

## *Supplementary Material*

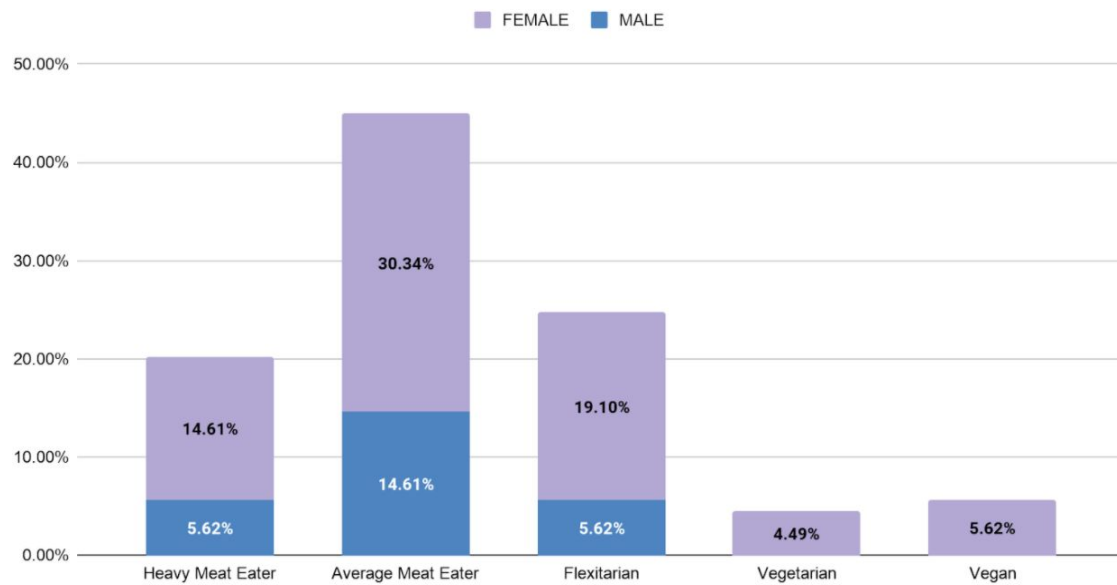
# **Impact of a college course on the sustainability of student diets in terms of the planetary boundaries for climate change and land, water, nitrogen and phosphorus use**

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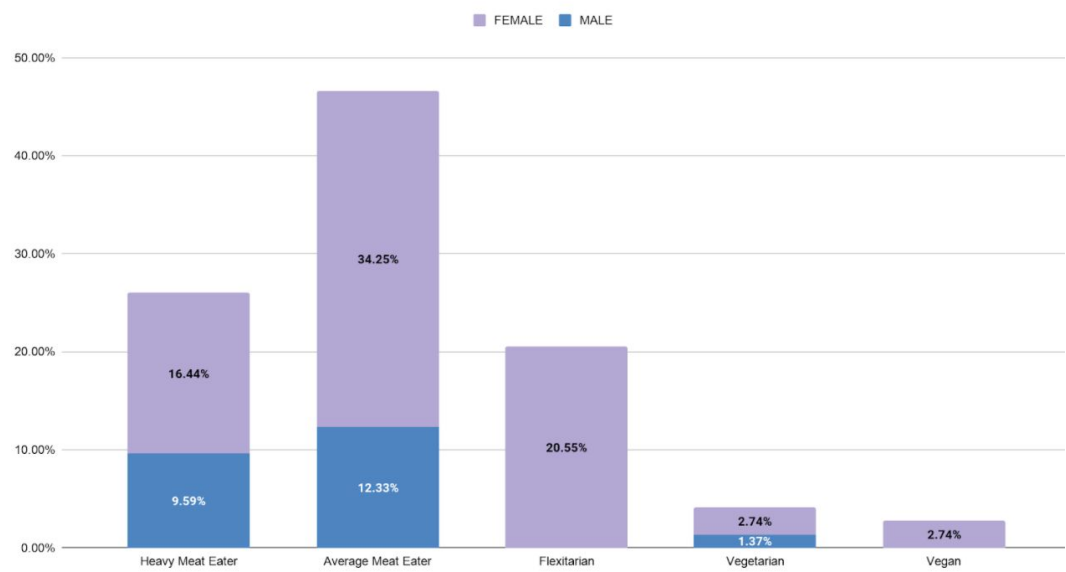
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Table S1. Conversion factors for calculating environmental footprints of foods.

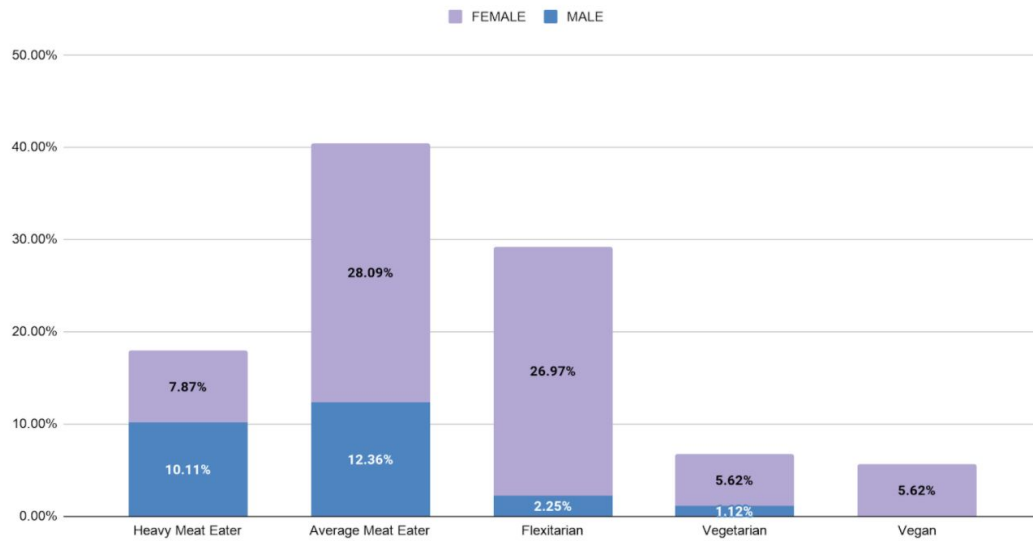
	Greenhouse gases		Land use		Blue water		Nitrogen		Phosphorus	
	g CO <sub>2</sub> -eq/g	Ref.	m <sup>2</sup> /g	Ref.	L/g	Ref.	mg/g	Ref.	mg/g	Ref.
Temperate fruits	0.34	H&K	6.70E-04	CFPC--NA	0.33	Spr	12.7	Spr	1.91	Spr
Tropical fruits	0.86	H&K	1.05E-03	CFPC--NA	0.32	Spr	10.2	Spr	1.58	Spr
Vegetables	0.816	H&K	8.10E-04	CFPC--NA	0.43	Spr	9.55	Spr	1.67	Spr
Legumes	0.73	H&K, Clune	4.04E-03	CFPC--NA	0.95	Spr	0	Spr	0	Spr
Corn	0.66	H&K	1.74E-03	CFPC--NA	0.15	Spr	22.7	Spr	3.57	Spr
Wheat	0.53	H&K	4.89E-03	CFPC--NA	0.49	Spr	13.9	Spr	4.39	Spr
Rice	1.14	H&K	2.17E-03	CFPC--NA	1.07	Spr	9.4	Spr	5.2	Spr
Potatoes	0.21	H&K	5.20E-04	CFPC--NA	0.04	Spr	3.63	Spr	0.71	Spr
Oil	1.63	H&K	1.31E-02	CFPC--NA	0.31	Spr	31.3	Spr	5.61	Spr
Other grains	0.48	H&K	4.54E-03	CFPC--NA	0.17	Spr	16.3	Spr	2.71	Spr
Eggs	3.54	H&K	6.84E-03	CFPC--NA	0.44	Spr	51.22	Spr	8.81	Spr
Butter	11.92	H&K	1.40E-02	CFPC--NA	0.465	Hoek	82.5	M&C	70	M&C
Milk	1.34	H&K	2.05E-03	CFPC--NA	0.08	Spr	20.4	Leach	1.58	Spr
Low fat dairy yogurt	2.02	H&K	2.26E-03	CFPC--NA	0.0156	M&C	9.7	M&C	8.2	M&C
Cheese	9.78	H&K	1.05E-02	CFPC--NA	0.0443	M&C	127.1	Leach	33.5	M&C
Soy milk	0.7	M&C	7.80E-04	CFPC--NA	0.0064	M&C	0.2	M&C	1.3	M&C
Almond milk	0.7	M&C	5.00E-04	CFPC--NA	0.0064	M&C	0.2	M&C	1.3	M&C
Other vegan milk	0.7	M&C	5.20E-04	CFPC--NA	0.0064	M&C	0.2	M&C	1.3	M&C
Ice cream	3.1	H&K	3.69E-03	CFPC--NA	0.0443	M&C	39.4	M&C	33.5	M&C
Frozen yogurt	3.1	H&K	2.26E-03	CFPC--NA	0.0156	M&C	9.7	M&C	8.2	M&C
Fish from aquaculture	3.83	H&K	4.94E-03	CFPC--NA	0.0147	M&C	80.1	Leach	4.4	M&C
Fish from trawling	3.83	H&K	0.00E+00	CFPC--NA	0.0147	M&C	80.1	Leach	4.4	M&C
Ruminant meat	40.2	Har	1.35E-01	CFPC--NA	0.55	Hoek	234	Leach	97.9	M&C
Pork and backon	6.87	Leach	2.10E-02	CFPC--NA	0.25	Spr	126	Leach	22.2	M&C
Poultry	5.05	Leach	1.15E-02	CFPC--NA	0.4	Spr	89.8	Leach	16	M&C
Soy-based meat alternatives	1.5	Nij	4.14E-03	CFPC--NA	0.0088	M&C	2.75	Spr	3.7	M&C
Sugar	0.96	M&C, Spr	2.39E-03	CFPC--NA	0.11	Spr	1.5	M&C	3.6	M&C
Peanuts	1.94	H&K	7.28E-03	CFPC--NA	0.0088	M&C	0	spr	8	M&C
Almonds	1.17	H&K	6.92E-03	CFPC--NA	0.143	M&C	14.2	Spr	12.6	M&C
Walnuts	1.17	H&K	6.92E-03	CFPC--NA	0.143	M&C	14.2	Spr	12.6	M&C
Seeds	0.8	M&C	6.92E-03	CFPC--NA	0.143	M&C	14.2	Spr	12.6	M&C
Quinoa	0.8	M&C	6.92E-03	CFPC--NA	0.143	M&C	14.2	Spr	12.6	M&C
Soda	0.96	M&C, Spr	-	-	-	-	-	-	-	-
Tea, caffeinated	23	HBAB	0		0		0		0	
Tea, herbal	23	HBAB	0		0		0		0	
Coffe, regular	23	HBAB	0		0		0		0	
Coffee, decaf	23	HBAB	0		0		0		0	



