

Engineering – prepared by Dr. Sandra Cruz-Poll, UPR-Mayaguez

Professor Resources

There are many tools that engineering professors can use to enhance their classes and complement their teaching activities. Many of them allowed the student to quickly grasp the material taught in the classroom and help them visualize difficult concepts. With a laptop and LCD projector, these teaching tools can be directly presented to students in class.

Links to Teaching Resources *by Areas*:

Many of the teaching tools websites provide java animations with experiments, online tutorials, online interactive quizzes, theoretical concepts, printable slides, graphs, and tables and much more.

Teaching and Learning with Internet Tools (A Position Paper by Daniel Schneider, TECFA, FPSE, University of Geneva

<http://tecfa.unige.ch/edu-com/edu-ws94/contrib/schneider/schneide.book.html>

General Engineering

<http://www.needs.org>

Page by The National Engineering Education Delivery System (Needs), provides this digital library of learning resources for engineering education. web-based access to a database of learning resources where the user can search for, locate, download, and comment on resources to aid their learning or teaching process.

Topics covered: Wide range of specific topics in mathematics, physical sciences, life sciences and engineering supplemented with links to related primary resources. E.g. Thermodynamics, Capacitors, engineering mechanics, engineering graphics, motor, refinery, etc..

<http://onlineethics.org/cases/pritchard/pritchard.html>

Page by the Ethics Center. The mission of the Ethics Center is to provide engineers, scientists and science and engineering students with resources useful for understanding and addressing ethically significant problems that arise in their work life. The Center is also intended to serve teachers who want to include discussion of ethical problems closely related to technical subjects as a part of science and engineering courses, or in free-standing subjects in professional ethics or in research ethics for such students

Topic covered: Ethics

<http://kahuna.sdsu.edu/testcenter/indexjavaapplets.html>

Page by the San Diego State University. Contains applets for Thermal radiation, heat transfer, Black-body Radiation. The subject matters are covered in Mechanical, Aerospace and Chemical Engineering as well as in Physics and Chemistry.

<http://www.engapplets.vt.edu>

Java Applets for Engineering Education from Virginia Tech.

Topics covered: dynamics, fluid dynamics , statics

<http://members.aol.com/engware>

Engineering Software (EngWare). Energy conversion systems (power and propulsion) software, slide shows, online calculators, textbooks, educational and consulting services!

Topics covered: Slide Shows, Online Calculators and Coursework Material. Energy conversion systems (power and propulsion).

<http://www.ieee-virtual-museum.org>

This site was created by the Institute of Electrical and Electronic Engineers(IEEE) Contains many java applets!!! from the virtual museum of the IEEE.

Topics covered: Electrical Engineering, Electronics, Computers, and related fields

Electrical Engineering

<http://www.educatorscorner.com>

Excellent!! page by Agilent Technologies (former HP)with numerous Pre-written Labs, Interactive Experiments, Java Animations, Printable Cartoon Slides in the areas of electricity and electromagnetics. Can be downloaded at no charge.

Topics covered: Electronic Experiments, RF Experiments, and Electromagnetic Simulations

<http://abalone.cwru.edu/tutorial/enhanced/files/lcd/intro.htm>

Page by Case Western Reserve University with excellent illustrations of electromagnetic waves polarization including linear, circular, and interactive experiments and movies to understand light concepts from the functioning of Liquid Crystal Displays (LCD) theory.

Topics covered: Twisted Nematic , Display Addressing and construction, Birefringence in Liquid Crystals, Textures and Defects, and Chemical Properties of Liquid Crystals

<http://lips-server.physik.uni-kl.de/software/jave/polarisation>

Page by Daniel Roth with many Java Applets to help understand the concepts of electromagnetic wave polarization

Topics covered: Polarization of Light, Electromagnetics, physics

<http://topex-www.jpl.nasa.gov/education/tutorial.html>

Page by NASA explaining performance of satellite used to measure ocean topography with an altimeter (C-band radar) and a radiometer to measure the amount of atmospheric water vapor to correct for radio path delay.

