COURSE SYLLABUS

Tunxis Community College

Education That Works For a Lifetime

Course Title:	Applied Renewable Energy Systems	**Date submitted:**	March 2020 (ACC: 20-18)
Department:	STEAM		
Curriculum:	Tech Studies: Energy Management Option		

Course Descriptors: Make certain that the course descriptors are consistent with college and Board of Trustees policies, and the current course numbering system.

Course Code: (eg. ACC 101)	**NRG 130**
Course Type:	**X**

A: Clinical B: Lab D: Distance Learning
I: Individual/Independent L: Lecture N: Internship
M: Seminar P: Practicum U: Studio
X: Combined Lecture/Lab Y: Combined Lecture/ Clinical/Lab Z: Combined Lecture/Studio

Elective Type:	**G**

AH: Art History E: English FA: Fine Arts G: General
HI: History HU: Humanities LA: Liberal Arts
FL: Foreign Language M: Math S: Science
SS: Social Science

Credit Hours:	3
Developmental: (yes/no)	No
Contact Hours: Lecture:	1.5
Clinical:	0
Lab:	1.5
Studio	0
Other:	0
TOTAL:	3
Class Maximum:	24
Semesters Offered:	Sp/F

Prerequisites:

C- or higher in PHY 121 – General Physics I AND NRG 123 – Energy Efficiency Methods

Corequisites:

None

Other Requirements:

None

Catalog Course Description:

Focuses on the practical application of renewable energy technologies. Topics include energy and resource conservation and project siting, economics, financing, renewable energy and tax credits, technical and engineering aspects, regulatory issues, energy storage, monitoring and verification. Students study the advantages, limitations and potential of various energy sources. Wind, solar, small-scale hydro, ground-source heat pumps, combined heat and power, biofuels, fuel cells, and other technologies are examined. Students will learn the strategies and cost/benefit analyses employed by energy analysts to meet demand with clean energy production. Students will also complete their own study and proposal for a renewable energy project.

Topical Outline: List course content in outline format.

- Energy Sources and Environmental Effects
- Electrical Fundamentals
- Solar Photovoltaics
  - Solar Power Systems - Electrical
  - Solar Power Systems - Thermal
  - Solar Tracking
  - Detailed design project using commercial design methods and tools

<table>
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Charge Controllers
Inverters

Wind Power Fundamentals

Wind Power Systems
Wind Turbine Control

Biomass Technologies
Geothermal Power Generation
Hydropower
Fuel Cells
Second class project based on technology to be selected
Generators
Connecting to The Grid
The Big Picture, Putting It All Together

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<tr><td rowspan="3">Outcomes:
Describe measurable skills or knowledge that students should be able to demonstrate as evidence that they have mastered the course content.</td><td>Upon successful completion of this course, the student will be able to do the following:
1. demonstrate an ability to use critical thinking and problem-solving skills to evaluate business energy use and how and when to apply renewable energy solutions
2. demonstrate an understanding of, and assess the obstacles associated with implementation of renewable energy systems
3. evaluate the advantages, limitations and potential of various clean energy sources for buildings and businesses
4. demonstrate an understanding and familiarity with engineering and financial aspects of projects
5. demonstrate an understanding and familiarity with the regulatory aspects of renewable energy projects
6. demonstrate an understanding and familiarity with the State policies, financing and utility-led programs in CT
7. produce a clean energy project proposal</td></tr>
<tr><td>TECH STUDIES PROGRAM, ENERGY OPTION: (Numbering reflects Program Outcomes as they appear in the college catalog)

2. utilize the tools, materials, techniques, and technical processes of engineering and technology when solving technical problems
6. identify energy conversion processes and their relation to engineering and technology</td></tr>
<tr><td>GENERAL EDUCATION:

None</td></tr>
<tr><td>Evaluation:
List how the above outcomes will be assessed.</td><td>Assessment will be based on the following criteria:
Class Participation
Homework Assignments
Project Presentation(s)
Quizzes/Tests</td></tr>
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Instructional Resources: List library (e.g. books, journals, on-line resources), technological (e.g. Smartboard, software), and other resources (e.g. equipment, supplies, facilities) required and desired to teach this course.	**Required:** Smartboard **Desired:**
Textbook(s)	Suggested: Renewable Energy Systems, David Buchla, Thomas Kissell and Thomas Floyd, Pearson, 2015, ISBN: 978-0-13-262251-6. Hardcopy available in the bookstore, eBook available at http://www.mypearsonstore.com/bookstore/renewable-energy-systemssubscription-9780133082012?xid=PSED Integration of Renewable Sources of Energy, 2nd Edition, Felix A Farret and M. Godoy Simoes, Wiley, 2018, ISBN: 978-1-11-913737-5, available in the library, intended for reference only.