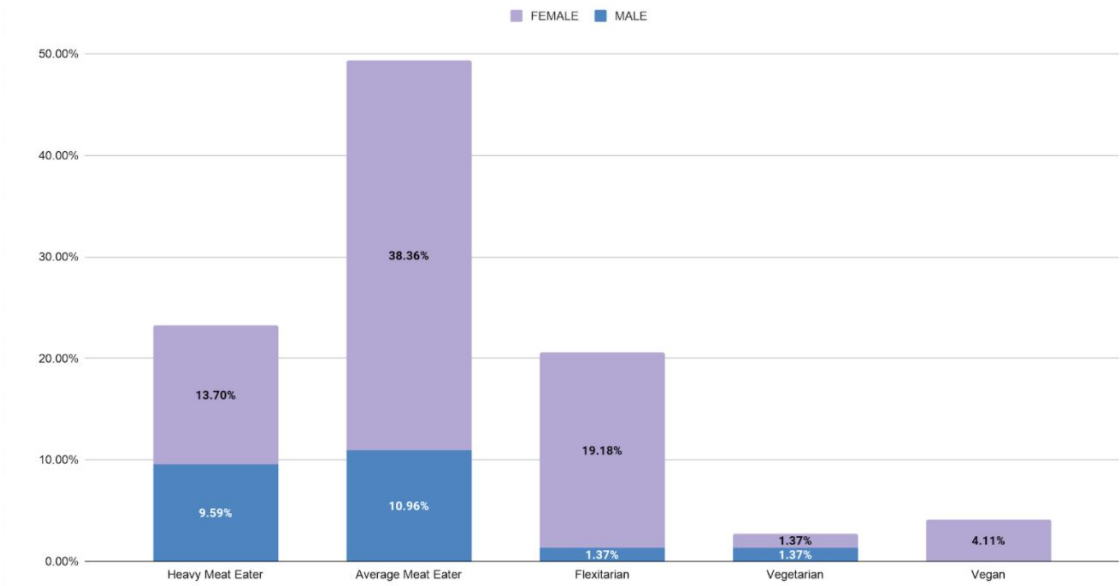
**Supplementary Figure S-1.** The dietary categories of students in the Food Cluster, separated by gender, at the beginning of Fall Quarter



**Supplementary Figure S-2.** The dietary categories of students in the Cosmos Cluster, separated by gender, at the beginning of Fall Quarter



**Supplementary Figure S-3.** The dietary categories of students in the Food Cluster, separated by gender, at the end of Winter Quarter



**Supplementary Figure S-4.** The dietary categories of students in the Cosmos Cluster, separated by gender, at the end of Winter Quarter

## Food questionnaire

3. Over the course of a typical week, approximately how many servings of each food (fruit, vegetables, and legumes) would you say you consume?

Servings per week

Temperate fruits (apple, blueberry, grapes, peaches, raspberry, strawberry)  
(serving = 1 cup chopped)

Tropical fruits (avocado, lemon, kiwi, mango, orange, passionfruit)  
(serving = 1 cup chopped)

Vegetables (asparagus, leak, mushroom, onion, romaine lettuce, tomato, etc.) (serving = 1 cup chopped)

Legumes (beans, hummus, lentils, soybeans) (serving = 1/2 cup, cooked)

4. Over the course of a typical week, approximately how many servings of each food (grains and starches) would you say you consume?

Servings per week

Corn, maize (except  
corn chips) (serving = 1  
cup sweet corn, 3 small  
tortillas, 1.5 6" ears of  
corn, 4 cups air popped  
popcorn)

Corn chips (serving = 9  
chips)

Wheat (serving = 1 slice  
wheat bread, 2/3 cup  
spoon size Shredded  
Wheat, 1/2 bagel)

Rice (serving = 1 cup  
cooked)

Potatoes (except French  
Fries and potato chips)  
(serving = 1 medium  
potato)

French Fries (serving =  
1/3 tray In N Out) or  
Potato Chips (1 oz bag  
or 10 chips)

Other grains (2/3 cup  
cooked oatmeal)



5. Over the course of a typical week, approximately how many servings of each food (eggs, dairy and dairy alternative to dairy) would you say you consume?

Servings per week

Eggs  
(serving = 1 egg)

Butter  
(serving = 1 Tablespoon)

Low fat dairy milk  
(serving = 1 cup milk)

Low fat dairy yogurt,  
plain (1 6 oz. container  
yogurt)

Low fat dairy yogurt, fruit  
(1 6 oz. container  
yogurt)

Cheese (serving = 1 oz,  
slide of cheese, 1/4 cup  
shredded cheese)

Soy milk (serving = 1  
cup)

Almond milk (serving = 1  
cup)

Other vegan milk  
(serving = 1 cup)

Ice cream (serving = 1/2  
cup)

6. Over the course of a typical week, approximately how many servings of each food (meat, fish, and soy-based meat alternatives) would you say you consume?

Servings per week

Fish from aquaculture  
(catfish, salmon, sea-  
bass, shrimp, tilapia,  
trout)  
(serving = 3 oz piece,  
about the size of a deck  
of cards)

Fish from trawling  
fishery (anglerfish, cod,  
crab, flat fish, herring,  
mackerel, Pollock,  
shrimp, snapper, squid)  
(serving = 3 oz piece,  
about the size of a deck  
of cards)

Ruminant meats (beef,  
veal, goat, mutton,  
lamb)  
(serving = 3 oz piece,  
about the size of a deck  
of cards)

Pork or bacon  
(serving = 3 oz piece,  
about the size of a deck  
of cards)

Poultry (chicken, turkey)  
(serving = 3 oz piece,  
about the size of a deck  
of cards)

Soy-based alternatives  
to meat  
(serving = 3 oz piece,  
about the size of a deck  
of cards)

7. Over the course of a typical week, approximately how many servings of each food (sugars and oils) would you say you consume?

Servings per week

Sugar (not counting  
sugar in soda) (serving =  
1 Tablespoon)

Oil (serving = 1  
Tablespoon)

8. Over the course of a typical week, approximately how many servings of nuts and seeds would you say you consume?

Serving size

Peanuts  
(serving = 1/4 cup nuts  
or 2 T peanut butter)

Almonds  
(serving = 1/4 cup nuts  
or 2 T nut butter)

Walnuts  
(serving = 1/4 cup nuts)

Seeds (chia, flax,  
sesame)  
(serving = 1 Tablespoon)

9. Over the course of a typical week, approximately how many servings of each beverage would you say you consume?

Servings per week

Tea  
(serving = 1 cup)

Coffee  
(serving = 1 cup)

Soda  
(serving = 1 12 oz. can)

Bottled water (domestic)  
(serving = 500 mL  
bottle)

Bottled water (imported)  
(serving = 500 mL  
bottle)

***Impacts of college and university educational interventions on sustainability of diets***

A literature review was conducted in December of 2020 using Web of Science with the following four topic keyword criteria, searching over all years: 1) carbon footprint OR climate change OR environmental footprint OR environmental sustainability; AND 2) food choices OR diet OR dietary OR eating behavior; AND 3) university OR college OR university students; AND 4) education OR course OR seminar OR intervention. The initial search yielded 42 results. After excluding papers that did not provide original data on interventions for college students involving both information on environment and sustainability and food behaviors (both food choices and food waste behavior were included), twelve papers remained. The findings are summarized in Table S-2.

**Table S-2.** Summary of systemic literature review results for studies of the effectiveness of college interventions on green eating behaviors.

Intervention		Findings
(Malan et al., 2020)	1-unit college seminar on three campuses; food questionnaires at baseline and follow up for intervention and control groups; n=176	Students in intervention group decreased carbon footprint from baseline to follow up, while the control groups did not.
(Jalil et al., 2020)	50 minute lecture on food and climate change; assessed meal purchases; n=49,301	After intervention, the probability of purchasing a meat-based meal decreased by 4.6% and the probability of purchasing a plant-based meal increased by 4.2%.

(Mehta et al., 2020)	2-week online course for staff and students on the food system through the lenses of environmental sustainability, equity and health; food questionnaires at baseline and follow up for intervention and control; n=47	Food system knowledge increased significantly for intervention group compared to control. Attitudes toward food purchasing improved significantly from baseline to follow up but changes were not significant when compared to the control.
(Cordero et al., 2020)	Intensive one-year university course; surveyed students at least five years after taking the course; n=104 responded to survey, out of more than 500 taking course	80% report choosing lower carbon footprint foods as a result of the course, while 48% report decreasing food waste due to the course.
(Jay et al., 2019)	Intensive two-quarter university environmental science course; n=163	Female students, and students overall, report more sustainable food choices after the course, and compared to the control group.
(Slapo & Karevold, 2019)	Tested impact of various eco-labels combined with posters on meat sales in university dining hall	Traffic light labels reduced meat sales by 9% in period 1 but not in subsequent period 2. Other label types were not effective.
(Pinto, et al., 2018)	Tested impact of a simple awareness campaign using informative posters on food waste in university dining hall	Increased awareness of food waste led to a 15% reduction in food waste
(Collins, et al., 2018)	Study of the contribution of ecological footprint calculators in teaching;	Students employed ecological footprint calculators and then had discussions on what aspects they would be willing to change. At the end of the course, nearly all recognized the importance of food choices, and about half reported being ready to change. Behavior not studied.

