General Education Course Information Sheet

Please submit this sheet for each proposed course

Department & Course Number Department of Earth and Space Sciences 98T

Course Title Earth without the Moon

1 Check the recommended GE foundation area(s) and subgroups(s) for this course

Foundations of the Arts and Humanities

- Literary and Cultural Analysis
- Philosophic and Linguistic Analysis
- Visual and Performance Arts Analysis and Practice

Foundations of Society and Culture

- Historical Analysis
- Social Analysis

Foundations of Scientific Inquiry X

- Physical Science X
  With Laboratory or Demonstration Component must be 5 units (or more)
- Life Science
  With Laboratory or Demonstration Component must be 5 units (or more)

2. Briefly describe the rationale for assignment to foundation area(s) and subgroup(s) chosen.

Course focuses on the study of planetary science, with emphasis on developing the critical thinking skills necessary to evaluate scientific studies and conclusions. Will incorporate fundamental principals of physics and geology.

3. "List faculty member(s) who will serve as instructor (give academic rank):
Carolyn Nugent, Ph.D. Candidate

Professor Kevin McKeegan, Faculty Advisor

4. Indicate when do you anticipate teaching this course over the next three years:

2010-2011		Winter Enrollment	X	Spring Enrollment	

5. GE Course Units

Proposed Number of Units: 5

6. Please present concise arguments for the GE principles applicable to this course.

❑ General Knowledge	Course will cover fundamental principals of physics, geology, and earth science.
❑ Integrative Learning	Students will use multiple source types in the learning process- scientific papers, popular sciences books, hands-on experiments, field observations.
❑ Ethical Implications	Course material will challenge the perspective of the earth as an immutable system, and instead present evidence that the earth is a dynamic system which can be influenced by human actions.
❑ Cultural Diversity	Course will not exclude the historical and current contributions of non-western scientists.
❑ Critical Thinking	Emphasis on critical thinking skills to evaluate scientific arguments and papers.
❑ Rhetorical Effectiveness	Will be addressed with both in in-class presentations and effective essay writing.
❑ Problem-solving	
❑ Library & Information Literacy	Final paper will require extensive research and synthesis of information.

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

1.	Lecture:	**3**	(hours)
2.	Discussion Section:	**N/A**	(hours)
3.	Labs:	**N/A**	(hours)
4.	Experiential (service learning, internships, other):	**N/A**	(hours)
5.	Field Trips:		(hours)

(A) TOTAL Student Contact Per Week **3** **(HOURS)**

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

1.	General Review & Preparation:	**2**	(hours)
2.	Reading	**6**	(hours)
3.	Group Projects:	**N/A**	(hours)
4.	Preparation for Quizzes & Exams:	**N/A**	(hours)
5.	Information Literacy Exercises:	**.5**	(hours)
6.	Written Assignments:	**2**	(hours)
7.	Research Activity:	**1.5**	(hours)

(B) TOTAL Out-of-class time per week **12** **(HOURS)**

GRAND TOTAL (A) + (B) must equal at least 15 hours/week 15 **(HOURS)**

EARTH WITHOUT THE MOON
Syllabus and Reading List
Winter 2011
Instructor: Carolyn Nugent

What would the earth be like if the earth didn't exist? We'll explore the many (and often surprising) ways the moon has influenced (or might have influenced) the Earth. Questions to be addressed include—could advanced life evolve on a moon-less earth? Does human civilization owe its existence to the moon? This course will focus on developing skills to think critically about complex scientific concepts.

COURSE OBJECTIVES:

1. Introduce students to the exciting field of planetary science
2. Develop the critical thinking skills needed to evaluate scientific theories
3. Cultivate excitement about recent scientific discoveries and research
4. Develop students' rhetorical effectiveness.

COURSE SCHEDULE:

Week 1: Baloney Detection Kit and the uniqueness of the Moon	
Discussion questions for class	How can we distinguish between science and pseudoscience? Is the Earth-Moon system best defined as a planet and a moon, or a binary system? Contrast and compare Earth and the Moon with Pluto and Charon, binary asteroids, and the moons of Jupiter and Saturn.
Readings	1) The Demon-Haunted World: Chapter 12 (online) 2) A Short History of Nearly Everything: Chapters 1, 2, and 3 3) Lies, Damned Lies and Science: Chapter 1 (online)
Assignments	Observe the Moon for fifteen days (the days do not have to be consecutive). For each day, carefully draw a detailed picture of what you see, and record the day, time, phase, and elevation (we will discuss how to determine elevation in class). Finally, draw a schematic diagram of the Earth-Moon system relative the sun, valid for your observation. The diagram should not be to scale. Due in class, week 4. May be helpful: MacRobert, Alan and Sinnott, Roger. "Young Moon Hunting", *Sky and Telescope*, Feb. 2005 p. 75. Available on course website.

