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Northeast Wisconsin Technical College

10-483-106 058178 Solar Advanced System Design

Course Outcome Summary

Course Information

Description	10-483-106 SOLAR ADVANCED SYSTEM DESIGN ... troubleshooting and repairing renewable thermal and electric equipment; diagnosing faulty equipment; selecting replacement parts; preparing a detailed work order. (Prerequisites: 10-483-107, Solar Thermal Design & Site; 10-482-132, Photovoltaics-Design & Site; 10-482-133, Photovoltaics-Adv; Corequisite: 10-483-108, Solar Thermal Advanced)
Total Credits	4
Total Hours	108

Course History

Last Revision Date	2/27/2017
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Pre/Corequisites

10-483-104 Solar Thermal Design & Site
10-482-120 Photovoltaic Design & Site
10-482-125 Photovoltaics - Advanced
Corequisite: 10-483-105 Solar Thermal - Advanced

Employability Skills

Communicate Effectively
Demonstrate Community and Global Accountability
Demonstrate Personal Accountability
Solve Problems Effectively
Think Critically and Creatively
Value Individual Differences and Abilities
Work Cooperatively and Professionally

Program Outcomes

TSA1 - Evaluate renewable, fossil and other energy resources in context of sustainability, environment, society and economics

TSA2 - Evaluate building performance and energy use

TSA3 - Recommend building/site solutions to optimize performance

TSA4 - Install equipment and materials to optimize performance

TSA5 - Service equipment and systems

Course Competencies

1. Evaluate Various Types of Solar Energy Business Structures

Assessment Strategies

by describing various types of solar energy business structures and what employment opportunities they offer.

Learning Objectives

- 1.a. Research various types of businesses that make up the solar industry.
- 1.b. Investigate the role of the installer & integrator in the solar industry.
- 1.c. Compare the differences between an integrator and a design-build company.
- 1.d. Locate several equipment distributors in the solar industry and determine the services they can provide installers and integrators.

Criteria

Your performance will be successful when:

- you explore various types of businesses that make up the solar industry.
- you describe the role of the installer & integrator in the solar industry.
- you differentiate between an integrator and a design-build company.
- you describe the role of the distributor in the solar industry.
- you describe the role of the equipment manufacturer in the solar industry.

2. Investigate Employment Opportunities in the Solar Energy Industry

Assessment Strategies

by articulating numerous employment opportunities in the solar energy industry

Learning Objectives

- 2.a. Determine where your interests are in the solar industry.
- 2.b. Research the types of job opportunities that are available in the solar industry.

Criteria

Your performance will be successful when:

- you evaluate where your interests are in the solar industry.
- you describe several job descriptions that interest you.

3. Prepare Documents for your Job Search in the Solar Energy Industry

Assessment Strategies

by preparing a sample letter of recommendation, cover letter and resume.

Learning Objectives

- 3.a. Evaluate sample resumes for suitability to the solar industry
- 3.b. Examine samples of cover letters that are written to accompany resumes.
- 3.c. Review samples of letters of recommendation.

Criteria

Your performance will be successful when:

- you compose a letter of recommendation for yourself from the perspective of your instructor.
- you compose a cover letter to accompany your resume.
- you compose your resume.

4. Prepare Employee Record Keeping Documents including Time Sheets & Service Reports

Assessment Strategies

by developing employee record keeping items such as time sheets and service reports.
by using time sheets and service reports.

Learning Objectives

- 4.a. Compare a variety of time sheets that are used for employee payroll and project costing.
- 4.b. Review field service reports used in the electrical, HVAC, and solar industries.

Criteria

Your performance will be successful when:

you develop a time sheet to be used for employee payroll and project costing.
you develop a template for field service call reporting.
you utilize a time sheet for various projects.
you utilize a field service report.

5. Develop Project Bill of Materials & Job Costing Documents

Assessment Strategies

by developing a project bill of material.
by job costing documents.

Learning Objectives

- 5.a. Examine bills of material that can be used for job costing and or purchase requisitioning for electrical and mechanical construction projects.

Criteria

Your performance will be successful when:

you develop a complete and accurate bill of material.
you develop a complete and accurate job costing document.

6. Monitor & Evaluate Renewable Energy Systems

Assessment Strategies

by evaluating and using renewable energy system monitoring and comparing the data to estimated performance data.

Learning Objectives

- 6.a. Investigate several built in and remote monitoring systems available in the PV and Solar Thermal market.
- 6.b. Review typical PV system energy production and compare to actual output of available monitored systems.
- 6.c. Review Solar Thermal system estimated energy production and compare to actual output for available monitored systems.
- 6.d. Explore available on line monitored wind turbines, hydroelectric, or other renewable energy system and compare actual output to estimated output.

Criteria

Your performance will be successful when:

you evaluate several built in and remote monitoring systems available in the PV and Solar Thermal market.
you monitor a PV system and compare actual output to estimated output.
you monitor a Solar Thermal system and compare actual output to estimated output.
you monitor and document a wind turbine, hydroelectric, or other renewable energy system and compare actual output to estimated output.