(De Groeve & Bleys, 2017)	Less Meat Initiatives (LMIs) were studied on a university campus	Simply providing information didn't significantly impact the support of the LMIs. Female students and those with less meat in their diets to start had higher levels of support for LMIs.
(Godfrey & Feng, 2017)	Students exposed to a three-week communications campaign on the footprint of foods.	Consumption patterns were unchanged. Student attitudes were water less positive toward the foods with lower water footprints. Water footprints appeared to be separate from the students' notion of sustainability.
(Txurruka et al., 2016)	Students participated in four activities pertaining to food systems and the environment. Qualitative results only. No food behaviors observed.	In general, students showed great interest in sustainable food and diet. Activity had a positive impact on social responsibility skills.
(Whitehair, 2013)	Tested impact of messages to change food waste behaviors; n=540 students	Observed a 15% reduction in food waste. More personalized, feedbackbased messages did not result in additional change.

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# GE Cluster/Environnement M1-A/B/CW

## “Food: A Lens for Environment and Sustainability”

Sponsored by the [UCLA Institute of the Environment and Sustainability](#)

**Fall 2016**

**Lecture Schedule:** Monday, Wednesday, Friday 11:00 a.m. to 11:50 a.m. – Dodd 121

**Synopsis:** This three-course cluster will address one of the most pressing issues of our time -- the relationships between the world's rapidly growing human population and the global environment that makes human existence possible --through the lens of food. The connections between food and the environment are complex, encompassing scientific and social factors. We will discuss pressing issues including biodiversity loss, nutrient cycling, land conversion, climate change, sustainable energy, chemical pollution, antibiotic resistance, fresh water quality and quantity, equitable access to healthy food, and dietary trends. We will investigate how our food systems impact all of these topics and the many exciting solutions that are under development. Each lecturer will present the concepts, perspectives, skills, and tools that his or her academic discipline can contribute to the formidable task of restoring worldwide environmental health. The courses are designed for students from all backgrounds and should appeal to those who wish to learn more about current environmental issues widely discussed in the public and scientific media.

**Cluster Format:** Environment M1 is presented as a three-course sequence in the fall, winter, and spring quarters with each course carrying 6 units of general education credit. Enrolling for the fall quarter guarantees enrollment for winter and spring quarters. Courses will be offered at the same time in the fall and winter quarters to simplify course planning. The fall and winter courses (Environment M1A and M1B, respectively) will consist of lectures and discussions. The spring quarter course (Environment M1C) will consist of small seminar sections of up to 20 students each, in which students will explore specialized environmental topics (see tentative list in this handout).

**Course Structure:** The format of the course consists of lectures, discussion sections, laboratories, and field trips. A schedule of lecture and discussion topics is attached. Discussion sections will be interactive, with student participation required. In the laboratory sections, students will perform exercises related to the course material.

- ❖ Four blocks of “basic” material each presented by a faculty member, taught with a focus on food (2/3 of lecture time)
  - Relationships between agriculture, ecology, and biodiversity
  - Food production, water quantity, and water quality
  - Air quality, climate change, energy elements of food production

- People, food, and the environment. Involves collaborative media project on food life cycle analysis.
- ❖ “Case Studies” of focused material presented by all faculty and guest lecturers (1/3 of lecture time)
  - Food from the sea
  - Agriculture and the California water supply
  - Food miles and impacts on greenhouse gas emissions
  - Antibiotics use in livestock and the growing resistance to these drugs
  - Feedlots versus pasture: comparison with respect to climate change
  - Aesthetics of the grocery store



#### Discussion Sections (20 students in each section)

- ❖ Two hours per week, entirely conducted by Teaching Fellows. Will include follow up discussions and exam reviews.
- ❖ “Labs” will help students quantitatively understand:
  - Carbon and water footprints of various foods and food systems
  - Nutrient demands of our food production
  - Food miles and related energy costs
  - How to achieve sustainable food production for a growing population

**General Education, Honors, and Writing Credit:** This cluster will satisfy four course requirements in the following General Education areas:

- ❖ 1 Foundations of Scientific Inquiry in Life Science with lab/demonstration credit
- ❖ 1 Foundations of Scientific Inquiry in Physical Science with lab/demonstration credit
- ❖ 1 Foundations of Society and Culture in Social Analysis
- ❖ 1 of the following (student will choose based on need for GE credit): Foundations of Scientific Inquiry in Life Science (without lab), Foundations of Scientific Inquiry in Physical Science (without lab), Society and Culture in Social Analysis, Society and Culture in Historical Analysis

Students receive College Honors Credit for all three quarters of the cluster course. Assistance with GE or Honors Credit or course enrollment can be obtained from your academic counselor (College Counseling Service, AAP, or Honors). Upon completion of the entire yearlong cluster, those students who have satisfied the College's Writing I requirement **by the end of Spring Quarter** (*must be satisfied by other courses*) will receive credit for the College of Letters and Sciences Writing II requirement. Students intending to enroll in English Composition 3 in the Winter or Spring should review the special procedure posted on the class web site for requesting a reserved space in English Composition 3.

**Course Facebook page:**





<https://www.facebook.com/groups/ENVM1/>

**Textbooks and Supplementary Reading Materials:** Readings will be assigned on a regular basis from the required textbook listed below and from class handouts (see lecture schedule). The following textbook is required (for both the Fall and Winter quarters) and is available for purchase at the campus bookstore:

*Environment: the Science Behind the Stories*, 5<sup>th</sup> ed., Withgott, J, and Laposata S., Pearson, 2015. The text is available in hardbound, loose leaf, or online (see [www.coursesmart.com](http://www.coursesmart.com)) formats. It is on reserve at Powell Library.

**Course Web Site:** Course materials, including the syllabus and all announcements, are available at the course web site at <https://ccle.ucla.edu/course/view/16F-ENVIRONM1A-1>

**Course Administrative Office:** The course administrator is Natalie Garrett (300 La Kretz Hall, (310) 825-9901, [ngarrett@ioes.ucla.edu](mailto:ngarrett@ioes.ucla.edu)).

**Course Reference Librarian:** The course reference librarian is Julia Glassman, 220 Powell Library Bldg., 310-206-4410, [jglassman@library.ucla.edu](mailto:jglassman@library.ucla.edu).

**Course Inquiry Specialist:** The course Inq Spec is Nathan Glovinsky, [nathanglovinsky@gmail.com](mailto:nathanglovinsky@gmail.com). You will meet Nathan during lecture and sections. Please contact him for help with research and writing assignments.

**Written Assignments:** Three papers, one library notebook activity, and four lab exercises will be required this quarter. The labs will be coordinated with activities in the discussion sections, which in turn will be closely related to the lecture material. Details concerning the requirements for the papers will be given by the TAs in the discussion sections. All assignments will be handed in at the beginning of your assigned discussion section during the weeks listed below:

		<i>Week Assigned</i>	<i>Week Due</i>
Writing Assignment #0	Library Notebook Activity	1	2
Writing Assignment #1	Writing a Summary	1	3
Lab #1	Ecological Footprint	2	3
Lab #2	Nat Geo What Worlds Eats	3	4
Writing Assignment #2	Annotated Bibliography	3	5
Writing Assignment #3	Civic Engagement Project	4	9
Lab #3	CA Water Balance	8	9
Lab #4	Global health and env. data	10	10

**Note:** There may also be short written assignments due as follow up from lecture.

**Examinations:**

*Midterm* -- Thursday, November 3, 6:30-8:00 pm, DeNeve Auditorium

*Final* – Friday, December 9, 11:30-2:30 pm, DeNeve Auditorium

Both the midterm and final examinations for this course will be closed book and will consist of mixtures of short answer (a sentence or two), short essay (half page), and longer essay (full page) questions. The examinations will be designed to test knowledge of definitions important to an understanding of the environment, concepts about how environmental systems function, and issues related to the interactions of humans with the environment. Questions on these topics will be drawn from the material presented in lecture, discussion sections, and from the assigned readings. Quantitative and factual material is required in supporting written arguments, particularly in response to essay questions.

**Participation:** Attending lectures and actively participating in discussion sections are both important aspects of the course, and both will be graded. Twenty of the course's thirty participation points are associated with discussion sections (plus one point awarded for completing evaluations for section). Five further participation points are awarded for attending and providing reflections on a required field trip. Five points are associated with lecture activities (one point for completing evaluations for lecture & four points for being present during four unannounced presentations during regular lecture time for which attendance will be taken in a form of a brief questionnaire handed out in class).

**Grading:** The course grade is determined by performance on examinations, written papers, and participation in lectures and discussion sections. The total number of points possible for the course is 300. Half of the grade is related to formal examinations and half to writing and class participation. The total points are distributed as follows:

	<u>Points</u>	<u>Percent</u>
Midterm	60	20%
Final	90	30%
Writing Assignments	75	25%
Lab Write ups	45	15%
<u>Participation</u>	<u>30</u>	<u>10%</u>
<b>Total</b>	<b>300</b>	<b>100%</b>

**Field Trips:** All students must participate in at least one of the following five field trips. Final information on field trip options and schedules will be distributed during the first week of classes. The field trips for the Fall are:

- ❖ Aquarium of the Pacific, Friday October 7, leaving at noon right after class
- ❖ Westside Food Bank for food sorting, Saturday October 29 at 11am
- ❖ Biogeography tour of campus, Saturday, October 8, at 9am meet at the flagpole by the quad (Dickson Court)
- ❖ Tillman Water Reclamation Plant, Friday October 14 leaving at noon right after class
- ❖ Pilot Urban Agriculture Project, October 15 meet at the Dig Garden (Sunset Rec) at 10am (time to be confirmed)

**Preliminary Seminar Topics for Environment M1C Spring Quarter 2016:**

- ❖ These are examples of potential seminar topics (Spring 2016 is in the planning stage)
  - Salton Sea & Agriculture in the Imperial Valley
  - Global Climate Change, Food, Health & Sustainability
  - Will the New Green Revolution Solve Hunger in Africa?
  - Making Films about Food
  - Food Conflict & Aid
  - Food & Social Justice

**Population, Food, Global Climate Change and Sustainability**

*At the end of 2011 the world's human population reached 7 billion. Approximately 1 billion people are starving and approximately 1.5 billion are overweight. At least two billion more people are on the way in the near future. Feeding the global population in a healthy and sustainable way in the face of climate change is an enormous challenge of the utmost importance.*

