

Curricular Unit Template

A published unit on *TeachEngineering* might look like this example →

The curricular unit template is the shortest one. It is basically a shell that ties together associated lesson(s) and activity(ies) into a curricular unit.

Information in the unit document (→) provides teachers with key information to quickly review the unit to see if it meets their needs, before they look at the unit's lessons and activities.

From this point on, this template describes the **required** and optional components for all units published in the TE digital library collection.

Visit <http://TeachEngineering.org> > Browse > Curricular Units to see examples of unit content and how they render on the website.

TEACH Engineering Resources for K-12

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Curricular Units Bridges

Grade: 7-10

Summary
 Through a 10-lesson series that includes numerous hands-on activities, students are introduced to the importance and generalities of bridges for connecting people to resources, places and other people. With references to many historical and contemporary examples, in learning about bridge types (beam, beam-truss and suspension) students explore the effect of tensile and compression forces. Students investigate the solutions that go into designing bridges; they learn about loads and structural stress by designing and testing the strength of model spans. Costing and scale are explored as they discuss the importance of foundations, bearing capacity and settlement considerations in the creation of supported bridges and structures. Students learn about brittle and ductile material properties. Students also learn about the many real factors that complicate the essential considerations of bridge building. Bridges are unique challenges that take advantage of the creative nature of engineering.

Engineering Connection
 While engineers know that engineers design bridges, not everyone realizes the range and depth of study and expertise that are required to create the modern bridges we depend upon every day. Engineers apply their understanding of various forces, loads, environmental conditions, material properties, etc., and math (calculating forces, stress, bridges and design, truss design, geometry, strength to weight ratios, construction costs, etc.) in designing bridges of every size and purpose. To create safe and long-lasting bridges requires great attention to detail. Once all aspects of the problem are understood, engineers explore many possible design solutions to determine the one that best meets all the objectives. Teams of engineers analyze customer needs, site and subsurface conditions, geologic and environmental factors. They make decisions about bridge type, design and materials. They create detailed design plans and specifications, obtain budget and funding approvals, and oversee construction.

Keywords: bridge

Related Subject Areas:
 • Forces, Energy
 • Forces and Torques

Related Learning Objectives:
 • Calculating Costs
 • Calculating Energy
 • Calculating Stress
 • Calculating Torque
 • Calculating Work

Related Activities:
 • Building a Bridge
 • Building a Suspension Bridge
 • Calculating Costs
 • Calculating Energy
 • Calculating Stress
 • Calculating Torque
 • Calculating Work

Contributions:
 • 10 Individual Lessons and Activities
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 Supporting Program:
 Integrated Teaching and Learning Program, College of Engineering, University of Colorado at Boulder
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example

Curricular Unit Title

[Provide the title of the unit. No formatting, such as italics or bold, permitted.]

Header

[(optional) Use Header to add an image or text at the top of the unit document.]

Image 1

ADA Description: Photo shows a female pilot reviewing a checklist while sitting in an airplane cockpit.

Caption (optional): Engineers design the control systems and human interfaces for flying airplanes.

Image file name: cub_airplanes_unit_image1.jpg

Source/Rights: Copyright © 2004 Microsoft Corporation, One Microsoft Way, Redmond, WA 98052-6399 USA. All rights reserved.



Grade Level ___ (___ - ___)

[What grade(s) is (are) targeted in this unit? “It is targeted for grade __, but could work for grades ___ to ___.” *Example:* 8 (7-9) or 8 (8-8) for just eighth grade, or 8 (5-9) if it also works for lower-grade students.]

Summary

[Provide a brief paragraph summarizing the unit and the topics covered. Must be one paragraph of plain text, no images or formatting. Write in present tense, not future.]

Engineering Connection

[Provide 60-100 words or ~3 sentences clarifying how the scientific and mathematical concepts being studied in this unit pertain to real-world engineering. Do not recap the unit. It often works to associate big concepts to particular fields of engineering. Must be one paragraph of plain text, no images or formatting.]

Engineering Category

[(optional for units and lessons; required for activities) Indicate which of the following four engineering categories best describes this unit’s amount or depth of engineering content:

1. relates science concept to engineering,
2. relates math concept to engineering,
3. provides engineering analysis or partial design
4. provides complete engineering design process.

Anecdotally, categories 1 and 2 are primarily science/math with some engineering, category 3 items are primarily engineering with some science/math, and category 4 presents full engineering design. For more complete descriptions of each category, see the TE Engineering Categories Description document (PDF) on the [Submit Curriculum](#) page. In most cases, units and lessons either do not have a category or use the category of the most relevant lessons and activities below them. In rare instances, activities work as a whole, in terms of their level of engineering design content, so that the lesson or unit actually has a different category than the activities below it. For example, a unit might be category 4 because its lessons and activities contain all of the steps in the engineering design process even though none of those individual lessons and activities is categorized as providing the complete engineering design process.

