Teaching Resources for All Engineering Disciplines

General Engineering Resources

**Compendex**  
A major engineering index with worldwide coverage of journals and conference publications in all areas of engineering, including engineering education. Requires MSU login off campus. May be titled EI Village or Engineering Village at other universities and also require university login off campus.  

**National Academy of Engineering (NAE)**  
The NAE is the portal for all engineering activities at the National Academies. Provides access to publications, reports, and projects on engineering education as well as other aspects of engineering.  
http://www.nae.edu/ [2]

Teaching Engineering

*Teaching Engineering, Phillip C. Wankat & Frank S. Oreovicz*, Purdue University, McGraw-Hill, November 1992  
This entire book is available online or can be downloaded as a PDF file. Includes comprehensive information about course design, goals and objectives, teaching strategies, use of educational technology, assignments and testing, teaching and learning theories, and other issues relevant to teaching engineering in higher education.  
https://engineering.purdue.edu/ChE/AboutUs/Publications/TeachingEng/index.html [3]

NEXT: Narratives Supporting Excellent Teaching (University of Washington with a grant from the National Science Foundation)  
A series of teaching and learning narratives designed to demonstrate solutions or strategies to engineering faculty facing specific teaching challenges. Covers a broad range of issues and problems in engineering education with links to online articles, websites, book chapters, and handbooks for extensive state-of-the-art coverage of each topic.  

MITOpenCourseWare  
Homepage for the MIT free online resources for teaching, including 1800 courses, course materials, and other teaching resources in the full range of higher education offerings. See Engineering for courses in those fields. Links to the various sub-disciplines in engineering offered by Michigan State University can be found below in the category “Discipline-Specific Engineering Education Resources.”
K to Gray Engineering Pathway Digital Library—Engineering Education Wing of the National Science Digital Library (NSDL)
The portal to high-quality teaching and learning resources in engineering and other applied sciences. A comprehensive and well-organized site for browsing, using, and submitting resources in engineering education. Offers courses and course materials in the various engineering education disciplines as well as more general teaching and learning materials useful for engineering educators.
http://www.aboutus.com/engineeringpathway.org

Karl A. Smith, University of Minnesota, Department of Civil Engineering
Karl Smith is a well-respected figure in cooperative learning. His website includes his most recent syllabi, course materials, and supplemental course resources. The site also provides links to his publications, presentations, and workshop and teaching materials. This is a valuable resource for engineering faculty interested in using or already using cooperative learning.
http://www.ce.umn.edu/~smith/

Richard Felder’s Home Page: Resources in Science and Engineering Education
This website focuses on research-supported instructional strategies that make teaching in science and engineering more effective. Dr. Felder includes links to full texts of his education-related publications and handouts on a wide range of topics from teaching methods and tips to tests and grading. Of special interest is information on learning and teaching styles in engineering education; click on “Learning Styles” and “Index of Learning Styles” on Felder’s Home Page for access to numerous links on this topic.
http://www4.ncsu.edu/unity/lockers/users/f/felder/public/

Engineering Subject Centre, The Higher Education Academy, United Kingdom
Although this site features U.K. engineering education activities, its searchable database of around 2000 learning and teaching resources can be equally valuable to U.S. engineering faculty. Other links to such topics as teaching engineering ethics and learning and teaching theory may also be of interest.
https://www.heacademy.ac.uk/

The National Effective Teaching Institute (NETI)
A 3-day workshop held each year just prior to the annual meeting of the American Society for Engineering Education (ASEE). It is designed to give engineering educators information and some hands-on practice in the elements of effective teaching.

Project Kaleidoscope
This organization’s aim is to disseminate information on best practices and new pedagogies in undergraduate science, mathematics, engineering, and technology (SMET) Education. Their homepage links to their online publications on “what works” and to their conferences, workshops, and programs.
http://www.pkal.org/

MERLOT: Engineering Portal
An online educational resource offering teaching and learning materials in higher education. This engineering portal links to resources on teaching engineering today, learning materials, showcased websites and much more.
https://www.merlot.org/merlot/Engineering.htm

This article reports on research demonstrating favorable outcomes in academic achievement, attitudes, and persistence through SMET courses and programs when small-group learning is used in undergraduate SMET courses.


Associations of Engineering and Science Education

American Society for Engineering Education (ASEE)
This is the primary society for furthering education in engineering and engineering technology. The Society’s homepage is at http://www.asse.org/about-us/headquarters/our-staff.
Papers from ASEE conferences 1996-2010 can be searched by keywords for paper title, authors, and session titles at http://www.asee.org/search/proceedings.