*Global climate change is the most sweeping environmental challenge that human kind has yet faced. The primary source of climate change, fossil fuel combustion, underlies much of the structure of our civilization. The impacts of climate change reach into every corner of our lives, impacting human health, food supplies, water supplies, and weather in all forms, from temperatures to severe storms. The impacts of climate change exacerbate the environmental challenges from other unsustainable human practices. Solutions to this complex and interwoven problem are also sweeping and depend on changes made by millions of people, from regular citizens to top regulators. Real, lasting, sustainable solutions must be ecologically sound, economically viable and socially just and equitable.*

*The fundamentals of these themes will be introduced in the beginning of the first quarter, and they will appear repeatedly throughout the entire course in the context of ecological, hydrologic, atmospheric and cultural issues. Students should strive to integrate the many aspects of human population growth, climate change and sustainability in their own minds throughout the course.*

Fall Quarter 2016, First Quadrant, Dr Cully Nordby, Ecology:					
Week	Date		Lec.	Lecture and Reading	Discussions
0	Fri.	Sept. 23	1	<b>Introduction:</b> Course themes and organization <u>Reading:</u> none	No discussion
1	Mon.	Sept. 26	2	<b>Introduction to Climate Change:</b> Dr Raffaella D'Auria Introduction to the mechanisms that drive Earth's climate and a brief exploration of historical and current climate change trends. <u>Reading:</u> Withgott & Laposata, Chap. 18 pp. (482-506)	Introduction: writing assignments & Library Notebook Activity; Part 1 of Food, Inc.
	Wed.	Sept. 28	3	<b>Environmental Science and Sustainability:</b> Science as a way of knowing, and environmental science as a way of understanding the interdependence between humans and nature. Sustainability as an emerging global view. <u>Reading:</u> Withgott & LaPosata, Chap. 1 (also recommended: Gopnik, A., "Moon Man: What Galileo saw" posted on class website)	
	Fri.	Sept. 30	4	<b>Population and Resource Use:</b> Mechanisms and patterns of population growth and how human population and resource use interact to create serious global challenges. <u>Reading:</u> Withgott & Laposata, Chap. 3 (pp 61-69) and Chap. 8	
2	Mon.	Oct. 3	5	<b>Biodiversity:</b> The origin, geographic distribution, and interactions of Earth's species. <u>Reading:</u> Withgott & Laposata, Chap. 3 and Chap. 4 (pp 75-80)	Lab 1: Ecological Footprint Exercise NOTE: alternate location (check w/ TA) Library Resources Introduction ( <u>Writing Ass. 0: Library Notebook Activity Due</u> )
	Wed.	Oct. 5	6	<b>The Biosphere:</b> How organisms, populations, ecological communities, and ecosystems function and interact in the living world. <u>Reading:</u> Withgott & Laposata, Chap. 4	
	Fri.	Oct. 7	7	<b>Soils and Nutrient Cycling:</b> Professor Greg Okin of the UCLA Dept. of Geography will discuss issues related to soils and nutrient cycling. <u>Reading:</u> Withgott & Laposata, Chap. 9	
3	Mon.	Oct. 10	8	<b>Energy Flow in Ecological Communities:</b> Conversion by plants of solar energy into chemical energy and its subsequent passage through all organisms in community food webs <u>Reading:</u> Withgott & Laposata, review Chap. 4 (pp 80-84)	Lab 2: What the World Eats NOTE: alternate location (check w/ TA) ( <u>Writing Ass. 1: Summary Due</u> ) ( <u>Lab 1: Ecological Footprint Due</u> )
	Wed.	Oct. 12	9	<b>Food From Land:</b> The methods, limits and ecological impacts of human food production on land. <u>Reading:</u> Withgott & Laposata, Chap. 10 and Chap. 16 (also recommended: Merrigan et al. "Designing a sustainable diet" posted on the class website)	
	Fri.	Oct. 14	10	<b>Food From the Sea:</b> The methods, limits and ecological impacts of human food production in the sea. <u>Reading:</u> Withgott & Laposata, Chap. 10 and Chap. 16	

4	Mon.	Oct. 17	11	<b>GMOs:</b> Prof. Peter Kareiva of the UCLA Institute of the Environment and Sustainability will discuss the science and controversy of genetically modified organisms. <b>Reading:</b> “Genetically Engineered Crops: Experiences and Prospects” article posted on the class website	Part 2 of Food, Inc.  Reading: Pollan, M. “Farmer in Chief” (posted on the class website)  (Lab 2: <u>What the World Eats Due</u> )
	Wed.	Oct. 19	12	<b>Food Systems and Public Health:</b> Tyler Watson of the UCLA Dept. of Environmental Health Sciences will discuss issues of urban agriculture, nutrition, environmental health. <b>Reading:</b> TBD	
	Fri.	Oct. 21	13	<b>United Nations Report on Livestock’s Environmental Footprint on Biodiversity:</b> Prof. Janny Jay <b>Reading:</b> U.N. Livestock’s Long Shadow Ch 5	
5	Mon.	Oct. 24	14	<b>Endangered Species:</b> Whether, why, and how to protect them. <b>Reading:</b> Withgott & Laposata Chap. 11	Discussion of readings, literature work, and developing ideas for civic engagement project.  (Writing Ass. 2: <u>Annotated Bibliography Due</u> )
	Wed.	Oct. 26	15	<b>Ecological Impacts of Climate Change:</b> The current and predicted impacts of global climate change on ecosystems, species and human society. <b>Reading:</b> Executive summary from Climate Change Futures: Health, Ecological and Economic Dimensions. 2005. The Center for Health and the Global Environment, Harvard Medical School; Withgott & Laposata, review Chap. 18 (pp 492-504)	
	Fri.	Oct. 28	16	<b>UCLA Sustainability:</b> Nurit Katz, UCLA Chief Sustainability Officer, will discuss what UCLA is doing to become more sustainable and how you can get involved. <b>Reading:</b> Withgott & Laposata, Chap. 24; UCLA: a Living Laboratory for Sustainability (posted); review/peruse <a href="http://www.sustain.ucla.edu">www.sustain.ucla.edu</a>	

Fall Quarter 2016, Second Quadrant, Prof. Jenny Jay, Water:					
Week	Date		Lec.	Lecture and Reading	Discussions
6	Mon.	Oct. 31	17	<b>Freshwater as a Resource:</b> Intro to hydrologic cycle; hidden water; issues re: bottled water (quality and environmental impacts) <b>Reading:</b> Withgott & Laposata Ch 15 and supplemental; U.N. Livestock’s Long Shadow, Ch 4.pp 125-135 ***Midterm Exam Review: 6:00-8:00 pm, DeNeve Auditorium***	NO DISCUSSION SECTIONS THIS WEEK.  Exam review: Monday Oct. 31, 6:00-8:00 pm, DeNeve Auditorium
	Wed.	Nov. 2	18	<b>California Water Balance:</b> Surface and groundwater supplies; options for meeting future demand; water recycling; use of reclaimed water for agriculture—both crops and livestock, introduction to California drought and agriculture. <b>Reading:</b> Withgott & Laposata Ch 15 and supplemental	
	Thurs	Nov. 3		<b>Midterm Examination: 6:30 pm – 8:00 pm, DeNeve Auditorium</b>	

	Fri.	Nov. 4	19	<b>Water Demand for Agriculture and Scarcity:</b> Dry and wet regions of the globe; definition of water scarcity; water use globally; local and regional water balances; strategies for meeting demand for water; planetary boundary for water appropriation <b>Reading Withgott &amp; Laposata Ch 15 and supplemental</b>	
7	Mon.	Nov. 7	20	<b>Guest Speaker Gene Baur of Farm Sanctuary.</b>	Discussion of readings, literature work, discuss civic engagement project.
	Wed.	Nov. 9		<b>The ocean as a sustainable food source;</b> Acid test; impacts of aquaculture—farmed environmental impacts of fishmeal. <b>Planetary boundary for ocean acidification;</b> Impacts of agricultural runoff on receiving ocean water: <b>Reading: Ch 16 of Withgott and Laposata and supplemental</b>	
	Fri.	Nov. 11	21	<b>VETERANS DAY – No class</b>	
8	Mon.	Nov. 14	22	<b>Antibiotic resistance and pathogens in food and the environment:</b> Antibiotic residues and antibiotic resistance genes in water and food;; appropriate technology; wastewater demonstration <b>Reading: Silbergeld review article on CAFOs and human health, 2008</b>	Lab 3: Introduction to California water issues  NOTE: alternate location (check w/ TA)  Hanak et al., Managing California's Water, Chapters 4 and 10
	Wed.	Nov. 16	23	<b>Guest speaker Dr. Mark Gold on Marine Protected Areas.</b> <b>Reading: W&amp;L Ch 5 pp. 123, 126-128, UN Ch 4, 137-140, 144-149</b>	
	Fri.	Nov. 18	24	<b>Nutrient and metal pollution due to agriculture:</b> planetary boundaries for N and P; eutrophication potential of foods, organic vs conventional comparison with respect to nutrient cycling, UN Livestock impact on N cycling Heavy metals from feed in soils and water; organic agricultural contaminants in ecosystems, bioaccumulation factors/ <b>Reading: Withgott &amp; Laposata sections of Ch 14 and UN Ch 4, 140-144</b>	
9	Mon.	Nov. 21	25	<b>Foodprint calculations:</b> Land use, nutrients, water use, and energy requirements of various food products and food systems; food miles (Eshel article and other case studies); water used for feed production (quantity and quality issues with using recycled water); planetary boundary for land conversion <b>Reading: Posted literature articles, sections of U.N. Livestock's Long Shadow Ch 3</b>	NO DISCUSSION SECTIONS THIS WEEK. Please attend OH for questions.  (Lab 3: California Water Due – <b>in class</b> )  (Writing Ass. 3: Civic Engagement Project Due – <b>in class</b> )
	Wed.	Nov. 23	26	<b>Case study: Guest speaker Joel Reynolds.</b> Food, Water, and Industrial Extraction. Natural Resources Defense Council (NRDC) Western Director Joel Reynolds will talk to us about the proposed Pebble Mine.	
	Fri.	Nov. 25		<b>THANKSGIVING - No Class</b>	
10	Mon.	Nov. 28	27	<b>Effects of Climate Change on Water Resources:</b> Impacts of climate change on water resources and related impacts on society. <b>Reading: To be posted.</b>	Lab 4: Global health and env. Data

