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DEPARTMENT OF INTEGRATIVE BIOLOGY AND PHYSIOLOGY
HERSHEY HALL
612 CHARLES E. YOUNG DRIVE EAST
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March 4, 2020

Members of the General Education Governance Committee.

I am submitting a packet for the certification of EEB 21: Field Biology for Foundations of Scientific (FSI) Inquiry General Education (GE) credit. Specifically, I would like students who take the course to be able to choose to receive either Life Sciences w/ Lab or Physical Sciences w/ Lab. This course is a revamp of a course that has not been offered for some time in EEB (at least 5 years). Because we would like to have the course be a GE with a lab, we are hoping to re-unit the course to 5 units to satisfy the unit requirements for FSI GE Lab courses.

The course grew out of the Broader Impacts for an NSF grant which is funding paleontological fieldwork in Utah. As part of this course, GE students will get the unique opportunity to experience field work and how we collect data about ecologies and environments in the past and will then apply that knowledge to how we can think about our current climatic crisis. Students will read a mix of popular and scientific literature about climate change and how we investigate paleoclimates. They will then use this knowledge to rebut current climate change skepticism. Through this process they will learn about the scientific methods and why it is the only way to address this issue, and how that those methods and results can be communicated to the public.

Please let me know if any further information is needed.

Sincerely,

Anthony Friscia

Anthony Friscia
Director, UCLA Cluster Program
Adj. Assoc. Professor, Integrative Biology & Physiology
tonyf@ucla.edu

General Education Foundations of Scientific Inquiry (FSI) Course Information Sheet

Please submit this sheet for each proposed course along with 1) a syllabus describing the key components of the course that will be taught regardless of the instructor and 2) assignment guidelines.

Department, Course Number, and Title **EEB 21: Field Biology**

Indicate when the department anticipates offering this course in 2019-20 and give anticipated enrollment:

Fall: ☐ Enrollment Winter: ☐ Enrollment Spring: ☐ Enrollment Summer: ☒ Enroll: 15

As stated in the guidelines regarding courses in the Foundations of Scientific Inquiry (FSI), the aim of these course offerings is:

To ensure that students gain a fundamental understanding of how scientists formulate and answer questions about the operation of both the physical and biological world. These courses also deal with some of the most important issues, developments, and methodologies in contemporary science and technology, addressing such topics as the origin of the universe, environmental degradation, and the decoding of the human genome. Through lectures, experiential learning opportunities such as laboratories, writing, and intensive discussions students consider the important roles played by the laws of physics and chemistry in society, biology, earth and environmental sciences, and astrophysics and cosmology.

General Education FSI Student Goals: Courses fulfilling the GE FSI will provide a minimum of four units and should align with some (not necessarily all) of the following seven general goals:

1. Students will actively engage in the scientific process of inquiry, analysis, problem-solving, and quantitative reasoning.
2. Students will acquire an informed appreciation of scientists, scientific research, and technology.
3. Students will experience the interdisciplinary nature of science.
4. Students will develop information literacy.
5. Students will make evidence-based decisions in a wide array of science and non-science contexts.
6. Students will develop scientific literacy by addressing current, critical issues and topics in science that are personally meaningful in daily life and/or connected to the needs of society.
7. Students will recognize fundamental scientific principles and the connections between different domains of science.

General Education FSI Student Learning Outcomes: Each course should have student learning outcomes listed in the syllabus. These outcomes may be tied to a specific discipline but should be associated with the seven broad categories listed above (please see **Appendix I** for a sample list of possible learning outcomes supporting each goal).

General Guidelines for GE FSI Courses: GE Courses may be upper or lower division, but they should have no prerequisites. Any student should be able to take them and understand the material with the background expected from all UCLA students. While the course may include material related to the history of science and the social and cultural implications of scientific research, **at least half** of the course should be devoted to students actively engaging in the scientific process of inquiry, analysis, problem-solving, and quantitative reasoning (Goal #1).

Please indicate the area/s which you believe this course should satisfy.

