California State University, San Marcos **FORM E-T**

• AUTHORIZATION TO OFFER TOPICS COURSES FOR ACADEMIC CREDIT THROUGH EXTENDED STUDIES •

(Note: Extended Studies sections of topic classes for which the appropriate form E-T is not on file in the Office of Academic Programs will be removed from BANNER as periodic audits of course offerings are performed.)

Note: Any proposed topic can only be offered two times before being converted to a non-topics course. Academic Programs will assign the appropriate suffix and edit the topic description provided.

1. College of: **Education** 2. Center/Program/Department: _____

3. Instructor_____
(If more than one instructor will be teaching the course, list full name of the "instructor of record.")

4. Topic Abbreviation and Number: **EDUC E592L** 5. Grading Method **N (Normal)**

6. Term **SUMMER** 7. Year **2007** 8. Variable Units* **2**

9. Has this topic been offered previously? ____Yes **X** No If yes, indicate term(s)_____Year_____

10. Topic Title: **Earth in the Solar System**

11. **Topic Description:** **Note: This part can be skipped if answer to part 9 is "yes."** (NOTE: Please provide detailed information about the topic. **Please type.** You may also attach the topic description on a separate sheet if you do not have enough space.

Learn more about our neighborhood in space. This course examines the Earth's relationship to the Sun, Moon, and other planets in the Solar System. The first week focuses on Earth-bound celestial observations and the origins of modern astronomy, including the development of the heliocentric model. Week two features an in-depth look at the Moon, our partner in space and the explanations for such phenomena as eclipses, phases, and tides. Weeks three and four present a detailed inventory of the Solar System including the planets, moons, meteoroids, asteroids, and comets. Finally, week five concludes with a close-up look at the star of our Solar System, the Sun, focusing on both its physical structure as well as its control over Earth.

12. Does this topic have prerequisites? No

13. Does this topic have co-requisites? No

14. Does the topic require consent for enrollment?____Yes _X_No
_____Faculty _____Credential Analyst _____Dean_____Program/Center/Department - Director/Chair

15. Is topic crosslisted:_____Yes ___X__No If yes, indicate which course_____and obtain signature in #18.

16. What resources are needed to offer this topic (including technology)?

17. Justification for offering this topic.

Offering this course online gives practicing teachers a flexible option for continuing their education. As graduate credit, it will qualify as electives in their Master's degree. Online courses and options to the traditional coursework for Master's Degrees have found to be in high demand as reflected in a recent survey by the College of Education.

* Enter units only if this is a variable-units topic course.

18. Does this topic impact any other disciplines? Note: This number can be skipped if answer to part 9 is "yes."

_____Yes __X__No If yes, obtain signature(s). Any objections should be stated in writing and attached to this form.

Discipline	Signature	Date	_____Support	_____Oppose
Discipline	Signature	Date	_____Support	_____Oppose

19. Location (if topic not offered at main campus) **Online**

20. Is this course being offered on-line? **X** Yes _____No

21. Is this a contract topic? **X** Yes _____No

22. Enrollment Limit: **30**

23. Requested Bldg/Room **N/A**
Please call Extended Studies first to reserve the room.

Please note: A separate Form E-T must be submitted for each section offered.

SIGNATURES

1. Program/Center/Department - Director/Chair — Date

2. College Dean (or Designee) — Date

The academic credentials of the instructor listed above are known to the Program/Center/Department (either regular faculty, or adjunct faculty with a curriculum vitae on file in the Program/Center/Department Office). The instructor is qualified to deliver the topic as described in part 9 (or on a previous Form T or Form E-T in the case of a topic that has already been offered).

3. Dean of Extended Studies (or Designee) — Date 06/01/07

Completed form received in the Office of Extended Studies

4. ~~Associate Vice President~~ for Academic Affairs – Academic Programs — Date 6/29/07

Note: This will need a thorough review if it's ever offered again.

For Academic Programs Use Only: 6/29/07 _____Banner _____Excel

Syllabus
EARTH IN THE SOLAR SYSTEM SYLLABUS

Course Description
This course examines the Earth's "place in space" and its relationships to the Sun and other planets of the solar system. The course is cross-disciplinary when appropriate and is especially designed for secondary school teachers who are currently teaching or who are preparing to teach courses in middle and high school Earth science. The course combines technical explanations of astronomical processes and phenomena with an explanation of the physical composition of the other planets, moons, and celestial objects found in our solar system. The original course content documents are supplemented with original animated graphics, other web-based resource links, and self-directed reviews of literature on various discussion topics presented during the course.