SEFI: European Society for Engineering Education
A network of European institutions and individuals involved in engineering education. The society holds an annual conference and publishes the European Journal of Engineering Education listed below under “Journals.”
http://www.sefi.be/

International Society for Engineering Education (IGIP)
Dedicated to improving teaching methods and curricula in engineering and supporting the development of engineering education in developing countries.
http://www.igip.org/

The International Federation of Engineering Education Societies (IFEES)
A newly formed organization aimed at promoting engineering education globally and enhancing its quality through exchange of ideas about methods, curricula, and other aspects of engineering education among engineering societies worldwide.
http://www.igip.org/pages/ifees/ifees.html

National Institute for Science Education (funded by the National Science Foundation)
Contains links to information on such topics as collaborative learning, classroom and program assessment, and learning through technology.
http://www.wcer.wisc.edu/archive/nise/

National Center for Case Study Teaching in Science
An informative and practical site on case method teaching in the sciences. Links to videotapes, articles, a collection of cases used in numerous scientific fields, and much more. The Center holds an annual fall conference with a link on the homepage.
See also the **Council on Undergraduate Research (CUR)** below under “Resources for Students.”

**Journals of Engineering Education**

**Prism Magazine** is the American Society for Engineering Education’s monthly publication for teaching engineering in higher education. Content includes instructional methods, innovative curricula, and cutting-edge technology.  

**Journal of Engineering Education**.  
This is a peer-reviewed international SoTL journal published quarterly by the American Society for Engineering Education. Publishes scholarly research in engineering education worldwide.  

**Journal of STEM Education Innovations and Research**.  
Provides case studies and other innovations in education that are relevant and important to educators in science, technology, engineering, and mathematics. Archives offer abstracts and PDF files of all articles with searchable database.  
[http://www.auburn.edu/research/litee/jstem/](http://www.auburn.edu/research/litee/jstem/) [23]

**European Journal of Engineering Education (EJEE)**.  
This bi-monthly journal offers a forum for sharing good practice and methodology in engineering education and examines the various factors influencing engineering education in different societies.  

**International Journal of Engineering Education**.  
An interdisciplinary forum for educational methods, case studies, laboratory applications, new technologies, and educational applications in all fields of engineering. Free access to full text articles up to and including 2002, plus many special issues. Homepage also has links to “Interactive Teaching” sites with educational materials, labs, demonstrations, and tutorials for EE undergraduates.  

**Engineering Education Centers and Departments**

The sites below offer comprehensive resources in teaching engineering, including Engineering Education research, publications, articles, and other resources for engineering faculty and administrators.

**Center for the Advancement of Engineering Education (CAEE).**  
Initiated in January 2003 with a 5-year grant from the National Science Foundation, the Center is a collaboration of five partner institutions—Colorado School of Mines, Howard University, Stanford University, University of Minnesota, and University of Washington. The focus is on research into learning and teaching engineering and supporting an Institute for Scholarship on Engineering Education. The site provides research and institute reports, articles, conference papers, and
other elements of scholarship in engineering education.
http://www.engr.washington.edu/caee/ [26]

**Center for the Advancement of Scholarship on Engineering Education (CASEE).**
A Center of the National Academy of Engineering dedicated to excellence in engineering education. Links to research reports, articles, videos, conference proceedings, and other resources in engineering education.
http://www.nae.edu/casee.aspx [27]

**Department of Engineering Education, Purdue University.**
An extensive curriculum in engineering education with links to research, articles, and special programs.
https://engineering.purdue.edu/ENE/ [28]

**Department of Engineering Education, Virginia Tech.**
Links to engineering education research studies and educational resources for engineering faculty.
http://www.enge.vt.edu/ [29]

**Center for Engineering Learning and Teaching (CELT), College of Engineering, University of Washington.**
Provides numerous links to engineering education centers throughout the U.S. in addition to other links with related resources for engineering education.

Back to top

Scholarship of Teaching and Learning in Engineering

http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Papers/Scholarship_chapter.pdf [31]

See also the *Journal of Engineering Education* and other journals listed above.

Back to top

Assessment and Accreditation in Engineering

**FLAG: Field-tested Learning Assessment Guide for Science, Math, Engineering, and Technology Instructors.**
This site offer classroom assessment techniques and discipline-specific tools for STEM instructors interested in new approaches to evaluating student learning, attitudes, and performance. FLAG is designed to promote effective and goal-appropriate field-tested assessment techniques.

**Assessment Handbook (College of Engineering, University of Michigan).**
A handbook designed to support engineering faculty and departments in creating and conducting direct and indirect assessment plans and using the data for curricular improvement. All examples are aligned with contemporary engineering curricula and accreditation criteria.

http://assessment.engin.umich.edu/ [33]

**ABET: Accreditation Board of Engineering and Technology.**
The recognized accrediting agency for higher education programs in applied science, computing, engineering, and technology. Contains resources for programs, help with assessment, criteria, and other information essential to accreditation.

http://www.abet.org/ [34]

For assessment planning tools such as methods and rubrics see

*We would like to acknowledge the help of Tom Volkening, MSU librarian, in compiling these resources in Engineering Education.*

Back to top

These resources were compiled and annotated by Lois Rosen, Ph.D., Instructional Consultant for the Office of Faculty and Organizational Development, Michigan State University.

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**Source URL:** http://fod.msu.edu/oir/teaching-resources-all-engineering-disciplines

**Links**
[9] https://www.heacademy.ac.uk/
[28] https://engineering.purdue.edu/ENE/
[29] http://www.enge.vt.edu/
[33] http://assessment.engin.umich.edu/
[34] http://www.abet.org/