Week 2: Where did the Moon come from?	
Discussion questions for class	IN CLASS: *Examination of actual Moon rocks on loan from NASA!!* Do the pre-Apollo mission Moon formation hypotheses withstand the "Baloney detection kit"? Without the returned Moon rocks, would the giant impact hypothesis ever be accepted by the scientific community? How valid is the giant impact hypothesis?
Readings	1) Canup, R. and Asphaug, E. "Origin of the Moon in a giant impact near the end of the Earth's formation", *Nature* 2001. (online) 2) Stewart, Glen. "Outstanding Questions for the Giant Impact Hypothesis", Origin of the Earth and Moon. (online).

	3) A Short History of Nearly Everything: Chapters 7, 9, and 10. 4) The New Solar System: Chapter 10. 5) "The Fate of the Moon Rocks" from *Astronomy*, Dec. 1985, p. 15. (online)
Assignments	Continue Moon observing.

Week 3: How does the Moon change the Earth's tides and day length?	
Discussion questions for class	IN CLASS: Interactive demonstration of conservation of angular momentum. How would tides be different on Earth without the Moon? How would these different tides affect the evolution of life? How would the length of a day be different on Earth without the Moon? How would this affect the Earth's weather? Compare with Venus, Jupiter.
Readings	1) Wunsch, Carl. "Moon, Tides, and Climate", *Nature*, 2000. Available on course website. 2) A Short History of Nearly Everything: Chapter 4 3) The New Solar System, Chapter 23. 4) "Lunar Eclipses That Changed the World", *Sky & Telescope*, Dec. 1992, p. 639 (online).
Assignments	Continue Moon observing. Begin work on final paper, due during finals week. Final paper to be 15-18 pages long, details to be discussed in class. You may choose one of the three topics below or, with instructor approval, devise your own topic. 1) What would happen on Earth if the Moon suddenly vanished? What actions would you advise humanity to take (if any) to compensate for the loss of the Moon? Why? 2) If the Moon never formed, would humanity exist today? Would mammals exist? Why or why not? 3) The Moon has been instrumental in the development of science and technology on Earth. If the Moon didn't exist, and assuming humans existed on a Moon-less Earth, would we still be able to develop the technology we have today? What things would we not know? In what alternate (Moon-less) ways could scientific discoveries be made?

Week 4: How would the interior of the Earth be different without the Moon?	
Discussion questions for class	IN CLASS: Convection demonstration tank. How do we know what's going on in the interior of the Earth? Could the formation of the Moon spurred (or enhanced) convection in the Earth's mantle? Could the formation of the Moon spurred (or enhanced) the core movement that powers the Earth's magnetic field? How does the Earth's magnetic field affect life?
Readings	A Short History of Nearly Everything: Chapter 14 and 15 The New Solar System: Chapter 4
Assignments	Moon observations due. Topic for final paper due. Begin work on outline for final paper. Begin work on midterm presentations for Week 7. Topic: How would life on Earth and human culture be different without the Moon?

	This is your opportunity to share your personal expertise with the rest of the class. Prepare a 6 minute presentation and 1 page class handout on how your major field or academic interest would be different if the Earth lacked a Moon. For example, a biology major could investigate how the evolution of the human eye was influenced by moonlight. A psychology major could report on how human behavior changes during the full Moon. If you need help thinking of a topic please contact me and we can brainstorm together. Specific requirements for this assignment to be discussed in class.

Week 5: How would the surface of the Earth be different without the Moon?	
Discussion questions for class	Why is the Earth the only planet with such dramatic plate tectonics? Is it because of the Moon, or something else? Is plate tectonics really necessary for life, as the chapter in Rare Earth stated?
Readings	1) A Short History of Nearly Everything: Chapters 5 and 12. 2) American Scientist: Basic Principles of Plate Tectonics (online) 3) Rare Earth: Chapter 9 (online) 4) The New Solar System: Chapters 9 and 12
Assignments	Topic for midterm presentation due. Continue work on final paper. Drafts due for peer review next week.