Topics covered: Oceanography, Microwave Remote Sensing (active and passive)

<http://www.trimble.com/gps>

Page by Trimble Corporation Description of the worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations

Topics covered: GPS theory

<http://science/world.wolfram.com/physics/topics/AntennaTheory.html>

Various links to antenna design software and applications. Topics covered:

NecWin Antenna Simulation (<http://www.onionmicro.com>)

Arecibo Photo Gallery (<http://www.naic.edu/about/photos/photogal.htm>)

Horn Antennas (http://www.q-par.co.uk/pages/Horns_Title_Page.htm)

Satellite Horn Antennas (<http://www.afcsat.com/SatelliteConicalHorn.html>)

Subsurface Radar Antennas (<http://www.geophysical.com/Sys2.htm>)

What is Antenna Gain? (http://www.antenna.com/faqs_theory.html)

Software for Ham Antennas (<http://ac6v.com/antsoftware.htm>)

Antenna Co. with Patterns (<http://www.astronautennas.com>)
Helical Wound Antenna Recipe (<http://www.radiohc.org/Distributions/Dxers/broomstick.html>)
Radio Antenna Tips (<http://www.moonlightsys.com/otr/antenna.html>)

<http://scienceworld.wolfram.com/physics/topics/AntennaTheory.html>

Page by Wolfram Research with lots of definitions and excellent illustrations of concepts in basic scientific topics.

Topics covered: Electromagnetism, Physics, Fluid Mechanics, Mechanics, States of Matter, wave motion (<http://scienceworld.wolfram.com/physics/topics/WaveMotion.html>); antenna theory

<http://www.vislab.usyd.edu.au/photronics/fibres/index.html>

Page by Sydney VisLab in Australia. Includes Slide presentation and interactive Quizzes explaining concepts such as Diffraction, Interference, Mie Scattering, Rayleigh Scattering, refraction, reflection, dispersion.

Topics covered: Optical Fibers, Computational Physics, Optics, Cloud Physics, Glass physics and applications, light physics

<http://www.ieee-virtual-museum.org>

This site was created by the Institute of Electrical and Electronic Engineers (IEEE). Contains many java applets!!! from the virtual museum of the IEEE.

Topics covered: Electrical Engineering, Electronics, Computers, and related fields

Computer Engineering (see also Electrical Engineering)

<http://www.smete.org>

Page by The National Engineering Education Delivery System, provides this digital library of learning resources for engineering education. Web-based access to a database of learning resources where the user can search for, locate, download, and comment on resources to aid their learning or teaching process.

Topics covered: Wide range of specific topics in mathematics, physical sciences, life sciences and engineering supplemented with links to related primary resources. E.g. Thermodynamics, Capacitors, engineering mechanics, engineering graphics, motor, refinery, etc.. Free Downloads .

<http://hometown.aol.com/engware/index.htm>

Page by EngWare with theory for Energy conversion systems (power and propulsion) software, slide shows, online calculators, textbooks, educational and consulting services.

Topics covered: Slide Shows, Online Calculators and Coursework Material. Energy conversion systems (power and propulsion).

<http://www.edcenter.sdsu.edu/repository/resources.html>

Recollection of computational resources available on-line, arranged by disciplines by the California State University.

Topics covered: Network Security , Cross-Platform File Archiving, and Computational Science for the Undergraduate Curriculum

<http://www.sec.ee/solutions.asp?lg=ee&solutionID=6>

Server" technology.

Topics covered: Business process modeling and simulation. Computer based training/teaching

Mechanical Engineering

<http://kahuna.sdsu.edu/testcenter/indexjavaapplets.html>

Page by the San Diego State University. Contains applets for Thermal radiation, heat transfer, Black-body Radiation. The subject matters are covered in Mechanical, Aerospace and Chemical Engineering as well as in Physics and Chemistry.

Topics covered: Thermodynamic Tables. A thermodynamic state is a snapshot of all the properties or attributes that describe a system under equilibrium. Solve mass, energy and entropy balance and other specific topics in engineering thermodynamics

<http://scienceworld.wolfram.com/physics/topics/AntennaTheory.html>

Page by Wolfram Research with lots of definitions and excellent illustrations of concepts in basic scientific topics.

Topics covered: Fluid Mechanics, Mechanics, States of Matter, wave motion

http://www.efluids.com/efluids/pages/edu_tools.htm

Page by EFluids with Educational Tools and Materials.