Course Delivery
Critical to the professional-development experience of teachers today is learning to function effectively in an online learning environment, one that is destined to expand in the future. Earth in the Solar System is an online course completed in five weeks, with an additional one-week grace period for submitting assignments. Although students may work on assignments offline, all course content, links to supplementary information, interaction among students in the class, class discussions, assessments, submission of assignments, and interaction with the instructor are carried out online, through email and the course site. This online format is designed for educators who need access to professional development on a flexible schedule and who are in different locations worldwide. Not all participants in this course will earn college credit; some are earning CEUs or auditing. Students earning college credit are required to participate in advanced discussions and complete all assignments.

About the Author
Stephen M. Tomecek is a geologist and educator who has spent the last 13 years as Executive Director of Science Plus, Inc., a company that provides science staff development and enrichment programs for schools and organizations throughout the United States. Prior to creating Science Plus, he worked as a science instructional specialist and Earth science teacher in New York City and served as the Science Program Supervisor for the New York Hall of Science.

Recommended Reading
Hataway, N. 1994. The Friendly Guide to the Universe. Viking.

Kolb, R. 1996. Blind Watchers of the Sky. Addison-Wesley.

Plait, P. 2002. Bad Astronomy. John Wiley and Sons.

Sagan, C. 1980. Cosmos. Random House.

Performance Objectives
In this course, students will:
1. Develop a broad understanding of the principles of solar system astronomy, including the origin of the Sun and planets, their physical makeup, and relationship to each other; an understanding of Moon phases, tides, and seasons; and future predictions for the Sun and the Earth.
2. Develop a classroom action plan on a selected aspect of the astronomy of the solar system for use with their own students. Unit plans will address state content standards and assessment areas and have a research base as a rationale for their instructional approaches.
3. Learn how to conduct an effective web search of online resources dealing with various topics in astronomy and share their findings with their course colleagues.
4. Critique other astronomy-related resources, such as articles in professional journals and books on astronomy and the solar system.
5. Learn different methodologies to present astronomy content to their students.
6. Share various teaching strategies with their classmates and present their own opinions on recent theories focusing on the Earth in the solar system, including the possibilities of life on other planets and the classification of planets, asteroids, and comets.

Course Outline
Week One: Early Theories About the Universe
This week provides a general introduction to early astronomical theories and explains the importance of the Copernican revolution.

Week One topics include:
A. The Day the Earth Stood Still. Describes the origins of the geocentric model of the universe and the work of Ptolemy. Includes an activity on celestial observations.
B. Earth Loses Center Stage. Introduces the heliocentric model. Explains how Copernicus solved the riddle of retrograde motion of the planets and includes a classroom activity for modeling the Earth's rotation.
C. Galileo's Telescope. Discusses how telescopic observations made by Galileo provided additional evidence for the heliocentric model of the universe. Includes an activity suggestion for organizing an evening star party.
D. Kepler's Laws. Describes the work of Kepler in developing his laws of planetary motion and his discovery of elliptical orbits. Includes a feature on Tycho Brahe and an activity on drawing ellipses.
E. Gravity Pulls Things Together. Explains the force of gravitational attraction and explains how Newton's discoveries help to support Kepler's laws. Includes a feature on Isaac Newton.
F. As the World Turns. Explains how parallax and the Foucault pendulum helped to confirm the concept that the Earth was in motion. Includes a classroom activity on measuring parallax.
G. Proving Earth Is Round. Explains Eratosthenes' method for measuring the circumference of the Earth and describes an activity for observing lunar eclipses.

Week One assignments:
Introduce yourself on the Teachers' Lounge Discussion Board. If you're a classroom teacher, tell us where you teach and how long you've been teaching. Also, let us know what you hope to get out of this course. If you'd like, you can also create a student homepage. Read the Course Documents for Week One. Conduct the celestial observation activity outlined in topic A for this week. Explain how your observations support either the heliocentric or geocentric model of the universe. Post your findings on the Course Assignment Discussion Board.

Discussion forum questions

You may respond to either one or two

1) What questions do you have about the course content on early theories ?
Restate in your own words concepts or theories which interest you or are new to you

or

2) When the heliocentric model of the universe was first proposed, it not only caused a stir in scientific circles, but also had tremendous impacts on both political and religious institutions. If you were trying to relate this to your students, can you think of any modern scientific theories that have had a similar impact?

Post your ideas to the Course Content and Application Discussion Board.

Week Two: The Moon
This week provides an introduction to the Moon, its origin, motions, and impact on the Earth.