Week 6: Rocks from space and the Moon	
Discussion questions for class	IN CLASS: Interactive demonstration of cratering processes AND meteorite samples! What does the Moon teach us about giant impact events? Does the Moon play a role in protecting us from these events?
Readings	1) A Short History of Nearly Everything, Chapter 13 2) Plait, Philip. Death From The Skies, Chapter 1 (online) 3) McGuire, Bill. Surviving Armageddon, Chapter 2 (online) 4) The New Solar System, Chapter 6
Assignments	Continue work on midterm presentation. Bring in final paper draft for exchange and peer review.

Week 7: How would life on Earth and human culture be different without the Moon?	
Discussion questions for class	6 minute midterm presentations by class members.
Readings	A Short History of Nearly Everything, Chapters 20-26
Assignments	Midterm presentations due. Continue work on final paper.

Week 8 How does the Moon influence the Earth's climate?	
Discussion questions for class	How would the Earth's historical climate be different without the Moon steadying the Earth's tilt? How would this affect the evolution of life? Compare the Earth's historical climate to Mars. Does the Moon play a role in climate patterns such as El Nino?
Readings	1) Laskar, J., and Robutel, P. "The chaotic obliquity of the planets" Nature,

	1993.(also second laskar paper) 2) A Short History of Nearly Everything, Chapter 17 3) Rare Earth: Chapter 10 4) Ice, Mud, and Blood, Chapter 2. 5) The New Solar System, Chapter 13
Assignments	Continue work on final paper. Prepare 100-word informational summary to be presented at next week's field trip. Topics to be chosen in class.

Week 9: Field Trip to Abalone Cove: How has the Moon influenced our local ecosystems?	
Discussion questions for class	We will be traveling to Abalone Cove to see first hand the tidepool ecosystem and dramatic evidence of tectonic uplift (the Palos Verdes Penninsula). Wear sturdy shoes (athletic shoes or hiking boots), and bring water and snacks. Short presentations.
Readings	1) A Short History of Nearly Everything, Chapters 16, 18, and 19 2) American Scientist: A tangled tale of plant evolution (online)
Assignments	Continue work on final paper

Week 10: How did the Apollo Moon missions affect our daily lives?	
Discussion questions for class	How did technology change during the space race? Was the space race unique in human history in terms of the rate of scientific advancement? Do the conditions exist for a second space race, now that China and India have their own space programs? How do we know the lunar landings were not a hoax?
Readings	1) "I'm at the Foot of the Ladder", *Astronomy*, July 1989, p.22. 2) "What is it like to Walk on the Moon?",*National Geographic*, Sept. 1973. 3) Research (on the internet) at least two pieces of "evidence" that the moon landings were faked. Also research arguments against these pieces of "evidence".
Assignments	Bring in nearly completed final papers for exchange and peer review. Rewrite papers.

GRADE DISTRIBUTION:
10% Class participation
15% Moon assignment
10% Field trip mini-presentation
25% Midterm presentation
40% Final paper

REQUIRED BOOKS
These books were carefully selected to be not only highly informative, but examples of excellent scientific writing. *The New Solar System* is a formal but accessible compilation of writings by eminent scientists. *A Short History of Nearly Everything* provides a entertaining and exceedingly clear description of key scientific concepts.

Bryson, Bill. A *Short History of Nearly Everything* (2003). Doubleday. (NOTE: Do not get A *Really Short History of Nearly Everything*—the abriged version does not contain all the information we will be covering).

Beatty, J. Kelly, Carolyn Peterson, Andrew Chaikin, *The New Solar System, Fourth Edition* (1999). Sky Publishing Corporation.

SUGGUESTED FURTHER READING
We will be reading excerpts from the following books. The excerpts will be available on the course website.

Canup, Robin and K. Righter (editors). *Origin of the Earth and Moon* (2000). University of Arizona Press.

McGuire, Bill. *Surviving Armageddon* (2005). Oxford University Press.

Plait, Philip. *Death from the Skies!* (2008) Viking.

Sagan, Carl. *The Demon-Haunted World* (1996). Ballantine.