Life Science: ☒ Physical Science: ☒ Life Science Lab*: ☒ Physical Science Lab*: X ☐

Students can take the course for either Life or Physical Sciences credit w/Lab

**Please see the additional student learning outcomes and expectations for courses approved as GE FSI Labs.*

The GE FSI Assessment Project Resource Team would be delighted to meet with you to assist in filling out this form. Please contact us at RRamachandran@teaching.ucla.edu if you wish to arrange a meeting.

We are interested in understanding the alignment of your course learning outcomes with the GE FSI learning goals. First, identify measurable learning outcomes from your course and enter them in the first column of Table 1. You may add more rows as needed. If you need to state new learning outcomes, see Appendix I for a sample list of possible learning outcomes supporting each goal. Should you wish to choose any of these outcomes, you may simply indicate its number, e.g., 6a. Next, indicate how your learning outcomes relate to the GE FSI learning goals 1 through 7 (see previous page), by placing X's in the appropriate boxes. Note that all GE FSI courses must address Goal #1.

Table 1: Alignment of Course Learning Outcomes with GE FSI Learning Goals

	Your Course Learning Outcomes	**Select GE FSI Goal #**						
		1	**2**	**3**	**4**	**5**	**6**	**7**
1	Distinguish science from non-science by learning about the scientific process	**X**	**X**	**X**	**X**	**X**	**X**	**X**
2	Interpret and explain climatic data from today and in the past	**X**	**X**		**X**			
3	Describe and practice the basic field techniques of paleontology and geology	**X**	**X**		**X**			**X**
4	Describe the specific geologic and paleontological history of the Uinta Basin		**X**	**X**				**X**
5	Create an argument defending the work of climate science	**X**	**X**	**X**		**X**	**X**	**X**

Considering each of the GE FSI goals that you marked with X's in the table above, please provide information about related course activities and assignments.

Table 2: Course Activities and Assignments that Support the Learning Goals

Course Learning Outcome No. from Table 1	**Course Activities** How will progress towards meeting this outcome be facilitated? In other words, what types of course activities will be provided to assist students in achieving the learning goal?	**Course Assignments** How will students in the course demonstrate their ability to meet this goal? Please describe and provide a sample assignment, such as a term paper, exam, essay prompt, etc.
1	Lecture, Readings	Reading Responses, Final Paper/Presentation
2	Lecture, Readings, Discussion in the field	Reading Responses, Final Paper/Presentation, Data collection in the field
3	Field experience of collection paleontological and geologic data collection	Reflection journal
4	Lecture, Readings, Discussion in the field	Reflection journal, Final Paper/Presentation
5	Lecture, Readings, Discussion in the field	Final Paper/Presentation

Additional Student Learning Outcomes for experiential learning courses approved as "GE FSI Labs"

GE FSI Lab Definition and Expectations: A hands-on laboratory, computer simulation, demonstration, or field experience that involves active participation in experimental observation, data generation and collection using the techniques, methodologies, and approaches of modern-day scientists. Any lab should be conducted under sufficient supervision by the instructor or a Teaching Assistant (TA). Furthermore, the instructor and TAs should meet regularly outside of class time (minimum weekly or biweekly) to practice performing the lab procedures and/or to review the experimental results.

Please select one or more of the following learning outcomes for your course (select all that apply):

☐ **X** 1. Students will design, implement, and evaluate an experimental strategy for answering scientific questions, testing a hypothesis, or solving a problem.

☐ **X** 2. When possible, students will replicate experiments to allow testing for and interpretation of statistical significance.

☐ **X** 3. Students will apply commonly used mathematical concepts and statistical methods (e.g., basic addition, subtraction, multiplication, division, averages, standard deviation, t-test for significance) in their analysis of different types of scientific data they collect.

☐ **X** 4. Students will be able to visually depict a quantitative dataset as a chart, graph, table, or mathematical equation.

☐ **X** 5. Students will be able to concisely summarize trends and patterns deduced from quantitative and qualitative data to make informed conclusions about their experimental results.

☐ **X** 6. When interpreting their results, students will distinguish between the most important and extraneous findings (i.e. identify those that are critical to addressing a question, solving a problem, or supporting/refuting a hypothesis).