	Wed.	Nov. 30	28	<b>Guest Speaker: Noah Garrison. Sustainability of CA water.</b> <b>Relationship between water availability and global food security globally:</b> wedge approach to water sustainability; closing the gender gap in agriculture <b>Reading: TBD</b>	NOTE: alternate location (check w/ TA)  Final Exam Review: Friday December 2, 6:00-8:00 pm, DeNeve Auditorium  <u>(Lab 4: Global Health Due – on Friday)</u>
	Fri.	Dec. 2	29	<b>Relationship between water availability and global food security continued</b> <b>Reading: TBD</b> <b>*** Exam review: 6:00-8:00 pm, DeNeve Auditorium ***</b>	
11	Fri.	Dec. 9		<b>Final Examination: 11:30 am – 2:30 pm, DeNeve Auditorium</b>	

**GE Cluster/Environnement M1-A/B/CW**  
**“Food: A Lens for Environment and Sustainability”**  
Sponsored by the UCLA Institute of the Environment and Sustainability  
**Winter 2017**

**Lecture Schedule: Monday, Wednesday, Friday 11:00 a.m. to 11:50 a.m. – Dodd 121**

**Synopsis:** This three-course cluster will address one of the most pressing issues of our time -- the relationships between the world's rapidly growing human population and the global environment that makes human existence possible –through the lens of food. The connections between food and the environment are complex, encompassing scientific and social factors. We will discuss pressing issues including biodiversity loss, nutrient cycling, land conversion, climate change, sustainable energy, chemical pollution, antibiotic resistance, fresh water quality and quantity, equitable access to healthy food, and dietary trends. We will investigate how our food systems impact all of these topics and the many exciting solutions that are under development. Each lecturer will present the concepts, perspectives, skills, and tools that his or her academic discipline can contribute to the formidable task of restoring worldwide environmental health. The courses are designed for students from all backgrounds and should appeal to those who wish to learn more about current environmental issues widely discussed in the public and scientific media.

**Cluster Format:** Environment M1 is presented as a three-course sequence in the fall, winter, and spring quarters with each course carrying 6 units of general education credit. Enrolling for the fall quarter guarantees enrollment for winter and spring quarters. Courses will be offered at the same time in the fall and winter quarters to simplify course planning. The fall and winter courses (Environment M1A and M1B, respectively) will consist of lectures and discussions. The spring quarter course (Environment M1C) will consist of small seminar sections of up to 20 students each, in which students will explore specialized environmental topics (see tentative list in this handout).

**Course Structure:** The format of the course consists of lectures, discussion sections, laboratories, and field trips. A schedule of lecture and discussion topics is attached. Discussion sections will be interactive, with student participation required. In the laboratory sections, students will perform exercises related to the course material.

- ❖ Four blocks of “basic” material each presented by a faculty member, taught with a focus on food (circa 2/3 of lecture time):
  - Relationships between agriculture, ecology and biodiversity (Fall)
  - Food production, water quantity, and water quality (Fall)
  - Air quality, climate change, energy & food production (Winter)
  - People, food, and the environment. Involves media and research project on food & sustainability (Winter)
- ❖ Guest lecturers (circa 1/3 of lecture time)



- Build & expand on the material presented during regular lectures
- ❖ Discussion Sections (maximum 21 students per section)
  - Two hours per week, entirely conducted by Teaching Fellows. Will include follow up discussions and exam reviews.
  - “Labs” will help students quantitatively understand:
    - Carbon and water footprints of various foods and food systems
    - Nutrient demands of our food production
    - Food miles and related energy costs
    - How to achieve sustainable food production for a growing population

**General Education, Honors, & Writing Credit:** This cluster will satisfy four course requirements in the following General Education areas: one in Life Science with lab/demonstration credit, one in Physical Science with lab/demonstration credit), one in the Foundations of Society and Culture-Social Analysis, and one of the following (student will choose based on need for GE credit): Life Science (without lab), Physical Science (without lab), Social Analysis, Historical Analysis. Students receive College Honors Credit for all three quarters of the cluster course. Assistance with GE or Honors Credit or course enrollment can be obtained from your academic counselor (College Counseling Service, AAP, or Honors). Upon completion of the entire yearlong cluster, those students who have satisfied the College's Writing I requirement by the end of Spring Quarter will receive credit for the College of Letters and Sciences Writing II requirement. Students intending to enroll in English Composition 3 in the Winter or Spring should review the special procedure posted on the class web site for requesting a reserved space in English Composition 3.

- ❖ 1 Foundations of Scientific Inquiry in Life Science with lab/demonstration credit
- ❖ 1 Foundations of Scientific Inquiry in Physical Science with lab/demonstration credit
- ❖ 1 Foundations of Society and Culture in Social Analysis
- ❖ 1 of the following (student will choose based on need for GE credit): Foundations of Scientific Inquiry in Life Science (without lab), Foundations of Scientific Inquiry in Physical Science (without lab), Society and Culture in Social Analysis, Society and Culture in Historical Analysis

**Faculty Instructors:**

**Raffaella D’Auria**, Institute of Digital Research and Education, 3348 Math Sci. Bldg., (310) 825-8548

Office Hours: Wednesdays 1:00-2:00pm or by appointment

Mail to: [dauria@idre.ucla.edu](mailto:dauria@idre.ucla.edu)

**Jenny Jay**, Civil & Environmental Engineering, 5732H Boelter Hall, (310) 866-2444

Office Hours: Mondays 10:00 – 11:00 a.m. or by appointment

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**Cully Nordby**, Institute of the Environment and Sustainability, 2316 Life Science Bldg, (310) 267-5607

Office Hours: Mondays 3-4 or by appointment

### Population, Food, Global Climate Change and Sustainability

*At the end of 2011 the world's human population reached 7 billion. Approximately 1 billion people are starving and approximately 1.5 billion are overweight. At least two billion more people are on the way in the near future. Feeding the global population in a healthy and sustainable way in the face of climate change is an enormous challenge of the utmost importance.*

*Global climate change is the most sweeping environmental challenge that human kind has yet faced. The primary source of climate change, fossil fuel combustion, underlies much of the structure of our civilization. The impacts of climate change reach into every corner of our lives, impacting human health, food supplies, water supplies, and weather in all forms, from temperatures to severe storms. The impacts of climate change exacerbate the environmental challenges from other unsustainable human practices. Solutions to this complex and interwoven problem are also sweeping and depend on changes made by millions of people, from regular citizens to top regulators. Real, lasting, sustainable solutions must be ecologically sound, economically viable and socially just and equitable.*

*The fundamentals of these themes will be introduced in the beginning of the first quarter, and they will appear repeatedly throughout the entire course in the context of ecological, hydrologic, atmospheric and cultural issues. Students should strive to integrate the many aspects of human population growth, climate change and sustainability in their own minds throughout the course.*

Winter Quarter 2017, First Quadrant, Dr D'Auria Climate/Energy/Pollution					
Week	Date		Lec.	Lecture and Reading	Discussions
1	Mon.	Jan. 9	1	<b>Atmospheric Fundamentals:</b> How the Atmosphere works: Composition and structure of the atmosphere.  Reading: W&L 449 – 475 454 456	<b>Introduction to aesthetics of the grocery story assignment</b>
				<b>Introduce grocery store photography prompt (Andy Rice)</b>  Reading: Pollan, Michael. 2006. "A Naturalist in the Supermarket." <i>The Omnivore's Dilemma</i> . 15-19.	Introduction; recap of Fall quarter; writing assignment for the Winter quarter
	Wed.	Jan. 11	2	<b>Air Pollution:</b> atmospheric processes and removal of matter from the atmosphere; introduction to air pollution, Clean Air Act & EPA  Reading: W&L , 456 – 475	<b>Photographs and descriptions due 5:00 PM, Saturday, January 14.</b>
	Fri.	Jan. 13	3	<b>Air Pollution continued:</b> atmospheric processes and removal of matter from the atmosphere; introduction to air pollution, Clean Air Act & EPA  Reading: W&L , 456 – 475	
	Mon.	Jan. 16		<b>No Class. Martin Luther King, Jr. holiday</b>	

Winter Quarter 2017, First Quadrant, Dr D'Auria Climate/Energy/Pollution					
2	Wed.	Jan. 18	4	<b>Guest Lecture Professor Simona Bordoni (CalTech)</b> on Atmospheric circulation from winds to monsoons to El Nino.  Reading: W&L 458-455	Reading: Pacala and Socolow, Climate wedges: solving the climate in the next 50 years with current technologies, <i>Science</i> , 305:968, 2005.  <b>Lab #1:</b> Carbon Budget Lab – Powell Library 3rd Floor Computer Classrooms  <b>Essay Part 1:</b> Working Title, Topic Summary, & Motivating Question due
	Fri.	Jan. 20	5	<b>Guest Lecture Professor Edward A. Parson (Dan and Rae Emmett Professor of Environmental Law, Co-Director, Emmett Center on Climate Change and the Environment, UCLA School of Law)</b> on climate change policy  Reading: Chapter 1 & 2 of “ <i>The Science and Politics of Global Climate Change</i> ” by Parson and Dessler – posted on the class website under Week 2	
3	Mon.	Jan. 23	6	<b>Anthropogenic Climate Change &amp; Climate Change Impacts:</b> Past climate records, past greenhouse gas emissions, natural and anthropogenic greenhouse warming and the concept of radiative forcing. Global carbon cycle, Review of evidence of human impact on climate and future climate model projections. Climate change impacts on the physical environment, precipitation, sea ice, glacier and sea levels  Reading: W&L 483 – 506	Reading: Hubbert M. King, “The Energy Resource: of the Earth”, <i>Scientific American</i> , 61-70, 1971.  <b>Lab #1 write up due</b>
	Wed.	Jan. 25	7	<b>Fossil Fuels:</b> Coal, oil, shale, natural gas, fracking, and when will we run out?  Reading: W&L 519 - 545	
	Fri.	Jan. 27	8	<b>Energy and Energy Conservation:</b> Overview and energy conservation;  Reading: W&L 507 – 515, W&L 546 – 548, W&L 553 – 576	
4	Mon.	Jan. 30	9	<b>Alternative energy:</b> nuclear, biomass and hydroelectric  Reading: W&L 507 – 515, W&L 546 – 548, W&L 553 – 576	Reading: Jacobson Review of solutions to global warming, air pollution, and energy security, <i>Energy Environ. Sci.</i> , 2, 148–173, 2009.  <b>Essay Part 2:</b> Annotated Bibliography due  <b>Lab #2:</b> Energy lab
	Wed.	Feb 1	10	<b>Guest Lecture Professor Susanna Hecht (UCLA):</b> Anthropogenic black soils and agriculture in the Amazon basin  Readings: TBD	
	Fri.	Feb 3	11	<b>Guest Lecture Professor Laurent Pilon (Mechanical &amp; Aerospace Engineering, UCLA)</b> on microalgae production for food production  Reading: TBD	

