# Energy Industry Fundamentals Course No. 41105 Credit: 1.0

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| **Student name:**  |  | **Graduation Date:** |  |

Pathways and CIP Codes:Energy (17.2071)

Course Description: This **technical level** course is an opportunity to directly link to a nationally recognized industry credential. Links to further information and an Instructor guide can be found at these locations: http://www.cewd.org/index.php - The Center for Energy Workforce Development (source of this work)http://www.cewd.org/curriculum/about-the-eifcertificate.php - Information about the EIF Certificate, the curriculum, and the Instructor’s guide. The course also leads to an industry recognized badge. **These competencies are an overview and are not intended to supplant the Instructor’s Guide. They are offered as a basic understanding of essential concepts to be covered.** Course required for pathway approval.

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

## Benchmark 1: WIND TECHNICIANS (for additional details on required competencies, go to www.centralia.edu/coe)

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | Foundational Science and Engineering Concepts. |  |
| 1.2 | Is able to describe the power generation delivery grid system from generation to end user including VARS (Vertical and Azimuth Reference System). |  |
| 1.3 | Describes wind energy and the way it is harnessed. |  |
| 1.4 | Defines kinetic energy. |  |
| 1.5 | Lists and describes the topography and weather patterns of states that effectively harness wind. |  |
| 1.6 | Explains hydraulics (brakes and/or blade/tip pitching). |  |
| 1.7 | Comprehends gearing, fasteners, torquing, and lubrication (oils and greases). |  |
| 1.8 | Comprehends how Material Safety Data Sheets (MSDS) are utilized. |  |
| 1.9 | Has a basic understanding of aviation terminology and basic aerodynamics (physics). |  |
| 1.10 | Is knowledgeable in instrumentation and controls logic theory. |  |
| 1.11 | Has a basic understanding of fiber optics. |  |
| 1.12 | Has an understanding of basic rigging. |  |
| 1.13 | Is knowledgeable in wind turbine concepts such as: Statics dynamics, Thermodynamics, & Basic Meteorology. |  |

## Benchmark 2: Solar Technicians

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 2.1 | Describes solar energy and how it is harnessed. |  |
| 2.2 | Explains the differences between passive solar and active solar. |  |
| 2.3 | Is able to diagram Photovoltaic cells (e.g. array, panel, module and boron‐ enriched silicon). |  |
| 2.4 | Describes a central receiver system. |  |
| 2.5 | Identifies parts of a solar plant. |  |

## Benchmark 3: Biomass & Biofuels Technicians

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 3.1 | Discusses the major sources of biomass. |  |
| 3.2 | Defines biofuels (e.g. ethanol, biodiesel and methanol). |  |
| 3.3 | Outlines the pyramid of energy flow, including the different trophic levels. |  |
| 3.4 | Describes the major sources, scale and impacts of biomass energy. |  |
| 3.5 | Measures and monitors raw biomass feedstock, including wood, waste or refuse materials. |  |

## Benchmark 4: Geothermal Technicians

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 4.1 | Defines geothermal. |  |
| 4.2 | Identifies how geothermal energy can be used for generation. |  |
| 4.3 | Explains the process used for Geothermal Heat Pumps (GHP) and exchange. |  |
| 4.4 | Identifies and corrects malfunctions of geothermal plant equipment, electrical systems, instrumentation or controls. |  |
| 4.5 | Calculates heat loss and heat gain factors for residential properties to determine heating and cooling required by installed geothermal systems. |  |
| 4.6 | Designs and lays out geothermal heat systems according to property characteristics, heating and cooling requirements, piping and equipment requirements, applicable regulations or other factors. |  |
| 4.7 | Determines the type of geothermal loop system most suitable to a specific property and its heating and cooling needs. |  |

## Benchmark 5: Hydropower & Marine Energy Technicians

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 5.1 | Defines hydropower. |  |
| 5.2 | Explains how hydropower works. |  |
| 5.3 | Describes ways that hydropower can be utilized without harming fish and wildlife. |  |
| 5.4 | Defines marine energy. |  |
| 5.5 | Explains how marine energy works. |  |

## Benchmark 6: Gas Transmission & Distribution

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 6.1 | Complies with the procedures necessary to ensure a safe and healthy work environment. |  |
| 6.2 | Lays out, assembles, installs and maintains pipe systems and pipe supports for use in the transmission and distribution of natural gas. |  |
| 6.3 | Reads, understands and creates basic prints used in the design, operation and maintenance of gas networks including engineering drawings, diagrams and schematics. |  |
| 6.4 | Inspects service lines and house lines, investigates leak fume complaints, restores and terminates gas service and performs pressure checks at customer’s premises. |  |
| 6.5 | Is able to use equipment to detect leaks both in a customer’s premises or outdoors such as CGI gas scope leak machine and Gas Ranger. |  |

## Benchmark 7: Nuclear Generation: Technical skills and knowledge necessary for nuclear power plant personnel reactor. Theory and Operations:

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 7.1 | Explains the general design overview of the basic reactor types. |  |
| 7.2 | Demonstrates understanding of reactor startup and shutdown procedures. |  |
| 7.3 | Explains the fission process including the construction of fission product barriers. |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

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