

# Hands-on K-12 Engineering Curricula

## Initial K-12 Curriculum Providers

- University of Colorado at Boulder
- Worcester Polytechnic Institute
- Colorado School of Mines
- Duke University

## K-12 Curriculum Content Sources

- Four NSF GK-12 grants
- Department of Education FIPSE grant
- NSF Math Science Partnership grant
- Other K-12 outreach initiatives

In the future...  
your K-12 engineering curricula?

## TeachEngineering Digital Library

**What:** A web-based digital library collection of standards-based, hands-on K-12 engineering lessons, activities and real-time 'Living Laboratories.'

**Why:** To use *engineering as a vehicle to integrate science and math* in the classroom.  
To increase K-12 student and teacher awareness of engineering as a career path.

**Engineering College Partners:** Jackie Sullivan, University of Colorado at Boulder  
Martha Cyr, Worcester Polytechnic Institute  
Mike Mooney, Colorado School of Mines  
Gary Ybarra, Duke University

**Software Infrastructure by:** René Reitsma, College of Business, Oregon State University

**Collection Host:** Open Source Lab, Oregon State University

## ASEE Partnership

- Disseminates and promotes the *TeachEngineering* collection
- Evolves the *TeachEngineering* collection long term



- Conducts engineering faculty workshops
- Conducts K-12 teacher workshops

## Engineering Faculty

- Use the on-line digital library to partner with local teachers to incorporate engineering (applied science and math) into K-12 classrooms
- Take ASEE 'How to Use' Workshops
- Contribute original lessons and hands-on activities content to the collection

## K-12 Teachers

- Use the on-line digital library to locate curricula to use in the classroom
- Take ASEE 'How to Use' Workshops
- Provide online feedback to the collection

**Digital Library End Users**

## Standards Based Engineering Curriculum

### Multiple Approaches to Select Activities:

#### Specify Standard Set to use as a basis

Home > Home > Curriculum > Educational Standards

**Educational Standards**

To serve you better, tell us which educational standards you want to browse.

Currently Selected Locale: **AAAS Benchmarks**

Select a state or national standard:

- AAAS Benchmarks
- Select...
- AAAS Benchmarks
- ISTE
- ITEA
- McREL National
- NCTM
- NSES
- Colorado
- Massachusetts
- North Carolina
- Oklahoma

Click "Browse AAAS Benchmarks Education" and to find matching federal and state details of the standards

More Educational Standard Information

- StateStandards.com
- National Standards - Science
- National Standards - Math
- Colorado Standards

Hosted by: **NSDL**

#### Browse by Activity List (sortable)

Title	Summary	Grade	Edu. Standards	Time	Group Size	Cost/Grp
<a href="#">Cooking with the Sun - Creating a Solar Oven</a>	For this activity, students will be given a set of materials: cardboard, a set of insulating materials (i.e. foam, newspaper, etc), aluminum foil, and plexiglass. Students will then be instructed to ...	6 (6-8)	North Carolina: <ul style="list-style-type: none"> <li>energy transfer 4.1, 4.2, 5.6</li> <li>solar system 3.4</li> </ul>	4 hours	3	USD 5.00
<a href="#">Racing with the Sun - Creating a Solar Car</a>	Students construct and test a fully solar powered car. Several options exist, though we recommend the "Junior Solar Sprint" (JSS) Car Kits that can be purchased with direction from the federal govern...	6 (6-8)	North Carolina: <ul style="list-style-type: none"> <li>energy transfer 4.5, 5.6</li> <li>motion &amp; forces 4.2, 4.3, 4.8</li> <li>solar system 3.4</li> </ul>	4 hours	2	USD 30.00
<a href="#">A House is a House for Me</a>	Students brainstorm and discuss the different types of materials used to build houses in various climates. Small models of houses are built and tested against different climates.	4 (3-5)	Massachusetts: <ul style="list-style-type: none"> <li>earth and space science 1.4</li> </ul>	75 minutes	2	USD 3.00
<a href="#">A Place in Space: Defining and Locating Points on the 3D Coordinate System</a>	The students will use a "real" 3D coordinate system. They will have 3 axes at right angles, and a plane (the XY plane) that will be able to slide up and down the Z axis. The students will then be gi...	7 (6-8)	NCTM: <ul style="list-style-type: none"> <li>geometry 3.1</li> </ul> North Carolina: <ul style="list-style-type: none"> <li>spatial sense, measurement and geometry 2.6, 2.7</li> </ul>	40 minutes	3	USD 5.00
<a href="#">A Roundabout Way to Mars</a>	In this activity, students explore orbit transfers and, specifically, Hohmann transfers. They will investigate the orbits of Earth and Mars simply by using a cardboard and strings. The planets' orbits...	7 (6-8)	McREL National: <ul style="list-style-type: none"> <li>problem-solving 1.2</li> </ul>	30 minutes	2	USD 5.00
<a href="#">A Tasty Experiment</a>	Students conduct an experiment to determine whether or not the sense of smell is important to being able to recognize foods by taste. They do this by attempting to identify several different foods th...	4 (4-6)	McREL National: <ul style="list-style-type: none"> <li>algebra 2.2</li> <li>statistics and data analysis 4.4</li> </ul> North Carolina: <ul style="list-style-type: none"> <li>animal growth 1.2</li> <li>data, probability and statistics 4.3</li> </ul>	2 hours	8	USD 3.00
<a href="#">Action-Reaction Rocket</a>	During this hands-on activity, students construct a rocket from a balloon propelled along a guide string. The students use this tool to learn about Newton's three laws of motion, examining the effect...	6 (5-7)	Colorado: <ul style="list-style-type: none"> <li>algebra 2.1</li> <li>computations 6.3</li> <li>data analysis, statistics, and probability 3.4</li> </ul>	45 minutes	4	USD 1.00
<a href="#">Air Pressure</a>	Air pressure is pushing on us all the time although we do not usually notice it. This activity will discuss the units of pressure and give the students a sense of just how much air pressure is pushing on them.	5 (4-6)	McREL National: <ul style="list-style-type: none"> <li>problem-solving 1.2</li> </ul>	30 minutes	1	USD 0.00
<a href="#">All Caught Up</a>	Commercial fishing nets often trap unprofitable animals in the process of catching their target species. In the following activity, students will experience the difficulty that fishermen experience wh...	5 (4-6)	NCTM: <ul style="list-style-type: none"> <li>number and operations 1.1, 1.2, 1.3</li> </ul> NSES: <ul style="list-style-type: none"> <li>science and technology E.1, E.2</li> <li>science as inquiry A.1, A.2</li> </ul>	30 minutes	4	USD 2.00