Topics covered: Visual, HTML, Aerodynamics, Engineering Applets

<http://www.engineerstoobox.com>

EngineersToolbox is a collection of advanced online computational and reference modules for professional and student engineers everywhere.

Topics covered: Solid mechanics, fracture, fatigue, dynamics ,controls, numerical analysis

<http://www.engapplets.vt.edu>

Java Applets for Engineering Education from Virginia Tech

Topics covered: dynamics, fluid dynamics , statistics

<http://members.aol.com/engware>

Energy conversion systems (power and propulsion) software, slide shows, online calculators, textbooks, educational and consulting services!

Topics covered: Slide Shows, Online Calculators and Coursework Material. Energy conversion systems (power and propulsion).

Civil Engineering

<http://www.smete.org>

Page by The National Engineering Education Delivery System, provides this digital library of learning resources for engineering education. Web-based access to a database of learning resources where the user can search for, locate, download, and comment on resources to aid their learning or teaching process.

Topics covered: Wide range of specific topics in mathematics, physical sciences, life sciences and engineering, supplemented with links to related primary resources. For example, motor, refinery, thermodynamics, capacitors, engineering mechanics, engineering graphics, and others. Free Downloads.

<http://kahuna.sdsu.edu/testcenter/indexjavaapplets.html>

Page by the San Diego State University. Contains applets for Thermal radiation, heat transfer, Black-body Radiation. The subject matters are covered in Mechanical, Aerospace and Chemical Engineering as well as in Physics and Chemistry.

Topics covered: Thermodynamic Tables. A thermodynamic state is a snapshot of all the properties or attributes that describe a system under equilibrium. Solve mass, energy and entropy balance and other specific topics in engineering thermodynamics

http://www.efluids.com/efluids/pages/edu_tools.htm

Page by EFluids with Educational Tools and Materials

Topics covered: Visual , HTML, Aerodynamics, Engineering Applets

<http://www.engineerstoolbox.com>

Page by EngineersToolbox (ETB) is a collection of advanced online computational and reference modules for professional and student engineers everywhere.

Topics covered: Solid mechanics, fracture, fatigue, dynamics, controls, numerical analysis.

<http://www.engapplets.vt.edu>

Java Applets for Engineering Education from Virginia Tech

Topics covered: dynamics, fluid dynamics, statics

Chemical Engineering

<http://www.processassociates.com/process/tools.htm>

Page by Process Associates of America provides hundreds of process engineering tools specifically designed as teaching resources.

Topics covered: Basics Fluid Flow & Hydraulics, Heat Transfer, Physical Properties, Rotating Equipment, Separation Equipment, Vessels

<http://www.sfu.ca/chemed>

Page by the Simon Fraser University, Canada. A selective, annotated collection of the best Web links for Chemistry teachers and multimedia developers provided by Simon Fraser University. Includes tutorials, course material, labs, homework, quizzes and more.

Topics covered: Basics, Acid base, analytical chemistry, quantum theory, biochemistry, nuclear chemistry, electrochemistry, polymers, physical chemistry spectroscopy, thermodynamics.

<http://kahuna.sdsu.edu/testcenter/indexjavaapplets.html>

Page by the San Diego State University. Contains applets for Thermal radiation, heat transfer, Black-body Radiation. The subject matters are covered in Mechanical, Aerospace and Chemical Engineering as well as in Physics and Chemistry.

Topics covered: Thermodynamic Tables. A thermodynamic state is a snapshot of all the properties or attributes that describe a system under equilibrium. Solve mass, energy and entropy balance and other specific topics in engineering thermodynamics

Industrial Engineering

<http://www.smete.org>

Page by The National Engineering Education Delivery System, provides this digital library of learning resources for engineering education. Web-based access to a database of learning resources where the user can search for, locate, download, and comment on resources to aid their learning or teaching process.

Topics covered: Wide range of specific topics in mathematics, physical sciences, life sciences and engineering, supplemented with links to related primary resources. For example, motor, refinery, thermodynamics, capacitors, engineering mechanics, engineering graphics, and others. Free Downloads.

