|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Unit Title: | Solar Photovoltaics |  | Grade: | 8-12 |

|  |  |
| --- | --- |
| Learning Styles: | All students have different learning styles, and we are using a mixture, based on seven recognized learning styles: Visual, Aural, Verbal, Physical, Logical, Social and Solitary. We believe this module incorporates different learning styles and that vicarious learning on the part of a student is critical for growth. Learning styles in this module include:•Visual: Pictures and images used•Verbal: Words to help convey meaning•Social: Students should discuss |
|  |  |
| Unit Description: | This unit will explain basic principles of Photovoltaics. Additionally, it will demonstrate how to effectively incorporate PV systems into stand-alone or interconnected electrical systems. This module will introduce and apply key terms to system operations.  |
|  |  |
| Instructional Objectives: | The curriculum is designed to achieve the following objectives for each individual area.Radiation1. Solar photovoltaics2. Irradiance3. Insolation4. Declination5. Solar window6. Sun hoursOff grid vs Connected1. Stand alone or connected2. Electrical grid3. Electrical loads4. AutonomyCells, Modules, Arrays1. Solar Cells2. Semiconductor3. P/N junction4. Sizing5. ConfigurationsInverters1. AC and DC voltage2. Sine waves3. Types of invertersRacking1. Racking systems2. Mechanical considerations3. Roof mounting4. Ground mounting |
| Estimated Time: | 10-14 hours depending on students |
|  |  |
| Teaching Strategies: | Lecture: Present materials in a structured manner.Active Learning: Promote active learning and critical thinking in discussion. Seek from students in discussion real-life applicability for the use of renewable energy resources and the concepts provided.  |
|  |  |
| Assessments: | At the end of each power point have the students answer questions based on the power point. At the end of the module create an assessment combining the five power points which the student can demonstrate basic knowledge of the subject. The assessment should be based upon discussions and power points. |
|  |  |
| Instructional Outcomes: | The outcomes for this unit include:1. The student will identify residential systems.2. The student will discuss the relationships between the sun and earth.3. The student will explain key terms in PV.4. The student will compare off-gird and on-grid applications.5. The student will recognize different collectors.6. The student will compare different collectors and efficiency.7. The student will identify different controls.8. The student will apply the appropriate electrical terminology.9. The student will explain the electrical grid.10. The student will understand the schematic of a PV layout. |

“This document was prepared by Northeast Iowa Community College under award EG-17-004 from the Iowa Energy Center. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the Iowa Energy Center.”