Seethaler, Sherry. *Lies, Damned Lies, and Science* (2009). Pearson Education, Inc.

Turney, Chris. *Ice, Mud, and Blood*. (2008). Macmillan.

Ward, Peter, and Donald Brownlee. *Rare Earth: Why Complex Life is Uncommon in the Universe* (2000). Copernicus.

New Course Proposal

	Earth & Space Sciences 98T **Earth without the Moon**
Course Number	**Earth & Space Sciences 98T**
Title	**Earth without the Moon**
Short Title	**EARTH WITHOUT MOON**
Units	Fixed: **5**
Grading Basis	**Letter grade only**
Instructional Format	**Seminar - 3 hours per week**
TIE Code	**SEMT - Seminar (Topical) [T]**
GE Requirement	**Yes**
Major or Minor Requirement	**No**
Requisites	**Satisfaction of entry-level Writing requirement. Freshmen and sophomores preferred.**
Course Description	**What would earth be like if the moon didn't exist? Would advanced life be able to evolve on such a planet? We will explore the many (and often surprising) ways the moon has influenced (or might have influenced) the earth.**
Justification	**Part of the series of seminars offered through the Collegium of University Teaching Fellows.**
Syllabus	File *ESS 98T syllabus.pdf* was previously uploaded. You may view the file by clicking on the file name.
Supplemental Information	**Professor Kevin McKeegan is the faculty mentor for this seminar.**
Grading Structure	**class participation - 10%; moon assignment - 15%; field trip mini-presentation - 10%; midterm presentation - 25%; final paper - 40%**
Effective Date	**Winter 2011**
Discontinue Date	**Summer 1 2011**
Instructor	Name: **Carolyn Nugent** — Title: **Teaching Fellow**
Quarters Taught	☐ Fall ☐ Winter ☐ Spring ☐ Summer
Department	**Earth & Space Sciences**
Contact Routing Help	Name: **CATHERINE GENTILE** — E-mail: **cgentile@oid.ucla.edu**

ROUTING STATUS

Role:	Registrar's Publications Office
Status:	Pending Action
Role:	Registrar's Scheduling Office - Thomson, Douglas N (dthomson@registrar.ucla.edu) - 51441

Status:	Added to SRS on 10/1/2010 5:42:47 PM
Changes:	Short Title
Comments:	No Comments

Role:	FEC School Coordinator - Soh, Michael Young (msoh@college.ucla.edu) - 45040
Status:	Returned for Additional Info on 9/29/2010 5:38:12 PM
Changes:	No Changes Made
Comments:	Routing to Registrar's Office

Role:	FEC Chair or Designee - Knapp, Raymond L (knapp@humnet.ucla.edu) - 62278
Status:	Approved on 9/29/2010 9:17:22 AM
Changes:	No Changes Made
Comments:	No Comments

Role:	L&S FEC Coordinator - Soh, Michael Young (msoh@college.ucla.edu) - 45040
Status:	Returned for Additional Info on 9/28/2010 3:21:34 PM
Changes:	No Changes Made
Comments:	Routing to FEC Chair Ray Knapp for approval

Role:	Dean College/School or Designee - Bicad, Mercedi G (mercyb@college.ucla.edu) - 54453
Status:	Approved on 9/28/2010 3:08:40 PM
Changes:	No Changes Made
Comments:	Acting as designee on behalf of Dean Joseph Rudnick, Physical Sciences, Office of the Deans - College of Letters and Science.

Role:	L&S FEC Coordinator - Soh, Michael Young (msoh@college.ucla.edu) - 45040
Status:	Returned for Additional Info on 8/25/2010 10:50:22 AM
Changes:	No Changes Made
Comments:	Routing to Mercy Bicad on behalf of Dean Rudnick for approval

Role:	CUTF Coordinator - Gentile, Catherine (cgentile@oid.ucla.edu) - 68998
Status:	Approved on 5/14/2010 4:32:33 PM
Changes:	No Changes Made
Comments:	on behalf of Professor Kathleen L. Komar, chair, Collegium of University Teaching Fellows

Role:	Initiator/Submitter - Gentile, Catherine (cgentile@oid.ucla.edu) - 68998
Status:	Submitted on 5/14/2010 4:30:57 PM
Comments:	Initiated a New Course Proposal

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Comments or questions? Contact the Registrar's Office at
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