☐ 7. When interpreting their results, students will infer relationships between controls and experimental variables as well as assess causality and correlation among variables.

☐ 8. Students will be able to troubleshoot experimental procedures or methods of analysis to develop a sound scientific rationale for deducing what went wrong and why.

Please present concise explanation of how your course satisfies these criteria.

How will students in this course actively experiment and engage in the hands-on process of gathering, analyzing, and interpreting data? How will progress towards meeting the student learning outcomes for "labs" be measured/assessed? In other words, what types of assignments will be given to determine whether students are achieving the learning outcomes?	Students will be actively collecting data in the field and incorporating this into their final papers/presentations. We will be teaching them specific field techniques, such as specimen collection & preparation and stratigraphic data collection & interpretation. They will also learn how specimens and other data can be further used for procedures like isotopic analysis. Students will also learn how this data can be used in the broader context of understanding past climates. They will compare the techniques we use in the field, with those used to study climates at other locales covering other time periods, and how these can all be used to build up a continuous record. They will learn how to collection paleoecological data, and how this can be used to look at faunal responses to climate change, and how this can be applied to our current climatic crisis.

Please provide information on estimated weekly hours for the class. **(Note: Hours are based on a 3-week summer course)**

A) STUDENT CONTACT PER WEEK (if not applicable write N/A)

Activity	Number of hours
Lecture	30
Discussion Section	N/A
Labs	N/A
Experiential (Community-engagement, internships, other	N/A
Field Trips	56
A) TOTAL student contact	86

B) OUT-OF-CLASS HOURS PER WEEK (if not applicable write N/A)

Activity	Number of hours per week
General Review and Preparation	10
Reading	20
Group Projects	N/A
Preparation for Quizzes & Exams	N/A
Information Literacy Exercises	10
Written Assignments	20
Research Activity	10
B) TOTAL Out-of-class time per week	60

GRAND TOTAL (A) + (B) must equal 12 hours/week: 146 (hours)

Please note the following:

- If you're teaching a lab, your course should be 5 units and should entail 15 hours of work/week.
- If you're teaching a summer course, your aggregated total hours should be 120 (for non-lab courses) or 150 (for lab courses). For instance, if you're teaching a 5 week lab your total in-class and out-of-class time per week should equal 30 hours.

Appendix I. Student Learning Goals with Nested Learning Outcomes for All General Education (GE) Foundations in Scientific Inquiry Courses

Course Goals (1-7) and Student Learning Outcomes (a, b, c, etc.) for all "GE FSI" courses:

1. Students will actively engage in the scientific process of inquiry, analysis, problem-solving, and quantitative reasoning.
   a. Students will explain how scientists answer scientific questions, test a hypothesis, or solve a problem.
   b. Students will make reasonable predictions of experimental outcomes based on observation, measurements, and/or prior knowledge surmised from the scientific literature or other reliable, validated, accurate information sources.
   c. Students will break down, reason through, and solve complex quantitative problem sets.
   d. Students will be confident working with numerical data.
   e. Students will estimate and complete calculations to solve a quantitative problem.
   f. Students will recognize different objects and apply units of measurement at relevant scales (quantity, size, time) and orders of magnitude.
2. Students will acquire an informed appreciation of scientists, scientific research, and technology.
   a. Students will value their academic experiences in a science course that is outside their primary field of study.

