RC 200

Basic Energy Principles

3 Credits

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Reviewer: James Woodhouse

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Alternate Delivery: Yes

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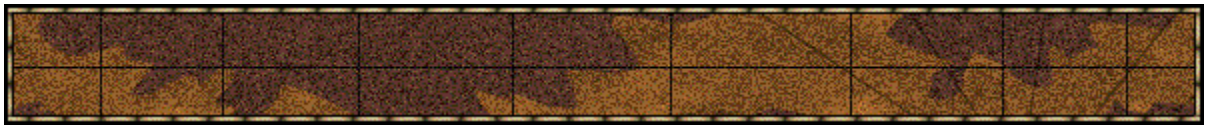

Basic Energy Principles

Calendar Description

This course provides a basic understanding of the principles of energy systems, including electricity, heat, energy movement and water flow. The course also examines the principles related to energy storage and transfer. The course provides a basic math review and provides practice with the basic types of calculations used in the energy industry.

Rationale

This is a required course for the Sustainable Energy Technology program. This is usually the first course students take in the Sustainable Energy Technology program and is prerequisite to further study in solar, wind, geothermal and bioenergy topics. A solid understanding of the basic principles of math and physics is necessary to work effectively in any renewable energy career and to continue with any in-depth study of the related topics. Topics covered in RC200 provide the foundation to prepare students increasing their understanding of the physical world and help them perform feasibility analysis, design calculations and system evaluations required by the subsequent courses in the program. Mathematics is a form of communication and this course helps students communicate effectively through math. Practical calculation skills are developed that ensure students target 100% accuracy in the information they may provide clients as a renewable energy practitioner. Errors in calculations during the design process must be eliminated reducing the risks of project failures, unhappy customers and possible litigation.

Prerequisites

Co-Requisites

None

Course Learning Outcomes

Upon successful completion of this course, students will be able to

1. perform mathematical calculations.
2. using correct electrical terminology, solve diverse problems related to renewable energy.
3. define temperature and heat, using the proper terms when discussing heat energy.
4. define the three modes of heat transfer, including the role of insulation and heat loss.

5. calculate heat flow for several situations of conduction.
6. apply mathematics to fluid properties.
7. recognize pump types and operation principles.
8. analyze forces and reactions on simple bodies, applying Newton's Laws of Motion.
9. calculate work and the power produced or required in various situations.

Resource Materials

***Required Text(s)*:**
No textbook is required. The course notes are downloaded from the learning manager system and contain most of the necessary information. Each learning activity identifies any supplemental on-line resources required.
A small electronics kit is provided with the course that students use to complete select assignments.

***Reference Text(s)*:**
The Internet is referenced with suggested search topics.

Conduct of Course

This course consists of the equivalent of 45 hours of lecture delivered on-line using an online learning manager program. The course is delivered over a set 8-week period. Course content modules and links to assigned readings are available on-line. A course facilitator/instructor is available to guide the learner through the course, answer any questions, and grade assignments and exams. Learners are expected to participate in on-line discussion forums and synchronous conference discussions with other classmates and the course facilitator. Assignments are submitted electronically through the learning manager program. Open book unit exams are taken on-line. Exams and assignments are marked by the instructor and returned to the student with a grade and comments in the learning manager program. Students can monitor their progress though the course using utilities available in the learning manager program. In order to complete the course on time, deadlines for assignments, exam, and projects are enforced.

Evaluation Procedures

Each module has unit assignments/assessments that are evaluated. The percentage for each item is as follows:

Introduction - Marked Discussion	2%
Assignment 1.1 - Numbers and Units	3%
Assignment 1.2 - Using Formulae	2%
Assignment 1.3 - Geometry and Trigonometry	2%
Assessment 2.1 - Circuits Lab	6%
Assessment 2.2 - Electricity	6%
Assessment 3.1 - Heat	9%

Assessment 4.1 - Fluid Flow	8%
Assessment 5.1 - Power and Energy	8%
Discussion 5.2 - Lessons Learned	4%
Midterm Exam	15%
Final Exam	35%
Total	100%

Grade Equivalents and Course Pass Requirements

A minimum grade of D (50%) (1.00) is required to pass this course.

Letter	F	D	D+	C-	C	C+	B-	B	B+	A-	A	A+
Percent Range	0-49	50-52	53-56	57-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-100
Points	0.00	1.00	1.30	1.70	2.00	2.30	2.70	3.00	3.30	3.70	4.00	4.00

Students must maintain a cumulative grade of C (GPA - Grade Point Average of 2.00) in order to qualify to graduate.

Attendance

Active participation is required in all courses within the Sustainable Energy Technology certificate and diploma programs. Each facilitator designates these requirements through the use of tools within the management system and personal contact with learners.

These expectations can be given marks as part of the assessment process. Each course outlines these expectations within the course structure.

For example, learners can be asked to demonstrate their participation/attendance through discussion forums, sharing research results, contributing relevant information, submitting assignments, communicating with colleagues and the facilitator, and participating in synchronous meetings or asynchronous activities.

Attendance is considered vital to the learning process. Absenteeism is recorded. For example, if a discussion forum is organized; the learner is expected to attend as per the guidelines set by the facilitator.

Students can request for an excused absence. An excused absence is one that is verified with your facilitator.

NOTE: Any exceptions to the above attendance policy (e.g. family or work-related issues) **must** be approved in writing by the Department Chair **prior** to the beginning of the course.

It is the student's responsibility to know their own absentee record.

Course Units/Topics

1. Mathematics
    - introductions
    - introduction to renewable energy and writing numbers
    - units
    - using formulae
    - geometric formulae
    - trigonometry
2. Electricity
    - terms and units
    - Ohm's law and measurements
    - power and energy
    - series and parallel
    - current types and rectification
    - wire size selection
3. Heat
    - temperature and heat
    - heat transfer and insulation
    - heat transfer calculations
4. Fluid Flow
    - fluid basics
    - pumps
5. Mechanical Power and Energy
    - energy, pressure, force and acceleration
    - mechanical work and power

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