to the makeup or you will not be allowed to take it.

Classroom Behavior and Academic Integrity

During lecture, **there** is **no need** to use laptops, tablets or smart phones. If you insist on using any of these devices during class, you will be asked to leave. If you need to bring these items to class, it is expected that they will be turned off or silenced during class. Disruptive behavior of any kind will not be tolerated during class. **Cheating of any type is unacceptable**. Cheating is defined in the Student Handbook of Rights and Responsibilities, but in particular for this course, includes relying too much on another student's work (i.e., simply copying another student's work). The following protocol will be followed should there be evidence of cheating on an assignment:

- Instructor will discuss the matter confidentially with the student(s) involved; if not satisfactorily resolved,
- 2. Instructor will discuss the matter confidentially with Department Chair and the student; if not yet resolved,
- 3. Instructor will discuss the matter confidentially with the Academic Ombud and the student.

Based on the outcome of this procedure, instances of cheating may result in a grade of "0" for the assignment and possibly additional penalties including a failing grade for the entire course.

Exams

Everything discussed *in class* (including materials from the text), regardless of whether it appears in the PowerPoint presentations, is fair game for exams. No quantitative problems requiring calculators will occur on the exams, and calculators are not permitted. The lowest score from the three regular exams will be dropped when calculating final grades. The final exam is comprehensive and will cover all of the material discussed in lecture; **it cannot be dropped**.

Before each exam, all personal items including backpacks, purses, notes, calculators, iPods, headphones or earplugs, and cell phones must be put away. Cell phones may be kept in your pocket, but if you are seen looking at it or operating it in any way, you will receive a zero grade for the exam.

Pop Quizzes

At least six 5-minute true/false quizzes will occur randomly throughout the semester at any time during class. Quiz material will cover the previous two lectures, and can include material from the text. The purpose of these quizzes is to encourage you to attend class and to review your notes regularly. The lowest quiz score will be dropped when calculating final grades.

Getting Additional Help

Please ask questions at any time during lecture. I have an open-door policy, but I may have to turn you away if it is not a good time for me outside of office hours. Don't count on me answering emails in the evenings, and don't wait until right before an exam or assignment due date to get help.

If you have a documented disability that requires academic accommodation(s), please see me as soon as possible during my scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center. The center is located in Room 2, Alumni Gym. If you have not registered with the Disability Resource Center for coordination of campus disability services, please contact the Center by calling 257-2754 or by email to the center director, Jacob Karnes, jkarnes@email.uky.edu.

Grading

Final grades will be calculated as follows:

50% Regular exams (3) – lowest score dropped

25% Final exam

25% Pop quizzes (6) – lowest score dropped

The calculated percentage will be rounded to the nearest whole number and assigned a letter grade according to the following scale: A = 90-100, B = 80-89, C = 70-79, D = 60-69, and E (or F) = 0-59. No curves will be applied in the grading. A running weighted average will be made available throughout the semester on the Blackboard grade center, so you can check your grade any time. Low exam and quiz scores will be dropped from the calculation of the running weighted average AFTER midterm grades are calculated and distributed.

Schedule			
Date	Lecture (tentative)*	Text Readings	
1/15 1/17 1/20	Overview Geologic time, climate system components, and climatic forcing Climatic responses to forcing, forcing-response time scales, and feedbacks Martin Luther King Jr. Birthday – No classes	Chapter 1	
1/22 1/24 1/27	Climate Archives Archives, dating, and resolution What are paleoclimatic data? Physical and geochemical models	Chapter 2	
1/29 1/31 2/3 2/5	CO ₂ and Long-Term Climate Rocks as a source of carbon to the atmosphere Removal of atmospheric CO ₂ by chemical weathering of rocks How do climatic factors control rates of chemical weathering? What about water vapor?	Chapter 3	
2/7 2/10 2/12 2/14	Plate Tectonics and Long-Term Climate Structure and composition of tectonic plates, and where have they been? Tectonic control of atmospheric CO ₂ input: Spreading rate hypothesis Tectonic control of atmospheric CO ₂ removal: Uplift-weathering hypothesis EXAM 1	Chapter 4	
2/17 2/19 2/21	Greenhouse Climate A look back: Why was Earth so warm 100 million years ago? Sea level changes and climate About sea levels – Is sea level rise the same everywhere?	Chapter 5	

	Greenhouse to Icehouse – The Last 50 Million Years	
2/24	Evidence – Ice, vegetation, oxygen isotopes, Mg/Ca data	Chapter 6
2/26	Did geography do it? The gateway hypothesis	•
2/28	Were large-scale tectonics the cause? The spreading rate and uplift-	
•	weathering hypotheses	
•	The Roles of Astronomical Processes	
3/3	Milankovitch Cycles – Orbital shape, axial tilt and axial precession	Chapter 7
3/5	Milankovitch Cycles – The amount and distribution of solar radiation on Earth	
3/7	Insolation and monsoons	Chapter 8
3/10	Insolation and ice sheets	Chapter 9
3/12	Orbital scale changes in important greenhouse gas concentrations (CO ₂ , CH ₄)	Chapter 10
3/14	EXAM 2	
3/17 - 3	21 Spring Break – No classes	
•		
	The Last Glacial Maximum	Chapter 12
3/24	CLIMAP: Reconstructing the last glacial Earth	
3/26	Models and data: Do they all match?	
5,20	Climate Since the Last Glacial Maximum	Chapter 13
3/28	Melting ice and rising seas	•
3/31	Giant deglacial floods	
3/31.	Charit deglacial modus	
	Humans and Preindustrial Climate	
4/2	Climate change and human evolution	Chapter 15
4/4	Climate impact on human development – Farming, civilization	•
4/4	Early human impacts on climate?	
4/ /	Larry Human impacts on climate:	
	Climate Change Over the Last 10,000 Years	
4/9	Important proxy records – Ice cores, tree rings, corals	Chapter 16
4/11	The Little Ice Age – Causes of rapid climate change 1000 – 1850 AD	•
4/11	The Little ice Age Causes of rapid chinate change 1999 1999	
	Climate Change Since 1850	
4/14	Sea level reconstructions	Chapter 17
4/16	Important instrument records – Air, oceans, glaciers, land, satellite observations	•
4/18	EXAM 3	
4/10	EARIN 3	
	Causes of Global Warming Over the Last 125 Years	
4/21	Natural causes – tectonics, orbital factors, solar forcing, volcanism	Chapter 18
4/23	Anthropogenic causes – Atmospheric change (CO ₂ , CH ₄ , CFCs, sulfate aerosols)	
4/25	Anthropogenic causes – Terrestrial change (land clearing, built environments)	
4/23	Antinopogenic causes - refrestrial change hand clearing, bane cirvinomically	
-	Future Climatic Change	
4/20	Projections based on atmospheric CO ₂ models	Chapter 19
4/28	How will continued greenhouse warming change human life?	5ap to. 25
4/30		
5/2	NO CLASS (free study day)	
c/c ^	FINIAL EVANA (TDD)	
5/5-9	FINAL EXAM (TBD)	