   b. Students will recognize the benefits of science to society or their everyday life.
   c. Students will express interest in contributing to the sciences (e.g., engaging in research or scientific discourse with others).
   d. Non-science students will see scientists as role models, helping them to identify as scientists themselves.
3. Students will experience the interdisciplinary nature of science.
   a. Students will investigate topics from a variety of scientific fields.
   b. Students will explore the perspectives of multiple diverse scientists.
   c. Students will make logical connections between key concepts from multiple scientific disciplines.
4. Students will develop information literacy.
   a. Students will be mindful of information they encounter, recognizing contexts or situations when it is necessary to seek out other sources or data.
   b. Students will identify, locate, and critically evaluate information sources and datasets to ensure they are reliable, validated, accurate, and scholarly (i.e. associated with citations in peer-reviewed, public research studies).
   c. Students will explain the peer-review process in science and its role in critical evaluation and validation of published, scientific findings.
5. Students will make evidence-based decisions in a wide array of science and non-science contexts.
   a. Students will distinguish between opinion and fact (i.e. recognize data-supported conclusions).
   b. Students will use reliable, validated, accurate, and scholarly information sources and datasets before accepting or formulating a conclusion.
   c. Students will draw conclusions or make judgements about experimental results informed by critical thinking, that is, a comprehensive exploration of ideas and systematic engagement with the scientific process.
6. Students will develop scientific literacy by addressing current, critical issues and topics in science that are personally meaningful in daily life and/or connected to the needs of society (e.g., climate change, vaccination, GMOs, evolution).
   a. Students will clearly state the significance or relevance of a research question or problem (i.e. state why scientists are motivated to study the issue or topic).
   b. Students will discuss societal impacts by citing examples of the ways in which scientists and scientific research contribute to society.
   c. Students will describe the interactions between humans and their physical world and the positive and negative effects of this interaction.
   d. Students will explain why issues perceived as “controversial” in the public domain are not considered “controversial” in among scientists.
7. Students will recognize fundamental scientific principles and the connections between different domains of science.
   a. Students will describe the nature, organization, and evolution of living systems.
   b. Students will explain the origin and physical processes of the planet earth and the surrounding universe.
   c. Students will differentiate between a scientific theory, hypothesis, fact, or law.

EEB 21: Field Biology
Paleoenvironments: Learning About Climate from the Past

Tony Friscia

Summer Session A3 or B

Meeting time and place: TBA
Contact info and office hours: tonyf@ucla.edu, Hershey Hall 329, (310) 206-6011
office hours by appointment
Schedule: 5 meetings per week of 3 hours during Weeks 1 & 3
Week 2 in the field
Course Objectives: By the end of this course students should be able to:

- distinguish between science and non-science by learning about the scientific process
- interpret and explain climatic data from today and in the past
- describe and practice the basic field techniques of paleontology and geology
- describe the specific geologic and paleontological history of the Uinta Basin
- create an argument defending the work of climate science

GE Credit: This course satisfies either the Foundations of Scientific Inquiry - Life Sciences w/Lab *OR* Foundations of Scientific Inquiry - Physical Sciences w/Lab credit
Course Description: This course will introduce students to the basics of climate science, especially how studying climates in the past can inform our inferences about the climate of the future. We will do this primarily by investigating a well-studied field area in northeast Utah, the Uinta Basin. The course will be divided into 3 parts:

- The first part of the course will be in the classroom and provide students basic scientific knowledge about climate, geology, and paleontology. We will also explore how climate science gets portrayed in politics and culture.
- The second part of the course will be field-based. Students will get experience in field techniques in paleontology and geology in the Uinta Basin, and throughout the extensive geological background of Utah. They will learn how we collect data about climates in the past and find some aspect of the research that they can study further.
- The final part of the course will have classroom time to go over any topics that may have come up out in the field and will have presentations by students about some aspect of the research that they will investigate on their own.

Schedule:

Week 1	
Meeting 1	The nature of science What do we know about climate today? How do we find out about climates in the past?
Meeting 2	The Uinta Basin: Geology, Ecology, Cultural History
Meeting 3	Paleontology: How is it done? What can we learn from it?
Meeting 4	Climate Change in Politics & Culture What can Paleontology add to this?
Meeting 5	Mammalian Paleontology
Week 2 – in the field	

Saturday	Travel Day
Sunday	Set-Up camp and Orientation
Monday	Geologic Tour of the Uinta Basin Cenozoic
Tuesday	Introduction to Fossil Collecting & Paleontological Field Work
Wednesday	Collecting and Geology
Thursday	Dinosaur National Monument Tour
Friday	Collecting & Geology
Saturday	Screen Washing
Sunday	Pack Camp & Travel Day
Week 3	
Meeting 6	Follow-Up Topics
Meeting 7	Follow-Up Topics
Meeting 8	Follow-Up Topics
Meeting 9	Student Presentations
Meeting 10	Student Presentations

Requirements:

Participation: A large portion of the grade will be your participation in the field work portion of the course. This means being engaged in the activities, taking notes, asking questions, and taking initiative. Although there is an academic part of the experience, and you will be learning a lot about the scientific working going on in the Uinta Basin, you will also be in the field, and part of that is helping around camp, being on time, and being a good companion to the rest of the team.