Winter Quarter 2017, First Quadrant, Dr D'Auria Climate/Energy/Pollution					
5	Mon.	Feb 6	12	<b>Newer Alternative Energies &amp; Geoengineering:</b> solar, tidal and wind energy  Reading: W&L 581 – 604, W&B 510 – 518	Reading: Wigley, T.M.L., A combined mitigation-geoengineering approach to climate stabilization, <i>Science</i> 314:452, 2006.  <b>Lab #2 write up due</b>  <b>Screen "Video Models" outside of class</b>
	Wed.	Feb. 8	13	<b>A very Brief History of Agriculture - Food &amp; Fuels:</b> Understanding the connections  Readings: Diamond, J. "Evolution, consequences and future of plant and animal domestication", <i>Nature</i> , 418, 2002	
	Fri.	Feb. 10	14	<b>Global warming and food security - guest Lecture: Professor Cristina Tirado (UCLA)</b>  Reading: -TBD	

Winter Quarter 2017, Second Quadrant, Dr Rice People/Food/Environment					
6	Mon.	Feb. 13	15	<u><b>Art and Aesthetics:</b></u> <b>Visual Culture and the Grocery Store: A History</b> Read: Patel, Raj. 2011. "Checking Out of Supermarkets." <i>Stuffed and Starved</i> . 215-226. 2) Cohen, Deborah. 2014. "Abundant and Cheap" (74-78). "Marketing Obesity," (85-90). <i>A Big Fat Crisis</i> .  <b>***Midterm Exam Review: 6:00-8:00 pm, DeNeve Auditorium***</b>	<b>NO SECTION</b>  <b>Midterm Exam Review: 6:00-8:00 pm, DeNeve Auditorium</b>

Winter Quarter 2017, Second Quadrant, Dr Rice People/Food/Environment					
	Wed.	Feb. 15	16	<p><b>I Think Therefore I Am, or You Are What You Eat?: Food, Self, and Art</b></p> <p>Read:</p> <p>Emeran Mayer. 2016. "Early Development," <i>The Mind-Gut Connection</i>, 3 pages of selects.</p> <p>Diamond, Jared. 2012. "Chapter 11: Salt, Sugar, Fat, and Sloth," <i>The World Before Yesterday</i>, 410-421.</p> <p>Kirshenblatt-Gimblett, Barbara. 1999. "Playing to the Senses: Food as a Performance Medium," <i>Performance Research</i> 4, 1. pp. 1-13.</p> <p>*** Midterm Exam, 6:30-8:00 pm, DeNeve Auditorium ***</p>	<p>Storyboard/pla and draft video <u>due Friday</u></p> <p><b>Midterm Exam, 6:30-8:00 pm, DeNeve Auditorium</b></p>
	Fri.	Feb. 17	17	<p><b>Food and Property</b></p> <p>Read:</p> <p>Locke, John. "Of Slavery," "Of Property." <i>Second Treatise of Government</i>, 17-30.</p> <p>Harvey, David. 2005. "Introduction." <i>A Brief History of Neoliberalism</i>. 1-4.</p> <p>Kirshenblatt-Gimblett, Barbara. 1999. "Playing to the Senses: Food as a Performance Medium," <i>Performance Research</i> 4, 1. pp. 13-26</p> <p>Screen in class:</p> <p><i>The Garden</i> (2006) selects</p>	
	Mon.	Feb. 20	18	<b>No class—President's Day</b>	

Winter Quarter 2017, Second Quadrant, Dr Rice People/Food/Environment					
7	Wed.	Feb. 22	19	<b>Family, Factory, and Urban Agriculture: The Rise and Fall of Farming</b>  <b>Guest lecture by Rachel Surls, author of <i>From Cows to Concrete: The Rise and Fall of Farming in Los Angeles</i></b>  <b>Read:</b> Pollan, 2006. "The Farm." <i>The Omnivore's Dilemma</i> . 32-56. Surls, Rachel. 2016. <i>From Cows to Concrete</i> . 162-177.	<b>Review and critique research papers</b>  <b>Essay Part 3, Rough Draft, due</b>  <b>Essay Part 4, Peer Review &amp; Critique of Papers due</b>
	Fri.	Feb. 24	20	<u><b>Economics and Urbanization</b></u>  <b>Neoclassical, Environmental, and Ecological Economics</b>  <b>Read:</b> W&L "Chapter 6: Ethics, Economics, and Sustainable Development," 132-160.  <b>Screen in class:</b> <i>Cowspiracy</i> selects	

Winter Quarter 2017, Second Quadrant, Dr Rice People/Food/Environment					
8	Mon.	Feb. 27		<p><b>The Automobile, Urbanization, and Fast Food</b></p> <p>Read:</p> <p>W&amp;L "Chapter 13: The Urban Environment: Creating Sustainable Cities," 335-357.</p> <p>Watch before class:</p> <p>"A Guerrilla Gardenre in South Central LA: Ron Finley," <i>TED Talks</i>. 10 min. <a href="https://www.youtube.com/watch?v=EzZzZ_qpZ4w">https://www.youtube.com/watch?v=EzZzZ_qpZ4w</a></p> <p>Optional readings:</p> <p>Patel, Raj. 2011. "Every Cloud Has a Redlining" etc. <i>Stuffed and Starved</i>. 242-244.</p> <p>Cohen, Deborah. 2011. "A Food Desert? Try a Swamp." <i>A Big Fat Crisis</i>. 79-84.</p> <p>Screen in class:</p> <p><i>A Place at the Table</i> (selects)</p> <p>Ron Finley TED talk (selects)</p>	Workshop performances/ short videos #1

Winter Quarter 2017, Second Quadrant, Dr Rice People/Food/Environment				
	Wed.	Mar. 1	21	<p><b><u>Policy</u></b></p> <p><b>Sugar and Power, from Plantations to School Food Policy</b></p> <p>Read:</p> <p>Mintz. 1986. <i>Sugar and Power</i>. (147-150)</p> <p>Patel, Raj. 2011. "Rhodes' Conundrum." <i>Stuffed and Starved</i>. (84-88).</p> <p>Nestle, Marion. 2015. "Obesity: Big Soda's Response" and "Marketing Sugary Drinks" <i>Soda Politics</i>. 102-116.</p> <p>Screen in class:</p> <p><i>Fed Up</i> (2014) (selects)</p>
	Fri.	Mar 3	22	<p><b>Alternative Visions of Food in Education</b></p> <p>Guest lecture by master gardener Marianne Brown, director of Seeds to Plate Program at Mark Twain Middle School: "How to teach middle school students by connecting the school garden to Language Arts, History, Science, and Math"</p> <p>Read:</p> <p>W&amp;L "Chapter 7: Environmental Policy: Making Decisions and Solving Problems," 161-186.</p> <p>Optional reading:</p> <p>Confessore, Nicholas. "How School Lunch Became the Latest Political Battleground." 2014. <i>The New York Times</i>. P. 1-17.</p>



Winter Quarter 2017, Second Quadrant, Dr Rice People/Food/Environment					
9	Mon.	Mar. 6	23	<p><b><u>Globalization, Food Technologies, and Labor</u></b></p> <p><b>Pros and Cons of Permaculture, Vertical Gardens, and Invitro Meat</b> Guest lecture by Karen Snook, director of <i>Kindred Spirits Care Farm</i></p> <p>Read: “The Vertical Essay,” Dickson Despommier, <a href="http://www.verticalfarm.com/?page_id=36">http://www.verticalfarm.com/?page_id=36</a> Future Food Website, “Cultured Meat,” <a href="http://www.futurefood.org/in-vitro-meat/index_en.php">http://www.futurefood.org/in-vitro-meat/index_en.php</a></p> <p>Screen <b>outside of class:</b> “Greening the Desert,” Geoff Lawton YouTube clip, 8 min. <a href="https://www.youtube.com/watch?v=keQUqRg2qZ0">https://www.youtube.com/watch?v=keQUqRg2qZ0</a></p>	Workshop short videos #2
	Wed.	Mar. 8	24	<p><b>Hunger and Globalization: A Long View of the 2007-8 Food Crisis</b></p> <p>Guest lecture by Deepak Rajagopal. Assistant Professor in Urban Planning and the Institute of the Environment and Sustainability</p> <p>Read: Hochman, Rajagopal et al. 2014. “Quantifying the causes of the global food commodity price crisis.” <i>Biomass and Bioenergy</i>, pp. 106-114.</p> <p>Optional reading:  Perez, Ines. 2013. “Climate Change and Rising Food Prices Heightened Arab Spring.” <i>Scientific American</i>. <a href="http://www.scientificamerican.com/article/climate-change-and-rising-food-prices-heightened-arab-spring/">http://www.scientificamerican.com/article/climate-change-and-rising-food-prices-heightened-arab-spring/</a></p>	

Winter Quarter 2017, Second Quadrant, Dr Rice People/Food/Environment					
	Fri.	Mar. 10	25	<p><b>Farmworker Vulnerability: Migratory Labor as a Sustainability Issue</b></p> <p>Read:</p> <p>Schlosser, Eric. "The New Industrial Migrants." <i>Fast Food Nation</i> (160-166)</p> <p>Patel, Raj. <i>Stuffed and Starved</i>. "You Have Become Mexican," (48-70).</p> <p>"A Fair Deal for CA's Farmworkers" (2012)  <a href="http://www.cuesa.org/article/fair-deal-californias-farmworkers">http://www.cuesa.org/article/fair-deal-californias-farmworkers</a></p> <p>Screen in class:  <i>Food Chains</i> (2014)</p>	
10	Mon.	Mar. 13	26	<p><b><u>Culture</u></b></p> <p><b>Sustainable Food Futures?</b></p> <p>Why not bugs?</p> <p>Read:</p> <p>Yen, A. L. "Forward: Why a <i>Journal of Insects as Food and Feed</i>?" <i>Journal of Insects as Food and Feed</i> 1(1), pp. 1-2.</p>	<b>Final exam review in sections</b>