<http://hometown.aol.com/engware/index.htm>

Page by EngWare with theory for Energy conversion systems (power and propulsion) software, slide shows, online calculators, textbooks, educational and consulting services.

Topics covered: Slide Shows, Online Calculators and Coursework Material. Energy conversion systems (power and propulsion).

Student Resources

Money (Fellowships, Scholarships, etc.)

NSF Scholarships for Minority Education

Description: NSF provides this easy and free service. They'll match your background against their database of over 600,000 scholarships! And they'll update you when new scholarships matching your background are added to the database. FastWeb is recommended by more than 3,000 colleges and 14,000 high schools

<http://scholarships.kachinatech.com/scholar3.html>

Summer Internship Programs

NSF Research Experience for Undergraduate (REU) Program

Requisites: Minority undergraduate students in any of the science and engineering areas listed. This program exists at many universities (Sites), some pay room and board, field trips plus stipend. Some other requirements may be listed in the specific university program.

WEB Page: <http://www.nsf.gov/home/crssprgm/reu/reulist.htm>

Description: Summer Research Program. for Undergraduates at one of several University sites. This allows students to experience first-hand how basic research is carried out, and to contribute consequentially. REU Sites are established in all fields of science, mathematics, and engineering. Lists of all the REU Sites, and of some other activities supported by NSF that have similar summer programs see the link above. Contact each Site directly for specific information, and for application procedures and deadlines.

Deadline: Depends on the program at a given institution. See web page.

NASA Academy

WEB Page: <http://www.nasa-academy.nasa.gov/>

Description: A 10-week internship at one of several NASA Research Centers exposes students from an international applicant pool to a one-of-a-kind summer experience geared towards guiding the future leaders of the space program. The students participate in individual research guided by world-class investigators at the center, a rigorous lecture series, and a group project that fosters leadership skills and interdisciplinary collaboration.

Application Form: at their web page

Deadline: Apply at State Space Grant Office by January 31, 2002.

PR Space Grant Office Address: University of Puerto Rico, Central Administration

Dr. Brad Weiner, Director, Puerto Rico Space Grant Consortium

University of Puerto Rico Resource Center for Science & Engineering

P.O. Box 23334 University Station

San Juan, PR 00931-5000

Phone: 7877655170 ext. 2021

Fax: 7877567717

Email: brad@adam.uprr.pr

- Research Internships in Science and Engineering (RISE)- at the University of Maryland for women college students.

Description: An eight-week summer program to promote the creativity of research and gain valuable experience through RISE. Twenty RISE chosen students (Scholars) will be an integral part of five team-based summer research projects coordinated by female faculty in the Clark School of Engineering and the College of Computer, Mathematical and Physical Sciences (CMPS). Teams will conduct research from June 2, 2002 through July 26, 2002 and each RISE Scholar will be paid a \$3000 stipend.

WEB Page: http://www.eng.umd.edu/wie/students_undergrad/riseII.html

Requisites: Women students of engineering and sciences. RISE is open to U.S. citizens and permanent residents as well as UMCP international students.

Deadline: April 20 , 2002

Application Form: at their web page

Undergraduate Research Programs

- Alfred Sloan Foundation -Undergraduate Research Program

URL: http://www.sloan.org/programs/edu_phd.shtml

Requisites: Underrepresented minority undergraduate students nominated by faculty.

Description: Intends to prepare highly qualified students to eventually obtain a Ph.D. in mathematics, natural science, and engineering. The program provides a small stipend, workshops on several topics such as Preparation for the GRE, and the opportunity to work in research. For a list of current participants go to

Web Page: http://www.sloan.org/programs/edu_phd7.shtml At UPR-Mayaguez, there are programs in Chemistry, Biology, Chemical Engineering, and Civil Engineering.

- Industrial Affiliates Program (IAP)

WEB Page: <http://ece.uprm.edu/~iap/>

Requisites: Undergraduate student in Electrical and Computer Engineering at UPR

Description: Undergraduate research program at the UPRM. Students work with faculty in research projects during one year, at the end of which the students present their work in an oral presentation before members of the industry partners, faculty and other students. Some students receive a stipend, depending on the professor.