Journal: At the end of the quarter you must turn in a journal of your field observations. It must be 10 pages handwritten on paper no smaller than 9in x 6in. If your handwriting is near illegible you must also hand in a typed version of your journal. These are journal entries and not repetition of what the instructors say in the field and should include *your own* observations, speculations, and questions about what you see. This includes critical thinking and finding outside sources (books, articles, etc.) to answer questions about things you observed.

Pop-Science Article: You will choose one of the observations you make during the course of journaling your field experience to describe to a popular audience. You will present how scientists do their work and how what they do relates to studying climate change. The article will be presented in 3-4 pages and will include an incorporation of your observation into the presentation (either as an introduction or as a further observation to back up your claim). You will be turning in the topics for your paper by the end of the field portion of the course.

In the last 2 days of class you will be required to give a BRIEF & CREATIVE presentation on what you're writing on.

Reading Questions: In the first week you will turn in answers to questions on the readings. Each question should be answered in about a paragraph. These will be graded on completion and are designed to make sure you are keeping up with the readings. In addition, at least once during the quarter you must participate in the pre-discussion questions on the course website.

Grading:

Participation	25%
Journal	25%
Pop-Science Article	35%
Reading Questions	15%

100%

Grades will be based on a straight 10 point scale (90-100% = A, 80-89.9% = B, etc.). The course is not curved; all students have the ability to get an A.

Reading List
Week 1
Monday

IPCC, 2014, Climate Change 2014 Synthesis Report Summary Chapter for Policy Makers, pp. 1-16.

Burke, K.D. et al., 2018, Pliocene and Eocene provide best analogs for near-future climates, *Proceedings of the National Academy of Sciences* 115:13288-13293.

Tuesday

Williams, F. et al., 2014 *Roadside Geology of Utah* pp. 46-56

Townsend, K.E. et al., 2006, Stratigraphic Distribution of Upper Middle Eocene Fossil Vertebrate Localities in the Eastern Uinta Basin, Utah, With Comments on Uintan Biostratigraphy, *Mountain Geologist* 43:115-134.

Wednesday

Stucky, R.K., Paleontology: The Window to Science Education. https://ucmp.berkeley.edu/fosrec/Stucky.html

Conroy, G.C., 2006, Creating, Displaying, and Querying Interactive Paleoanthropological Maps Using GIS: An Example from the Uinta Basin, Utah, *Evolutionary Anthropology* 15: 217-223.

Thursday

Weart, S., 2011, Global Warming: How skepticism became denial, *Bulletin of the Atomic Scientists* 67:41-50.

Zachos, J.C. et al., 2008, An early Cenozoic perspective on greenhouse warming and carbon-cycle dynamics, *Nature* 451:279-283.

Friday

Townsend et al., 2019, After the Bridgerian Crash: An Integrate Analysis of Mammalian Paleocommunities and Paleoecologies During the Middle Eocene, NSF Grant Proposal

Rasmussen, D.T. et al., 1999, Mammals of the Middle Eocene Uinta Formation, *in* Vertebrate Paleontology in Utah, pp. 401-420.

Field Readings

Murphey et al., 2017, Paleontology and Stratigraphy of Middle Eocene Rock Units in The Southern Green River and Uinta Basins, Wyoming and Utah, *Geology of the Intermountain West* 3:1-53.

