

## Clackamas Community College

### Online Course/Outline Submission System

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#### Section #1 General Course Information

**Department:** Manufacturing

**Submitter**

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**Course Prefix and Number:** IMT - 225

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**# Credits:** 2

**Contact hours**

Lecture (# of hours):

Lec/lab (# of hours): 44

Lab (# of hours):

Total course hours: 44

For each credit, the student will be expected to spend, on average, 3 hours per week in combination of in-class and out-of-class activity.

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**Course Title:** Electromechanical Systems II

**Course Description:**

This course in renewable systems will provide in-depth understanding of the technology, economics and policies relevant to each type of energy source. Analysis techniques to evaluate renewable energy applications from a systems design and selection perspective will be presented. Topics include physical operating principles, theoretical vs. actual system output, energy storage, efficiency and cost analysis. Includes hands-on lab exercises.

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**Type of Course:** Career Technical Preparatory

**Is this class challengeable?**

**Yes**

Can this course be repeated for credit in a degree?

**No**

Is general education certification being sought at this time?

**No**

Does this course map to any general education outcome(s)?

**No**

Is this course part of an AAS or related certificate of completion?

**Yes**

**Name of degree(s) and/or certificate(s):** Industrial Maintenance Technician – Eventually

Are there prerequisites to this course?

**Yes**

**Pre-reqs:** IMT-215

**Have you consulted with the appropriate chair if the pre-req is in another program?**

**No**

Are there corequisites to this course?

**No**

Are there any requirements or recommendations for students taken this course?

**No**

Are there similar courses existing in other programs or disciplines at CCC?

**No**

Will this class use library resources?

**Yes**

**Have you talked with a librarian regarding that impact?**

**No**

Is there any other potential impact on another department?

**No**

Does this course belong on the Related Instruction list?

**No**

**GRADING METHOD:**

A-F or Pass/No Pass

**Audit: Yes**

When do you plan to offer this course?

✓ **Spring**

Is this course equivalent to another?

If yes, they must have the same description and outcomes.

**Yes**

Course Number: RET-211 Title: Renewable Energy II: System Fundamentals

Will this course appear in the college catalog?

**Yes**

Will this course appear in the schedule?

**Yes****Student Learning Outcomes:**

Upon successful completion of this course, students should be able to:

1. explain energy principles and how they relate to using renewable energy sources,
2. describe the technology of each of the sources of renewable energy,
3. explain environmental impact and safety of each source of renewable energy,
4. explain economic issues around renewable energy sources,
5. evaluate, compare and select energy systems based on economic and environmental considerations.

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***This course does not include assessable General Education outcomes.***

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**Major Topic Outline:**

1. Why Renewables?
2. Methods of analysis for renewable energy technologies.
3. Renewables: Cost and Performance.
4. Energy Policy.
5. Overview of renewable energy systems.
  - a. Energy mathematics and basics for each type of renewable energy.
  - b. Economics and environmental factors of each type of energy.
6. Energy efficiency and design relative to:
  - a. Passive Solar.

- a1. Solar utilization in buildings.
- a2. Design related efficiency.
- a3. System Elements.
- a4. Functional systems.
- a5. Passive solar mathematics.
- b. Solar Thermal Systems.
  - b1. Design efficiency (energy chain & losses).
  - b2. System elements.
  - b3. Applications.
  - b4. Solar thermal mathematics.
  - b5. Economic factors.
  - b6. Environmental factors.
- c. Solar Thermal Power Plants.
  - c1. Solar thermal plant design – collector & plant types.
  - c2. Design related efficiency.
  - c3. System Elements.
  - c4. Solar thermal power plant mathematics.
  - c5. Economic factors.
  - c6. Environmental factors.
- d. Photovoltaic Systems.
  - D1. Photovoltaic system design.
  - D2. Design related efficiency.
  - D3. System elements.
  - D4. Grid tied systems –Off grid systems.
  - D5. Photovoltaic systems mathematics.
  - D6. Economic factors.
  - D7. Environmental factors.
- e. Wind Power.
  - e1. Wind Turbine Design.
  - e2. Design related efficiency.
  - e3. System Elements.
  - e4. Power control.
  - e5. Wind parks (farms).
  - e6. Off-grid applications.
  - e7. Wind power mathematics.
  - e8. Economic factors.

Does the content of this class relate to job skills in any of the following areas:

- |                                      |           |
|--------------------------------------|-----------|
| 1. Increased energy efficiency       | <b>No</b> |
| 2. Produce renewable energy          | <b>No</b> |
| 3. Prevent environmental degradation | <b>No</b> |
| 4. Clean up natural environment      | <b>No</b> |
| 5. Supports green services           | <b>No</b> |

Percent of course: 0%

First term to be offered:

**Next available term after approval**

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