Week Two topics include:
A. The Birth of the Moon. Describes several theories that explain the origins of the Moon and provides a description of its physical characteristics and internal structure.
B. The Lunar Surface. Discusses the surface features of the Moon, explaining the origins of the lunar seas, highlands, and craters. Includes student activities for making models of moonquakes and lunar seas.
C. Smiling Phases. Explains the lunar phase cycle and discusses the relationship between celestial motions and time. Includes a hands-on activity for students that models the Moon's phases.
D. Solar Eclipses. Discusses the importance of solar eclipses in the past and describes the geometric relationships needed in order for a total solar eclipse to occur.
E. Lunar Eclipses. Explains the geometry of lunar eclipses and provides a classroom demonstration for modeling umbral and penumbral shadows.
F. Time and Tides. Discusses the relationship between lunar motions, the phase cycle, and ocean tides on Earth.

Week Two assignments:

Read the Course Documents for Week Two. Model the student activity described in topic one for this week by completing a web search for Internet sites that provide current data on new discoveries that deal with the solar system/universe. Post your favorite to the Course Assignment Discussion Board and explain how you might use it in a lesson or homework activity with your class.

Week Two discussion forums

You may respond to either one or two

Forum Question One
What questions do you have about the course content on the moon, its origins, motions and impact on earth? Restate in your own words concepts which interest you or are new to you.

or

Forum Question Two
Consider the following discussion question: While the course documents go into many of the physical details about what makes our Moon special, the Moon has also had a tremendous impact on literature, music, and folklore. Sometimes the most effective science teaching "backs into" a subject via a non-science direction. How might you use some of these stories, legends, and songs about the Moon to introduce a lunar science lesson?

Post your ideas to the Course Content and Application Discussion Board.

Week Three: The Planets of the Solar System
This week provides an introduction to the nine known planets of the solar system, including their physical features and how they compare to Earth.

Week Three topics include:
A. Mercury. Describes the physical characteristics of the planet and includes a student activity on the naming of the planets.
B. Venus. Describes the planet's surface features and compares its atmosphere to that of Earth. Includes a demonstration on the greenhouse effect and discusses the possible connection to global warming on Earth.
C. Earth. Describes the unique role that water plays on our planet and discusses the importance of nutrient cycles in maintaining life on Earth. Includes an activity on building a simple terrarium.
D. Mars. Discusses recent discoveries on the "red planet" and how they compare to similar features found on Earth.
E. Jupiter. Discusses some of the unique features of the "king of the solar system" and includes a demo to show the fluid flow in the atmosphere.
F. Saturn. Describes the physical features of the planet, including a discussion about the dynamics of rings. Provides a focus on Saturn's largest moon, Titan, and how various space probes have helped to give Earth-bound scientists a close-up look at the planets of the outer solar system.
G. Uranus. Discusses the physical characteristics of the planet and the role that Caroline Hersche played in its discovery.
H. Neptune. Describes some of the features of this "last" planet and relates them to similar features found on Jupiter. Discusses some recent theories about its internal structure and includes a classroom activity on making a scale map of the solar system.
I. Pluto. Describes the unique physical features of both the planet and its moon Charon. Includes a student activity concerning the future status of Pluto as an "official" planet in the solar system.

Week Three assignments:
Read the Course Documents for Week Three. Review the current debate surrounding the status of Pluto and the newly discovered planet Sedna . Should Pluto and Sedna be considered planets? Over the last few years, a number of astronomers have raised this issue because of some of Pluto's unique characteristics. In addition, there is a growing body of evidence to suggest that many other celestial bodies in the Kuiper Belt share these same characteristics with Pluto. At least one institution has elected to remove Pluto from its list of planets, upsetting many people (including astronomers). Should Sedna be considered a planet ? What's your view? Post your findings on the Course Assignment

Discussion Board.

Week Three Discussion forums

You may respond to either one or two

Forum Question One

What questions do you have about the course content on the planets and their comparisons to earth? Restate in your own words concepts which interest you or are new to you about this topic.

or

Forum Question Two

Consider the following discussion question: While no specific launch date has been set, NASA does have long-range plans to send astronauts to Mars and possibly set up a base there. This prospect seems even more likely now that there is evidence to suggest that Mars has abundant amounts of water in the form of ice. More recent finding by Mars Rover Opportunity found geological evidence that water once flowed . In light of recent budget cuts, however, people are starting to question the need for sending astronauts on a complicated and expensive mission to Mars. The question is, should we do it? What do we hope to gain by setting up a base on Mars? Could the money be better spent on Earth-bound projects? What's your view? Post your ideas to the Course Content and Application Discussion Board.

Week Four: Big MAC's of the Solar System
This week provides an introduction to the remaining objects in the solar system, including moons, meteoroids, asteroids, and comets.