UCLA Course Inventory Management System

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Course Revision Proposal

Ecology and Evolutionary Biology 21 Paleoenvironments: Learning About Climate from the Past

Requested revisions that apply:

☐ Renumbering ☑ Title ☑ Format ☑ Requisites ☑ Units ☐ Grading ☑ Description

Multiple Listing: ☐ Add New ☐ Change Number ☐ Delete

Concurrent Listing: ☐ Add New ☐ Change Number ☐ Delete

	CURRENT	PROPOSED
Course Number	**Ecology and Evolutionary Biology 21**	**Ecology and Evolutionary Biology 21**
Title	**Field Biology**	**Paleoenvironments: Learning About Climate from the Past**
Short Title	**FIELD BIOLOGY**	**PALEOENVIRONMENTS**
Units	Fixed: **4**	Fixed: **5**
Grading Basis	**Letter grade or Passed/Not Passed**	**Letter grade or Passed/Not Passed**
Instructional Format	Primary Format **Lecture** Secondary Format **Laboratory**	Primary Format **Lecture - 15 hours per week** Secondary Format **Field Work - 15 hours per week**
TIE Code	**LECS - Lecture (Plus Supplementary Activity) [T]**	**FWS - Fieldwork (Skills/Techniques) [T]**
GE	**No**	**Yes**
Requisites	**None**	**None.**
Description	Lecture, three hours; discussion, two hours, or field trips, three to four hours. Recommended preparation: Life Sciences 15. Not open for credit to students with credit for course 122 or Life Sciences 1. Introduction to natural history of Western North America, especially Southern California. Classification, distribution, and ecology of common plants and animals. P/NP or letter grading.	**Introduction to natural and evolutionary history of Western North America. Classification, distribution, and ecology of common plants and animals, and deep time history of the region, with applications to modern climate change.**
Justification		**This course is a revision of a course that has not been offered for some time in EEB. Because we would like to have the new version of the course be a GE with a lab, we are hoping to re-unit the course to 5 units to satisfy the unit requirements for FSI GE Lab courses. We are also broadening the focus to include all of the Western US, as well as deep time and climate change topics.**
Syllabus		File *EEB 21 Syllbaus_REVISION.doc* was previously uploaded. You may view the file by clicking on the file name.
Supplemental Information		**This course will introduce students to the**

basics of climate science, especially how studying climates in the past can inform our inferences about the climate of the future. We will do this primarily by investigating a well-studied field area in northeast Utah, the Uinta Basin. The course will be divided into 3 parts:
? The first part of the course will be in the classroom and provide students basic scientific knowledge about climate, geology, and paleontology. We will also explore how climate science gets portrayed in politics and culture.
? The second part of the course will be field-based. Students will get experience in field techniques in paleontology and geology in the Uinta Basin, and throughout the extensive geological background of Utah. They will learn how we collect data about climates in the past and find some aspect of the research that they can study further.
? The final part of the course will have classroom time to go over any topics that may have come up out in the field and will have presentations by students about some aspect of the research that they will investigate on their own.

Effective Date	**Fall 2004**	**Summer 1 2021**
Department	**Ecology and Evolutionary Biology**	**Ecology and Evolutionary Biology**
Contact		Name **EILEEN MANSOORIAN**
Routing Help		E-mail **emansoorian@lifesci.ucla.edu**

ROUTING STATUS

Role: FEC Chair or Designee - Lewis, Jeffrey B. (jblewis@polisci.ucla.edu) - 65295
Status: Pending Action

Role: L&S FEC Coordinator - Corrado, Leah Marcos (lcorrado@college.ucla.edu) - 310/825-1021
Status: Returned for Additional Info on 12/9/2020 4:41:30 PM
Changes: TIE Code
Comments: For FEC approval.

Role: Department Chair or Designee - Mansoorian, Eileen Rose (emansoorian@lifesci.ucla.edu) - 310/825-0914
Status: Approved on 12/9/2020 11:32:27 AM
Changes: TIE Code, Supplemental Info
Comments: Approved on behalf of Karen Sears, chair of EEB.

Role: Initiator/Submitter - Mansoorian, Eileen Rose (emansoorian@lifesci.ucla.edu) - 310/825-0914
Status: Submitted on 12/9/2020 11:22:48 AM
Comments: Initiated a Course Revision Proposal

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