7. Investigate current Industry Trends, Procedures & Policies

Assessment Strategies

by reviewing and presenting current industry trends, procedures and policies.

Learning Objectives

- 7.a. Investigate current trends in the PV industry.

- 7.b. Examine current trends in the Solar Thermal industry.
- 7.c. Review current renewable energy policies at the local, state and federal level.

Criteria

Your performance will be successful when:

- you present current trends in the PV industry.
- you present current trends in the solar thermal industry.
- you analyze current renewable energy policies at the local, state and federal level.

8. Incorporate Safety Procedures into the Workplace & Jobsite

Assessment Strategies

by reviewing and explaining safety rules and regulations in the workplace and on the jobsite.

Learning Objectives

- 8.a. Review OSHA requirements for job safety.
- 8.b. Review OSHA requirements that are specific to the solar industries.
- 8.c. Evaluate the safety record of the solar industry and compare to other similar industries.

Criteria

Your performance will be successful when:

- you review and explain OSHA requirements for job safety.
- you review and explain OSHA requirements that are specific to the solar industries.
- you evaluate the safety record of the solar industry and compare to other similar industries.

9. Design PV Systems

Assessment Strategies

by designing PV systems.

Learning Objectives

- 9.a. Review examples of a residential PV systems.
- 9.b. Examine examples of a commercial PV systems.
- 9.c. Explore examples of off grid PV systems.

Criteria

Your performance will be successful when:

- you design a residential PV system.
- you design a commercial PV system.
- you design an off grid PV system.

10. Design Solar Thermal Systems

Assessment Strategies

by designing solar thermal systems.

Learning Objectives

- 10.a. Review types of residential solar hot water heating systems.
- 10.b. Review examples of commercial water and or process heating systems.
- 10.c. Review examples of solar air heating systems.
- 10.d. Review examples of transpired wall solar air heating systems.
- 10.e. Examine examples of thermal storage systems.

Criteria

Your performance will be successful when:

- you design a residential solar hot water heating system.
- you design a commercial water and or process heating system.
- you design a solar air heating system.
- you design a transpired wall solar air heating system.
- you design a thermal storage system.

11. Install PV System(s)

Assessment Strategies

by installing and working on one or more PV systems.

Learning Objectives

- 11.a. Review permitting and utility intertie applications and agreements.
- 11.b. Apply job site safety procedures.
- 11.c. Incorporate NEC section 690 and other pertinent code sections.
- 11.d. Install racking, modules, inverter(s) and BOS components.
- 11.e. Draw as built one line and full wiring diagrams.
- 11.f. Utilize proper grounding techniques
- 11.g. Utilize proper wiring techniques.
- 11.h. Inspect all aspects of the installation.
- 11.i. Test system operation.
- 11.j. Compile system specifications, manuals and operating procedures.

Criteria

Your performance will be successful when:

you install and service one or more working PV system.

12. Install Solar Thermal System(s)

Assessment Strategies

by installing and working on one or more solar thermal systems.

Learning Objectives

- 12.a. Review permitting requirements
- 12.b. Apply job site safety procedures.
- 12.c. Incorporate pertinent plumbing and electrical codes.
- 12.d. Install racking, panels, piping, and BOS components.
- 12.e. Draw as built piping and wiring diagrams.
- 12.f. Utilize proper wiring techniques.
- 12.g. Utilize proper soldering & pipe joining techniques.
- 12.h. Utilize proper insulating materials and techniques.
- 12.i. Inspect all aspects of the installation.
- 12.j. Flush, fill, test & charge all piping.
- 12.k. Test system operation.
- 12.l. Compile system specifications, manuals and operating procedures.

Criteria

Your performance will be successful when:

you install and service one or more solar thermal systems.

13. Select System Components

Assessment Strategies

by selecting system components for PV and solar thermal systems.

Learning Objectives

- 13.a. Review the function of each major components and all balance of system components for a PV system.
- 13.b. Review the function of each major components and all balance of system components for a solar thermal system.
- 13.c. Investigate examples of the specifications for system components for a PV system.
- 13.d. Explore examples of specifications for system components for a solar thermal system.

Criteria

Your performance will be successful when:

you describe the function of each major components and all balance of system components for a PV system.

you describe the function of each major components and all balance of system components for a solar thermal system.

you write the specifications for system components for a PV system.

you write the specifications for system components for a solar thermal system.

14. Apply Electrical & Plumbing Code to Project Design & Installation

Assessment Strategies

by describing applicable electrical and plumbing codes to the solar electric and solar thermal industries.

Learning Objectives

14.a. Review electrical codes that apply to solar electric (PV) and solar thermal energy systems.

14.b. Investigate what plumbing codes apply to solar thermal energy systems.

Criteria

Your performance will be successful when:

you determine and describe what electrical codes apply to solar electric (PV) and solar thermal energy systems.

you determine and describe what plumbing codes apply to solar thermal energy systems.