



# Solar Technology Curricula

## Contents

### INTRODUCTION

#### NEARPOD PRESENTATIONS

- Exploring Solar Energy
- Exploring Solar Thermal Technology
- Exploring Solar Photovoltaic Technology

#### LESSONS

##### **Understanding the Mechanics of Solar Technology**

Students investigate the factors that influence the speed and pattern of movement in simple solar toys. After hypothesizing the internal mechanism that moves the toy, students dissect the toy to further examine its inner workings and determine the types of energy transformations that occur.

##### **Using Models to Investigate Solar Thermal Technology**

Students learn about and build models of solar thermal tubes to determine the optimal design for the greatest heat transfer.

##### **Building a Solar Photovoltaic Array by Exploring Series and Parallel Circuits**

Students build and investigate different arrangements of series and parallel circuits to determine the optimal design for the greatest energy production.

##### **Using Real-Time Data to Relate Solar Energy Production to the Sun's Location**

Students measure and use the angles at which the sun's rays strike Earth's surface to design a PV solar arrangement that maximizes electrical energy production. Using the results of the investigation and a thorough analysis of real-time data from various PV solar panels at Stone Laboratory, students present plans for arrangement and use of PV solar technology systems to maximize energy production in various location throughout a year.

#### REFERENCE PAGES

- Using a Multimeter
- Solar Technology Vocabulary



# Introduction

Sunlight is a renewable source of energy for Earth. The demand for cleaner energy sources and the development of strategies to harness the sun's energy has led to an explosion of solar technology applications worldwide. In 2013 Ohio Sea Grant's Stone Laboratory - the nation's oldest freshwater biological research station - installed both solar thermal and photovoltaic solar panel systems throughout its facility to reduce energy consumption. These solar technologies are generating over 30,000 kWh annually and offset Stone Laboratory's carbon footprint by more than 96,000 lbs in their first three years of installment.

The Solar Technology Curriculum offers teachers a blended approach to instruction; Nearpod presentations ([www.nearpod.com](http://www.nearpod.com) or the free app) utilize a highly engaging content delivery application, allowing students to interact directly with background knowledge and lessons while providing real-time formative assessment. Teachers can create a free account and generate session codes used to administer Nearpod lessons to students. Ohio Sea Grant's Solar Technology Curriculum is available in the Nearpod store by searching "Ohio Sea Grant Solar Technology."

The four lessons are built around Bybee's (1978) 5 E Learning Cycle (engage, explore, explain, elaborate, evaluate) and incorporate multiple science and engineering practices outlined in the Next Generation Science Standards (2013). Students have the opportunity to design investigations, analyze and interpret data, and communicate understanding through the use of models. The lessons are written using a structured or guided inquiry approach which can easily be adapted to meet the needs of higher- or lower-level learners. The teacher materials incorporate a variety of instructional strategies, contain suggestions for formative and summative assessment, and are accompanied by student-friendly, ready-to-print handouts.