Las Positas College
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Course Outline for EVST 5

ENERGY AND SUSTAINABILITY

Effective: Fall 2010

I. CATALOG DESCRIPTION:
EVST 5 — ENERGY AND SUSTAINABILITY — 3.00 units

Introduction and exploration of Energy production, utilization, management, and the effects on society and the environment. This course will also compare and contrast current and future renewable and non renewable methods of energy generation, auditing, and conservation. Strongly recommended: Eligibility for English 1A. 3 hours lecture.

3.00 Units Lecture

Prerequisite
ENG 1A - Critical Reading and Composition

Grading Methods:
Letter Grade

Discipline:

	MIN
Lecture Hours:	54.00
Total Hours:	54.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering the course a student should be able to:

A. ENG1A

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

1. describe the scientific principles underlying various forms of energy including the interaction of the Earth and Sun
2. use the scientific terminology for energy and associated units
3. describe and discuss historical and technological changes in the production and use of Energy
4. describe and discuss current primary methods of energy production locally, and globally
5. discuss the physical, political, and economic factors in energy production
6. describe and discuss the role of energy in key sectors of the economy, including transportation, manufacturing, agriculture, electricity, water. and heating
7. discuss the advantages and disadvantages of various forms of energy use and production, including the social, economic and the environmental effects of each method
8. discuss current and proposed methods of energy conservation, including Auditing, recycling, and reducing waste energy
9. describe and discuss emerging renewable energy technologies
10. discuss the advantages and disadvantages, and appropriate use of renewable energy technologies

V. CONTENT:

A. The Science of Energy.
   1. Relationship to mass, motion, Force, and Work
   2. Energy Units
   3. Kinetic and Potential Energy
   4. Energy Conservation
   5. Thermal Energy
   6. Heat Engines and Entropy
   7. Radiation
   8. Geologic Energy Sources
   9. Mass and Energy
   10. Energy from the Sun

B. Interaction of Earth and Sun
   1. Atmosphere of Earth
   2. Absorption, scattering, and transparency of atmosphere
   3. Formation of Life
   4. Photosynthetic processes
   5. Biological Energy Storage and Transport

6. Creation of fossil Fuels.
7. Greenhouse effect and Climate Change

C. History of Energy Technology
1. Preindustrial Technology
2. Early water and wind technology
3. Heat engines and industrial revolution
4. transportation systems
5. development and use of current fuels and energy productions systems

D. Contemporary Energy Technologies overview
1. Renewable vs. Non-Renewable
2. National Electrical Grid
3. Use of Coal, fossil Fuels, natural Gas
4. Nuclear Power
5. Total energy Budget
   a. National
   b. Global
   c. Projections

E. Renewable Technologies
1. Bioenergy
2. Solar thermal energy
3. Photovoltaic Power
4. Hydropower
5. Tidal Energy
6. Wave Energy
7. Wind Power
8. Geothermal Power
9. Alternative Transportation Systems

F. Energy Conservation
1. Energy Auditing
2. Insulation and Waste Energy
3. Fuel Economy and Electric Vehicles
4. Sustainable Building practices

G. Energy and Future
1. Population growth and Energy Use
2. Reducing Greenhouse Gasses
3. Public and Alternative Transportation
4. Sustainable Development

VI. METHODS OF INSTRUCTION:
A. **Lecture** - (may include demonstrations, video, and computer-based simulations)
B. **Discussion** - Group discussion of Assigned reading and Contemporary Topics
C. Individual and group skill building activities
D. **Field Trips** - Field trips (may include scheduled field trips to off-campus locations in the Greater Bay Area)
E. Oral presentations
F. Directed Internet based Research
G. Journal article review or research
H. **Written exercises and case studies** - Written assignments
I. Reading from Textbook and Current periodicals

VII. TYPICAL ASSIGNMENTS:
A. Complete weekly readings B. Prepare brief summaries, to be handed out in or discussed in class, of relevant contemporary articles found on print or internet based periodicals. C. Research paper on relevant and current issues of energy and sustainability. D. Prepare one or more oral presentations to be done individually or as a group.

VIII. EVALUATION:
A. **Methods**

1. Exams/Tests
2. Quizzes
3. Research Projects
4. Oral Presentation
5. Class Participation
6. Final Performance
7. Other:
   a. in class or on-line quizzes
   b. informed participation in class discussions and activities
   c. midterm exam
   d. Research Project
   e. Oral presentation
   f. Final Examination.

B. **Frequency**

1. 4 – 8 per semester
2. on-going
3. 1 per semester
4. 1 per semester
5. 1 – 2 per semester
6. once

IX. TYPICAL TEXTS:
1. Boyle, Geoffry *Renewable Energy, Power for a Sustainable World.*, -, 2004.
2. Friedman, Thomas *Hot, Flat, and Crowded*., -, 2008.

X. OTHER MATERIALS REQUIRED OF STUDENTS:
A. Access to the Internet and computers, through the LPC Computer Center, or access to a personal computer at home with an Internet connection