

**Fond du Lac Tribal and Community College**  
**COURSE OUTLINE FORM**

Updated 11/25/14

Please return this form to the college vice president of academic affairs and the chairperson of the Academic Affairs and Standards Council (AASC)

1. Prepared by: \_\_\_\_\_

2. Date submitted: \_\_\_\_\_

3. Date approved: \_\_\_\_\_ Date revised 04/22/15

4. Department/discipline: EUT/GEOG

5. Department(s) endorsement(s): \_\_\_\_\_

(Signatures of the person(s) providing the endorsement are required.)

6. Course Title: Alternative & Renewable Energy Systems

Abbreviated course title (25 characters or less): \_\_\_\_\_

7. Course Designator: EUT/GEOG 8. Course Level: 1025

9. Number of Credits: Lecture 3 Lab \_\_\_\_\_

10. Control Number (on site) 40 Control Number (online) \_\_\_\_\_

11. Catalog/Course description:

Students will become acquainted with the background issues, scientific and geographic concepts, and technologies of alternative and renewable energy systems. This course also explores the potential of solar, biomass, photovoltaics, wind, and other energy sources.

12. Course prerequisite(s) or co-requisite(s): Accuplacer scores/ Other courses

Prerequisite(s):

Co-requisite:

13. **Course Materials** (Recommended course materials and resources. List all that apply, e.g. textbooks, workbooks, study guides, lab manuals, videos, guest lecturers).

Texts to be determined yearly on the basis of content and availability and will be listed on the syllabus.

14. **Course Content** (Provide an outline of major topics covered in course)

1. Introduction and overview:

- a. Social and political implications
- b. Energy and environmental consciousness
- c. Sustainable development and economy
- d. Overview of types of alternative and renewable energy systems

2. Science of energy systems:

- a. Concept of energy-what is being measured?
- b. Concept of power-rate of energy usage
- c. Energy production, storage, transmission, distribution, grid density mapping vs usage.
- d. Measuring the environmental impact from energy sources and power systems

3. Conservation and demand-side management
  - a. Conservation
  - b. Embedded energy
  - c. Demand side management
  - d. Full cost pricing
4. Current non-renewable energy
  - a. Coal
  - b. Natural gas
  - c. Petroleum
  - d. Nuclear
5. Alternative and renewable energy sources and power systems
  - a. Distributed energy systems using non-renewable energy sources, position on the grid, value and problems with distributed systems and geographic locations.
  - b. Wind
  - c. Photo voltaic systems
  - d. Hydro
  - e. Bio Mass energy
  - f. Solar thermal and day lighting
  - g. Geothermal
  - h. Fuel Cells
  - i. Hydrogen, pumped hydro, flywheel energy storage, and other alternatives
6. Comparative evaluation of current, alternative, and renewable systems
  - a. Traditional economic assessments
  - b. Environmental impact assessments
  - c. Full cost pricing and sustainable systems assessments
  - d. Politics of energy incentives, real pricing implications
7. Future forecast for alternative and renewable energy sources and power systems.
  - a. Trends and needs for political and economic support
  - b. Developing an energy and environmental consciousness
  - c. Local, regional, national, and world initiatives
  - d. Politics of energy trading, world energy flow and ramifications of geographic location
8. Course summary, review and wrap-up  
 Student-selected construction or demo project of alternative/renewable energy

### 15. Learning Goals, Outcomes, and Assessment

At FDLTCC we have 4 Competencies Across the Curriculum (CAC) areas. They are as follows:

- A. Information Literacy (the ability to use print and/or non-print tools effectively for the discovery, acquisition, and evaluation of information)
- B. Ability to Communicate (the ability to listen, read, comprehend, and/or deliver information in a variety of formats.)
- C. Problem Solving (the ability to conceptualize, apply, analyze, synthesize, and/or evaluate information to formulate and solve problems.)
- D. Culture (knowledge of Anishinaabe traditions and culture, knowledge of one's own traditions and culture, knowledge of others' traditions and cultures, culture of work, culture of academic disciplines and/or respect for global diversity.)

Course Learning Outcomes will fulfill the identified competencies:

*Course Learning Outcomes*

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

1. Identify characteristics of Alternative and Renewable Energy Systems. (A, B)
2. Present a verbal report on a Renewable energy project. (B)
3. Produce a written report on a Renewable energy project. (B)
4. Research a current Renewable energy topic, present case and defend position. (A, B, C)
5. Discuss the power grid and the geographic differences of production and use. (B, C)

16. **Minnesota Transfer Curriculum (MnTC):** If this course fulfills an MnTC goal area, state the goal area and list the goals and outcomes below:

See [www.mntransfer.org](http://www.mntransfer.org)

Goal Area(s): 10

Goal 10: People and the Environment

Goal and Outcomes: **Students will be able to:**

- Describe the basic institutional arrangements (social, legal, political, economic, religious) that are evolving to deal with environmental and natural resource challenges.
- Evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions.
- Propose and assess alternative solutions to environmental problems.
- Articulate and defend the actions they would take on various environmental issues.