Week Four topics include:
A. Meteors, Meteoroids, and Meteorites. Explains the difference between these three related objects and discusses how these "space rocks" vary in composition. Includes an activity on crater formation and age dating.
B. Asteroids. Describes asteroids' origin, composition, and the impact some of them have had on Earth. Includes an activity relating asteroid impacts to catastrophic events in Earth history.
C. Comets. Discusses the composition, origin, and significance of comets as "fossils" of the solar system. Includes a classroom demonstration on how to make a model comet.
D. Io. Discusses recent discoveries on the most volcanically active object in the solar system that have scientists re-thinking some of the accepted ideas on volcanism.
E. Europa: An Ocean Runs Deep. Discusses how recent data from the Galileo space probe have helped to redirect scientists' search for extra-terrestrial life in the solar system.
F. The Birth of the Solar System. Describes the proposed process responsible for the formation of the present-day solar system and discusses how new data from other solar systems are helping scientists refine their models.

Week Four assignments:
Read the Course Documents for Week Four. In recent years, there has been a growing body of evidence that extra-terrestrial impacts from large asteroids and comets may have been responsible for several mass-extinction episodes in Earth's history. Using course documents and external sources, discuss the evidence being offered by supporters of the impact/extinction hypothesis and post your findings to the Course Assignment Discussion Board.

Week Four Discussion forums

You may respond to either one or two

Forum Question One

What questions do you have about the course content on meteors, moons and asteriods ? Restate in your own words concepts and information which interest you or are new to you about these topics.

Or

Forum Question Two

The discussion question for this week involves the possibility of life elsewhere in the solar system. For over two centuries, scientists have argued about it, and with the discovery of possible "fossils" on a Martian meteorite several years back, the arguments cranked back into high gear. Currently the search for life continues, but this time the focus is not on Mars, but on several of the moons surrounding Jupiter and Saturn. The question is, based on current ideas about the origins of life on our planet and given the conditions on Europa and Titan, what is the likelihood of finding other life forms in our solar system and what might they look like? How might you use these current discoveries to construct a lesson for your classes? Post your ideas to the Course Content and Application Discussion Board.

Week Five: The Sun
This week provides an introduction to the "star" of our solar system, the Sun, focusing on its origin, evolution, and eventual death.

Week Five topics include:
A. Origins of the Sun. Describes the current theories for the origin of the Sun and introduces the H-R diagram. Includes a student activity on locating present-day solar nurseries.
B. Structure of the Sun. Offers a review of the internal structure of the Sun as well as an activity on plotting sunspot cycles.
C. The Sun's Energy. Describes the process of nuclear fusion, explaining where the Sun's energy comes from. Discusses the problems associated with this energy model, especially when it comes to matching the theory with the current data on solar neutrinos.
D. Spectral Analysis of Stars. Discusses how the use of spectral analysis by astronomers allows them to understand the composition of objects many millions of miles away. Includes an activity on viewing different light spectra.
E. Solar Energy on Earth. Discusses how sunlight is the primary source of energy for our planet and explains how the greenhouse effect has been slowly warming the Earth. Includes a description of why we have seasons on Earth and how even small changes in the Sun's angle of insolation can have major effects on temperatures on Earth.
F. The Death of the Sun. Describes what many scientists think will happen to the Sun when it reaches the end of its life cycle.

Week Five assignments:
Read the Course Documents for Week Five. One of the most difficult concepts for students to understand is why the Earth has seasons. Based on course documents and external resources, develop a short outline of how you would present this concept to your students. Include any hands-on activities and web resources that you might use to get the concept across. Post your ideas to the Course Assignment discussion board.

Week Five Discussion forums

You may respond to either one or two

Forum Question One

What questions do you have about the course content on the sun? Restate in your own words concepts and information which interest you or are new to you about these topics.

Forum Question Two

The discussion question for this final week has to do with the energy the Sun provides us. While the Earth does have a small amount of self-contained "geothermal" energy, most of the energy we depend on for life comes from the Sun. Because Earth is a dynamic planet, and our atmosphere is in a constant state of change, the energy balance from the Sun is always changing. In the past, the Earth was subject to ice ages and today global warming is a major issue. While greenhouse gases like carbon dioxide do contribute to this warming, many scientists are quick to point out that long before humans were burning fossil fuels, the Earth was experiencing major climate swings. At least some of these

climate changes appear to tie into orbital variations. Back in the early 1900s, a scientist by the name of Milutin Milankovitch proposed a still controversial theory that says that the ice ages were caused by a series of orbital variations. Conduct a web search on his theory. Does it have any scientific merit?

Post your ideas to the Course Content and Application Discussion Board.

Take the final examination.

OK