#### Browse by Subject Area

Title	Summary	Associated Curriculum
<a href="#">Algebra</a>	The branch of mathematics that treats the relations and properties of quantity by means of letter and other symbols. It is applicable to those relations...	<a href="#">View Related</a>
<a href="#">Biology</a>	Biology is the scientific study of life, the branch of the natural sciences that studies living organisms.	<a href="#">View Related</a>
<a href="#">Chemistry</a>	Chemistry is the scientific study of matter and its interaction with other matter and with energy. It is the branch of natural science that deals with...	<a href="#">View Related</a>
<a href="#">Data Analysis and Probability</a>	Education in a free society must prepare citizens to make informed choices in all areas of their lives. They must be able to grasp the information bei...	<a href="#">View Related</a>
<a href="#">Earth and Space</a>	In earth and space science, students study the origin, structure, and physical phenomena of the earth and the universe. Earth and space science studie...	<a href="#">View Related</a>
<a href="#">Geometry</a>	Geometry is the branch of mathematics which investigates the relations, properties, and measurement of solids, surfaces, lines, and angles. It is the...	<a href="#">View Related</a>
<a href="#">Life Science</a>	The life sciences investigate the diversity, complexity, and interconnectedness of life on earth. Students are naturally drawn to examine living thing...	<a href="#">View Related</a>
<a href="#">Measurement</a>	Measurement is best learned through direct applications or as part of other mathematical topics. A measurable attribute of an object is a characterist...	<a href="#">View Related</a>
<a href="#">Number and Operations</a>	The study of numbers and operations is the cornerstone of the mathematics curriculum. Learning what numbers mean, how they may be represented, relatio...	<a href="#">View Related</a>
<a href="#">Physical Science</a>	Physical science is the science of matter and energy and their interactions and examines the physical world around us. Using the methods of the physic...	<a href="#">View Related</a>

#### Browse by Standard

**Browse Massachusetts Educational Standards**

Below are the standards for Massachusetts.

To change your locale, select the new one from the box at right:

Grade level:  and

Type:

Subtype:

[Clear additional search criteria.](#)

#### Activity Selected

Home > Home > Curriculum > Activities > A House is a House for Me [Printer Friendly Version](#)

Activities may be standalone, or part of lessons or curricular units.

**TE Activity: A House is a House for Me**

Grade Level: 4 (3-5)      Group Size: 2

Time Required: 75 minutes      Expendable Cost Per Group: 3 USDollars  
45 minutes for building and 30 minutes for testing.

Keywords: adobe, climate, region, structural design, hut, igloo, lodge, pagoda, tepee, treehouse, wigwam

Summary: Students brainstorm and discuss the different types of materials used to build houses in various climates. Small models of houses are built and tested against different climates.

Reviews: [Read Reviews](#) | [Write Review](#) Avg. Rating: ★★★★★ 4.2 stars by 5 users

Associated Curriculum

subject areas: [Earth and Space](#), [Science and Technology](#)

curricular units: No results found

lessons: No results found

Educational Standards

Massachusetts science: earth and space science **1.4**

Learning Objectives

- The impact climates have on the building of structures
- Details about several types of climates
- Basic structural design
- Basic experimental skills

Materials List

- Hay or long grass
- Clay
- Popsicle Sticks
- Sugar Cubes
- LEGO's
- Small Stones
- Flour (snow)
- Fan (wind)
- Water (rain)
- Hairdryer (heat)

Introduction/Motivation

If you could live anywhere in the world and in the climate of your choice, what kind of a house would you construct? What would you need to build your house so that it could withstand the climate? In the next two classes you are going to use the given materials to create a house of your choice. You will need to choose materials that are suitable for the climate you have chosen to live in. Your house needs to still be standing after we have huffed, puffed, and tried to blow your house down!!

**Standard Details:**

Locale: Massachusetts

Type: science

Subtype: earth and space science

Code: 1.4

Grade: 9-12

Description: Describe the nature of the continuous emission and absorption spectrum that indicates the composition of stars.

Activities: [A House is a House for Me](#)

Click to expand standards details

# TEACH Engineering