Subject Area(s)

[Identify subject area(s) that are in common for every lesson and activity of the unit; all a unit’s “child” documents will be linked to these same subject areas. [Choose from:](#) algebra, biology, chemistry, computer science, data analysis & probability, earth & space, geometry, life science, measurement, number & operations, physical science, physics, problem solving, reasoning & proof, science & technology. Users can browse TE for curricula by subject area.]

Keywords

Example: biomedical, biotechnology, body, human body

[(optional) Provide 0-10 keywords. They should be words the layperson and a K-12 teacher would know and **might use to search** for the unit. They should apply to all lessons/activities in the unit, which means there might be few keywords. List in A → Z order, lower-case unless proper nouns. Usually, make nouns singular. Avoid highly-technical or lingo words. It is likely you have used these words in the summary. Even though TE provides full text search capability, often these become the few keywords that are seen by other websites that search the collection.]

Educational Standards

[(optional) List any educational standards common to every lesson and activity of the unit from the state and national standards available at the online ASN viewer at <http://www.jesandco.org/asn/viewer/default.aspx>. These should be **specific standards, not just the broader objectives of the standards**. Please include the source, standard number(s) and text of each standard. *Example:*]

North Carolina, science, 2004, 1.01: Identify and create questions and hypotheses that can be answered through scientific investigations.

[Special note for Massachusetts: The middle school science standards are written in the same format except that instead of a “strand” there is a number: 1 for Earth and Space Science, 2 for Life Science and 3 for the Physical Science strand. For example, 1.12 stands for the “Relate the extinction of species to a mismatch of adaptation and the environment” standard in the earth and space science strand.]

Related Lessons & Activities

[To make sure that all the associated lessons and activities of a unit are linked together in the *TeachEngineering* collection, list every one of them in this section. For each, provide its title.]

Related Lessons

- Lesson titles here in 1, 2, 3 order...

Related Activities

- Activity titles here...

Time Required __ minutes, hours, days or weeks *Example:* 6 hours

[(optional) To help in teacher planning, provide an estimate of time to complete the entire unit and its lessons and activities. Cannot be a time range, however you may include an optional text note for a brief explanation, such as: *Spread over six, one-hour class periods*. If summing up a total unit time does not make sense, add a note, such as: *See individual lessons and activities*.]

Unit Overview

[(optional) If it helps explain the unit, provide an overview to describe the parts and/or steps within a unit, or a recap of topics by lesson number.]

Unit Schedule

[(optional) If it helps explain the unit, provide a suggested schedule or describe how the various lessons build upon or relate to each other.]

Summary Assessment

[(optional) If you want, provide summary assessment tools to help teachers gauge students’ comprehension of the unit topic(s), such as pre-/post-unit quizzes and tests.]

Attachments

[(optional) If the unit has any attachments, such as a test or quiz, list them here. On TE, they will be hot linked to files. In addition to PDF versions, provide original format versions (Word, Excel, PowerPoint) so teachers can modify. In listing the attachment names, include the file format (see example, below), to help teachers choose what to download/print. When naming files for attachments, use lower-case letters only (no caps). This includes file extensions: jpg, .doc, pdf, ppt, etc. Also, leave no spaces in the file names; use underscores instead.]

Examples:

[Flying Solo Unit Pre/Post Quiz \(pdf\)](#)

[Flying Solo Unit Pre/Post Quiz \(doc\)](#)
[Flying Solo Unit Pre/Post Quiz Answers \(pdf\)](#)
[Flying Solo Unit Pre/Post Quiz Answers \(doc\)](#)

Other

[(optional) This component is available for information that doesn't seem to fit in anywhere else.]

Redirect URL

[(optional) Provide one URL to direct teachers to required internet materials; URL will be rendered in *TeachEngineering* by a note in the document, like this: **Attention:** This unit requires the following internet resource: [URL here.](#)]

Contributors

[(optional) List the name(s) of who contributed to developing, testing, reviewing and editing this unit. List the primary creator first. Role and organization may be included, too.]

Example: Jay Shah, Malinda Schaefer Zarske, Janet Yowell

Copyright

[(optional) To include a brief copyright citation for the source of this curricular content, provide a copyright year and owner name. Check with your institution for the appropriate copyright text.]

Example: Copyright © 2010 by Regents of the University of Colorado. This digital library content was developed by the Integrated Teaching and Learning Program under National Science Foundation grant no. 0338326.

Supporting Program

[Briefly provide the name and organization of the source of this curricular content.]

Example: Integrated Teaching and Learning Program, College of Engineering, University of Colorado at Boulder

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