Winter Quarter 2017, Second Quadrant, Dr Rice People/Food/Environment					
	Wed.	Mar. 15	27	<p><b>In a Pickle: Food Storage Traditions and the Cold Chain</b></p> <p>Read:</p> <p>Diamond, Jared. "Seasonality and Food Storage," <i>The World Before Yesterday</i>, 307-313.</p> <p>Twilley, Nicola. 2014. "What Do Chinese Dumplings Have to Do With Global Warming?" <i>The New York Times</i>, p. 1-13.</p> <p>Optional:</p> <p>Twilley, Nicola. 2012. "The Coldscape," <i>Cabinet Magazine</i>, <a href="http://cabinetmagazine.org/issues/47/twilley.php">http://cabinetmagazine.org/issues/47/twilley.php</a>  <a href="http://www.jihyundavid.com/">http://www.jihyundavid.com/</a></p>	<p><b>Due <u>Wednesday</u> at 5:00 PM:</b>  Completed video on Google Drive</p>
	Fri.	Mar. 17	28	<p><b>Video Screening and Reasons for Hope</b></p> <p>Readings:</p> <p>Cohen, Deborah. 2014. "The Supermarket of the Future." <i>A Big Fat Crisis</i>. 151-156.</p> <p><b>Wrap Up Discussion (All)</b></p> <p>*** Exam review: 6:00-8:00 pm, DeNeve Auditorium ***</p>	
				<p>*** Final Examination Monday, March 20, 3:00 pm – 6:00 pm, DeNeve Auditorium ***</p>	

## Syllabus

### GE70: Evolution of the Cosmos, the Earth, and Life

This 3-quarter cluster course explores the emergence of the Universe and its contents—from the Big Bang and the formation of our solar system to the development and evolution of life on Earth. This course introduces scientific understanding of the astronomical, geological and biological processes that shaped the evolution of our world from formation to the very recent arrival of humans. Another course emphasis concerns the enterprise of science itself: exploration of how scientists formulate and test hypotheses using evidence, data, and logic.

GE70 is open to first year students of any major, and enrollees are expected to remain with the course through their entire first year. Students who complete the three quarter sequence will receive credit for four courses in the Foundations of Scientific Inquiry: two Life Science with one with laboratory credit, and two Physical Science with one with laboratory credit. The full course satisfies the College Writing II requirement (see below for details); there is a significant writing component to the assigned coursework. If you leave the course after fall quarter you will only receive credit for one Physical Science course (with lab). If you leave after winter quarter you will also receive one Life Science credit (with lab). **You must complete all 3 quarters to get the credit for the FOUR GE Science courses and the Writing II credit.**

The Fall Quarter – GE70A – focuses on the physical emergence and the subsequent natural development of the universe, our solar system, and our planet. Attention is given to how and whether the processes that formed and shaped our world might be repeated elsewhere.

Class web site: <https://ccle.ucla.edu/course/view/16F-GECLST70A-1> (or just go through your my.ucla.edu page)

Use the class web site to stay up-to-date on assignments, readings, and notices. It will also contain answers to exam and lab questions. Students are encouraged to use the course bulletin board linked to this site in order to post questions, and the chat facility for electronic office hours.

Lecture Schedule: Tu/Th 11:00 a.m. -12:15 p.m. – DeNeve Auditorium

Faculty: James Larkin (Physics & Astronomy)  
 Kevin McKeegan (Earth, Planetary & Space Sciences)  
 Ryan Ellingson (Ecology & Evolutionary Biology)  
 Tony Friscia (Integrative Biology and Physiology & Undergraduate Educ. Initiatives)

Teaching Associates: Scott Sunnell (Archaeology)  
 Teni Adewumi (Environmental Health Sciences)  
 Tyler McCraney (Ecology & Evolutionary Biology)  
 Jason Utas (Earth, Planetary & Space Sciences)  
 Kevin Hill (Archaeology)

*(for contact information of all members of the teaching team, see the course web site)*

Office Hours – Instructors and TAs will each hold individual office hours at the times posted on the class web site. In addition, every Tuesday immediately after the lecture, all students are invited to join the teaching team at lunch in the DeNeve cafeteria for informal discussions or questions about the course material or about anything and everything.

#### Lab/Discussion Sections

Each student is assigned to a Lab/Discussion section that meets for 2 hours per week. Attendance is mandatory. There will be weekly activities and assignments associated with labs.

Field trip – We have scheduled a field trip to Devil's Punchbowl for geologizing and star gazing on October 22<sup>nd</sup>.

Textbooks (required) All available at the ASUCLA Bookstore:

1. A Short History of Nearly Everything, by Bill Bryson, 2003, Random House, ISBN: 0767908
2. The Story of Earth: The First 4.5 Billion Years, from Stardust to Living Planet, by Robert Hazen, Penguin 2013, ISBN 0143123645

### Grading and exams

Midterm exam .....	20%
Research paper .....	20%
Lab assignments .....	20%
Participation/Quizzes .....	10%
Final Exam .....	30%
Total .....	100%

- The exams consist of a combination of multiple choice and short-answer questions.
- There will be an online quiz due before most lectures based on the assigned reading. They will be due before the lectures. You can miss two quizzes through the quarter. You will be notified as to what will be covered on the quizzes the week before.
- *Policy on make-up exams:* make-up exams are possible only in dire and documented circumstances, and **only if the instructor is notified in advance.**
- *Policy on late assignments:* 50% grade reduction if turned in within 1 week of due date.
- *Participation includes attendance in both lectures and labs, use of Clickers, vocal participation in discussions, asking questions in lectures, attendance at office hours and review sessions, appropriate use of the bulletin board, and participation in the field trip. Not all of these activities are mandatory, but they all contribute to the participation grade.*

### LECTURE SCHEDULE

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#### Week 0

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September 22, Thursday: Course Introduction and “What is Science?” (All Instructors)  
Reading: Online - Introductory Comments, The Scientific Method, and the Nature of Evidence, Interpretation, Error and Uncertainty.  
“Gut instinct isn’t science”, Barash, 2007

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#### Week 1

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September 27, Tuesday: “Our Place in the Universe” (Larkin)  
Reading: GE70 Supplement – Chapter 1: Newton’s “Law” of Gravity  
GE70 Supplement – Chapter 2: Your Place in the Universe

September 29, Thursday: “Special Relativity” (Larkin)  
Reading: GE70 Supplement – Chapter 3: Special Relativity

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#### Week 2

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October 4, Tuesday: “General Relativity & Cosmology” (Larkin)  
Reading: GE70 Supplement – Chapter 4: General Relativity and the Shape of the Universe

October 6, Thursday: “Light and Atoms” (Larkin)  
Reading: GE70 Supplement – Chapter 5: Universal Messenger

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#### Week 3

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October 11, Tuesday: “Early Universe and the Big Bang” (Larkin)  
Reading: GE70 Supplement – Chapter 6: The Early Universe

October 13, Thursday: “Dark Matter and the First Nuclei” (Larkin)  
Reading: GE70 Supplement – Chapter 7: Galaxies

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#### Week 4

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*Writing Assignment Exercise 1: Summary and Literature Review activity due in section*

October 18, Tuesday: “Formation of the Galaxies; The Sun and Stars” (Larkin)  
Reading: GE70 Supplement – Chapter 8: Stars – Atomic Synthesizers

October 20, Thursday: “Stars, Stellar Death and Nucleosynthesis” (Larkin)

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Week 5

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October 25, Tuesday: “Stellar Recycling and the Solar System” (Larkin/McKeegan)

Reading: GE70 Supplement – Chapter 9: Our Solar System

October 25, Tuesday: **Review Session, 5:00 – 7:00 PM, Loc. Bunch 2209A**

October 27, Thursday: **\*\*MIDTERM EXAM\*\***

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Week 6

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*Writing Assignment Exercise 2: Rough Drafts due in sections*

November 1, Tuesday: “Meteorites, Asteroids, and Comets: Messengers from the Solar Nebula” (McKeegan)

Reading: Hazen – Introduction and Chapter 1

November 3, Thursday: “Origin of the Earth and Moon” (McKeegan)

Reading: Hazen – Chapter 2

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Week 7

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*November 7 – 11: No labs! Mandatory meeting with TAs about papers*

November 8, Tuesday: “Extrasolar Planets” (Larkin)

Reading: GE70 Supplement – Chapter 10: Extrasolar Planets

November 11, Thursday “The age of the Solar System and of the Earth” (Friscia)

Reading: GE70 Supplement – Chapter 11: Quantifying the Timescale

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Week 8

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November 15, Tuesday: “The Hadean Earth and a possible Great Cataclysm” (McKeegan)

Reading: Hazen – Chapter 3

November 17, Thursday: “A Habitable Planet: Origins of Earth’s Ocean and Atmosphere” (McKeegan)

Reading: Hazen – Chapter 4

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Week 9

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November 22, Tuesday: “The Structure of the Earth and its Changing Surface” (McKeegan)

Reading: Hazen – Chapter 5; GE70 Supplement – Chapter 12: Plate Tectonics

*November 24-25: **Thanksgiving Holiday – no lab/discussion sections Nov 21-25***

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Week 10

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*Writing Assignment Exercise 2: Final Paper due in lecture, Thursday Dec. 3<sup>rd</sup>*

November 29, Tuesday: “Co-evolution of the Biosphere and Geosphere” (McKeegan)

Reading: Hazen – Chapters 6 and 7

December 1, Thursday: “The current Earth system” (McKeegan)

Reading: GE70 Supplement – Chapter 13: Climate controls

December 1, Thursday: **Review Session, 5:00 – 7:00 PM, Loc. Bunch 2209A**

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**FINAL EXAM - December 6, Tuesday, 8:00-11:00 AM**

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**List of Lab Activities:**

Week 1: Evidence & Uncertainty: The Pith of Science and the Pitfalls of Pseudoscience  
Week 2: Scientific Article Walk-Thru  
Week 3: Library orientation and writing tips  
Week 4: Light and the Inverse Square Law  
Week 5: Expansion of the Universe  
Week 6: Meteorite Exploration  
Week 7: NO LABS – Mandatory Meeting with TA  
Week 8: Peer Review of Rough Drafts  
Week 9: NO LABS - Thanksgiving  
Week 10: Orbits of the Moon and the Tides

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**Lab Times and TA Assignments:**

Section 1A Monday 1-3 – Scott Sunell	Section 1F Wednesday 3-5 – Jason Utas
Section 1B Monday 3-5 – Scott Sunell	Section 1G Thursday 1-3 – Tyler McCraney
Section 1C Wednesday 9-11 – Teni Adewumi	Section 1H Thursday 3-5 – Tyler McCraney
Section 1D Wednesday 11-1 – Teni Adewumi	Section 1I Friday 1-3 – Kevin Hill
Section 1E Wednesday 1-3 – Jason Utas	Section 1J Friday 3-5 – Kevin Hill

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**Writing II Credit and the Clusters**

Cluster students must complete English Comp 3 (or the equivalent) by the end of their first year in order to receive Writing II credit for the cluster. Students are **strongly encouraged** to enroll in English Comp 3 during the *Fall* or *Winter* Quarter of their freshman year (instead of enrolling concurrently with a cluster seminar in the spring) for two important reasons:

1) *pedagogical* – cluster instructors in the spring quarter seminars will assume that students have received prior college level writing instruction; and

2) *practical* – a limited number of English Comp 3 classes are offered during spring quarter and are in great demand by upper division students; cluster students who wait until spring may be unable to enroll in one of the few sections available at that time. Students who fail to complete English Comp 3 by the end of the spring term will **not** receive Writing II credit through their cluster work.

