

Prepared by the Department of Natural Sciences & Life Fitness

Date of Departmental Approval: March 12, 2012

Date Approved by Curriculum and Programs: September 24, 2012

Effective: Fall 2012

1. **Course Number:** ENV179
Course Title: Solar Thermal Installation
2. **Description:** This course introduces students to the fundamentals of solar thermal system installation and maintenance procedures. The class is divided between classroom based lectures/activities and project-based activities that involve the installation of a residential scale solar thermal system. This course is approved by the North American Board of Certified Energy Practitioners and counts towards the training requirements for becoming a certified Solar Thermal System Installer (additional field experience is required to be eligible for certification).
3. **Student Learning Outcomes (instructional objectives; intellectual skills):**
Upon successful completion of this course, students are able to do the following:
 - Identify safety hazards associated with the installation, operation, and maintenance of solar hot water systems.
 - Demonstrate safe, proper use of required tools, equipment, and personnel protection.
 - Identify appropriate codes and standards concerning installation, operation and maintenance of solar thermal systems and equipment.
 - Identify and describe the purpose and operation of components specific to the following solar thermal systems: active direct, active indirect, passive direct, passive indirect, and swimming pool heating.
 - Determine the location of components, system layout and configuration of the following solar thermal systems: active direct, active indirect, passive direct, passive indirect, and swimming pool heating.
 - Demonstrate and/or explain safe, proper, code compliant mounting procedures and techniques for a variety of roofing types (tile, shingle, metal.)
 - Demonstrate and/or explain safe, proper, code compliant water heater and storage tank installation procedures and techniques.
 - Demonstrate and/or explain safe, proper, code compliant piping and pipe insulation procedures and techniques.
 - Explain function and installation procedures associated with electrical control systems.
 - Determine type of pipe and wire flashing to use for specific roof types and explain proper roof penetration and flashing installation procedures and techniques.
 - Identify factors that reduce/enhance solar hot water system performance.
 - Describe typical system design errors.
 - Describe typical system performance problems and troubleshooting procedures.
4. **Credits:** 3 credits
5. **Satisfies General Education Requirement:** No
6. **Prerequisite:** ENV173
7. **Semester(s) Offered:** Varies
8. **Suggested General Guidelines for Evaluation:** Students are evaluated through homework assignments, quizzes, and project work.
9. **General Topical Outline (Optional):** See attached.

ENV179. Solar Thermal Installation Content Outline

Classroom Topics:

- Review of solar thermal technology, markets, applications, and system types
- Review of solar resource fundamentals
- Piping and thermodynamics basics
- Safety Basics
- Tools of the Trade
- System Components
 - Collectors
 - Water Heating and Storage Tanks
 - Heat Exchangers
 - Differential Controllers
 - Piping and Wiring
 - Expansion Tanks
 - Valves and Fittings
- System Configurations
 - Active Indirect
 - Active Direct
 - Passive Indirect
 - Passive Direct
 - Pool Heating
- Mounting Techniques
- Building and Plumbing Code Compliance
- Control System Design, Installation, and Operations
- Commissioning & Labeling
- Maintenance & Troubleshooting

Project Topics:

- Installing Racking Mounts
- Mounting Panels on Rack
- Piping & Pipe Insulation
- Roof Penetrations, Flashing, and Weather Sealing
- Tank Installation
- Interconnection with Existing System*
- Commissioning & Labeling

(* Piping to existing hot water system must be completed by licensed plumber)