Special arrangements will be available for students in clusters to enroll in English Comp 3 for the Winter and Spring quarters. Details about this will be provided when they become available.

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**Course Policies**

**Classroom:** You are expected to follow the rules of generally civilized behavior in class (and we will endeavor to do the same!). Please show up on time, and we will end the lecture on time. Stay for the entire lecture, and please do not shuffle papers, pack-up your bags, etc., until the lecture is finished (it is very distracting to both the instructors and your colleagues). Please, no food in the classroom. Switch off your mobile phone before entering the classroom. In a rare circumstance where you absolutely must leave early, please let us know ahead of time and then sit near the exit. Thank you for your cooperation.

You are expected to abide by the University's policy on **Academic Integrity**. *Cheating and plagiarism will not be tolerated.* If you are unsure about this policy, please see:

<http://www.deanofstudents.ucla.edu/Portals/16/Documents/StudentGuide.pdf>  
or drop by to discuss your concerns.

**Disability Accommodations:** If you will need disability accommodations for this class, please see one of us as soon as possible. Information regarding disability accommodation is confidential.

**Title IX prohibits gender discrimination**, including sexual harassment, domestic and dating violence, sexual assault, and stalking. Students who have experienced sexual harassment or sexual violence can receive confidential support and advocacy at the CARE Advocacy Office for Sexual and Gender-Based Violence, 1<sup>st</sup> Floor Wooden Center West, [CAREadvocate@caps.ucla.edu](mailto:CAREadvocate@caps.ucla.edu), (310) 206-2465. You can also report sexual violence or sexual harassment directly to the University's Title IX Coordinator, Kathleen Salvaty, 2241 Murphy Hall, [titleix@conet.ucla.edu](mailto:titleix@conet.ucla.edu), (310) 206-3417.

## Syllabus

### GE70: Evolution of the Cosmos, the Earth, and Life

This 3-quarter cluster course explores the emergence of the Universe and its contents—from the Big Bang to the formation of our solar system, and then the development of life on Earth. One emphasis is on scientific understanding of the astronomical, geological and biological processes that have shaped the evolution of our world from its beginning to the very recent arrival of humans. The other primary emphasis is on the scientific enterprise itself: how scientists formulate and test hypotheses using evidence, data, and logic.

GE70 is open to freshmen of any major, and enrollees must assume that they will remain with the course through their entire first year. Students who complete the three quarter sequence will receive credit for four 6-unit courses in the Foundations of Scientific Inquiry: 2 Life Science (one with laboratory credit), 2 Physical Science (one with laboratory credit), depending on which Spring seminar is chosen. The full course also satisfies the College Writing II requirement (see below for details). There is therefore a significant writing component to the assigned coursework.

The Winter Quarter – GE70B – focuses on the evolution of life on our planet. This includes discussion of the processes that drive this change, as well as the history of this change written in fossils. We finish by bringing the entire course full circle with a discussion of the future of Earth in general and humanity specifically.

Class web site: Use the class web site to stay abreast of assignments, readings, and notices, as well as answers to exam and lab questions. Also, students are encouraged to use the various bulletin boards on the site in order to post questions, interesting tidbits, and coordinate study groups.

Lecture Schedule: Tu/Th 11:00 a.m. -12:15 p.m. – DeNeve Auditorium

Faculty:  
 James Larkin (Physics & Astronomy)  
 Ryan Ellingson (Ecology & Evolutionary Biology)  
 Kevin McKeegan (Earth & Space Sciences)  
 Tony Friscia (Integrative Biology & Physiology)

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*(for contact information of all members of the teaching team, see the course web site)*

Office Hours – Instructors and TAs will each hold individual office hours at the times posted on the class web site. In addition, all students are invited to join the teaching team at lunch in the DeNeve cafeteria for informal discussions or questions about the course material or about anything and everything. These ‘lunch office hours’ will be on Tuesdays for the first half of the quarter, and Thursdays for the second half of the quarter.

#### Lab/Discussion Sections

Each student is assigned to a Lab/Discussion section that meets for 2 hours per week, and attendance is mandatory. There will be weekly activities and assignments associated with the labs. Labs meet in Geology 4653.



### Textbooks (required):

1. The Tangled Bank, 2<sup>nd</sup> ed, by Carl Zimmer, Roberts and Company Publishers, ISBN: 9781936221448, available in the ASUCLA bookstore
2. A Short History of Nearly Everything, by Bill Bryson, 2003, Random House, ISBN: 076790818X, available in the ASUCLA bookstore.

### Field trips – February 24-26 – Fossil Collecting in Western Nevada

March 5 – Palos Verde Tide Pools

March 11 – La Brea Tar Pits

### Grading and exams

Midterm exam .....	20%
Research paper .....	20%
Lab assignments .....	20%
Participation/Quizzes .....	10%
<u>Final Exam</u> .....	30%
Total .....	100%

- The exams will consist of a combination of multiple choice and short-answer questions.
- *Policy on make-up exams:* make-up exams are possible only in dire and documented circumstances, and only if the instructor is notified in advance.
- One online quiz will be given each week and will cover the readings, as well as other course material. They will be due before the lectures. You can miss two quizzes through the quarter. You will be notified what will be covered on the quizzes the week before.
- *Policy on late assignments:* 25% grade reduction if turned in within 1 week of due date.
- *Participation includes attendance in both lectures (including use of Clickers) and labs.*

### Schedule

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#### Week 1

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January 10, Tuesday: An Introduction to Biological Evolution (Frischia)

Reading: Zimmer, Chapter 1

January 12, Thursday: History of Evolutionary Thought (Frischia)

Reading: Zimmer, Chapter 2

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Week 2

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*January 16, Monday - Martin Luther King, Jr. Day - NO LABS Jan 16-20*

January 17, Tuesday: The Geologic and Fossil Records (Frischia)

Reading: Zimmer, Chapter 3

January 19, Thursday: Building the Tree of Life (Ellingson)

Reading: Zimmer, Chapter 4

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Week 3

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*Research Paper – Topics chosen in lab sections*

January 24, Tuesday: Inheritance and DNA (Ellingson)

Reading: Zimmer, Chapter 5

January 26, Thursday: Population Genetics & Selection (Frischia)

Reading: Zimmer, Chapter 6

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Week 4

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January 31, Tuesday: Molecular Evolution (Ellingson)

Reading: Zimmer, Chapter 7

February 2, Thursday: Adaptation (Frischia)

Reading: Zimmer, Chapter 8

*Research Paper – Annotated Bibliography/Outline/Summary Due in Lecture 2/2*

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Week 5

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February 7, Tuesday: Catch-Up & Review

February 7, Tuesday: **5p-7p REVIEW SESSION, Location: Haines 220**

February 9, Thursday: **\*\*\*MIDTERM\*\*\***

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Week 6

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February 14, Tuesday: Sex and Evolution (Ellingson)

Reading: Zimmer, Chapter 9

February 16, Thursday: The Origin of Species (Ellingson)

Reading: Zimmer, Chapter 10

*Research Paper – Rough Drafts due to grader in Lecture 2/16*

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Week 7

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*February 20, Monday - Presidents Day - NO LABS Feb. 20-24*

*Research Paper – Meet with grader to discuss paper sometime this week*

February 21, Tuesday: Macroevolution and the History of Life (Frischia)

Reading: Zimmer, Chapter 11

February 23, Thursday: Coevolution (Ellingson)

Reading: Zimmer, Chapter 12

*February 24-26 – FIELD TRIP – Fossil collection in western Nevada*

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Week 8

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February 28, Tuesday: The Evolution of Behavior (Ellingson)  
Reading: Zimmer, Chapter 13

March 2, Thursday: Evolution of Humans (Friscia)  
Reading: Zimmer, Chapter 14

*March 4 – FIELD TRIP – Palos Verde Tide Pools*

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Week 9

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March 7, Tuesday: Evolution & Medicine (Friscia)  
Reading: Zimmer, Chapter 15

March 9, Thursday: Climate Change (McKeegan)

*March 11 – FIELD TRIP – La Brea Tar Pits*

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Week 10

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March 14, Tuesday: Extraterrestrial Life and the End of the Universe (Larkin)

March 16, Thursday: SOAPBOX

March 16, Thursday: **Review Session, 5–7 PM, Location: Haines 220**

*Research Paper – Final Paper Due in Lecture, 3/16*

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March 21, Tuesday: **Final Examination 11:30a-2:30p**

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List of Lab Activities:

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Week 1: Belief Systems and Evolution: Movie – Judgment Day & What About God?

Week 2: NO LABS

Week 3: Belief Systems and Evolution: Discussion

Week 4: Rocks, Maps and Fossils

Week 5: Evolution & Development

Week 6: Jurassic Lark

Week 7: NO LABS

Week 8: Simulating Coevolution

Week 9: Tar Pit Fossils and Functional Morphology

Week 10: Cane Toads: The story of an invasive creature