- Puerto Rico Louis Stokes Alliance for Minority Participation (PR-LSAMP) Program

Description: Undergraduate research experiences for Science, Engineering and Math (SEM) students in order to improve their preparation and motivation to continue graduate studies. Students work with a professor during a semester or Summer session on a project related to their field of study. They receive a stipend of \$800. The professor receives \$200 for materials. There is also some money for traveling, to present the result of the work at national conferences.

Requisites: Undergraduate students from PR-LSAMP institutions. The program is competitive, so students with a good GPA have higher chances of being accepted. Professor and student submit papers together. Deadline varies by semester.

Web Page: www.prlsamp.org

Internship Programs

- UPR Co-op Program

Description: Students work in industry in a field related to their field of study to gain experience and apply the theory learn in class. The student can choose from companies within the island of Puerto Rico

or abroad in the United States. The student receives course credit for this practice as well as salary from the industry. Every year, approximately 80% of the students obtain job offers from the company they worked for.

Requisites: Have approved 60 credits or more with a grade point average (GPA) of at least 3.0.

WEB page from Rio Piedras Campus: <http://rrpac.upr.clu.edu/~coop/>

WEB page from Mayagüez Campus: <http://www.ece.uprm.edu/coop/coop/spanish/index.htm> and <http://www.ece.uprm.edu/~colom/4995.html>

Global Engineering Education Exchange
Educating Engineers for a Global Marketplace

WEB Page: <http://www.ije.org/pgms/global-e3/nonmemb.htm>

<http://www.yale.edu/necuse/>

<http://www.care.ucla.edu/inside/intern.html>

Students' Organizations

Society of Women Engineers (SWE)

Description: Open to all UPR Engineering students, male or female. It organizes many professional activities for students such as technical workshops, seminars, field trips and some social and outreach activities such as the annual K-12 workshops. It's a great opportunity to network with other female engineering students and to develop you leadership skills.

WEB Page: <http://mayaweb.upr.clu.edu/swe/uprmswe.html>

Institute of Electrical and Electronic Engineers (IEEE)

Description: The IEEE is a non-profit, technical professional association of more than 377,000 individual members in 150 countries. UPR has the 11th largest IEEE student chapter in the world. Open to Electrical, Electronic and Computer Engineering students, it organizes many professional activities for students such as workshops, seminars, and some social and outreach activities such as the annual K-12 open house called "Taller de Ingeniería". It's a great opportunity to network with other students and to develop you leadership skills. The Society has five other sub-chapters, each within the following areas: Computer, Communications, Power, Electronics. When you subscribe you receive a monthly magazine, Spectrum and have access to thousands of technical abstract online. It is faster to subscribe online.

Web Pages: <http://mayaweb.upr.clu.edu/~comsoc/home.html>;

<http://www.ece.uprm.edu/~ieeecs/Default.htm>; <http://www.ece.uprm.edu/%7Ecsc-ieee/>

<http://ece.uprm.edu/pes/>; <http://ece.uprm.edu/~ramaieee/>

Tau Beta Pi Honor Society (TBP)

Description: Tau Beta Pi is the largest engineering honor society in the world. It was founded in 1885 to recognize engineering students. Requisites include having a GPA of 3.0 or higher in any engineering major.

Web Page: <http://ece.uprm.edu/~taubeta/>

Asociación de Estudiantes de Ingeniería de Computadoras (AEIC)

Description: Student organization for Computer Engineering students. Some of their activities include the annual High School Challenge, a computer contest for various schools, and other social and technical events.

Web Page: <http://www.ece.uprm.edu/~aeic/>

Society of Electrical Engineers of Puerto Rico (SIE)

Description: Open to all UPR Engineering students, male or female. It organizes many

Web Page: <http://www.ece.uprm.edu/~aeic/>

Society of Electrical Engineers of Puerto Rico (SIEPR) SHPE

Description: SIEPR share the office with the IEEE student branch and collaborates with some of their activities, besides engaging in their own technical and social events.

Web Page: <http://ece.uprm.edu/~sie/>

Society of Hispanic Professional Engineers (SHPE)

Description: Students from all Engineering departments are welcome to join this society. The SHPE sponsors an annual National Conference in which students have the opportunity to attend workshops, job fairs and network with other students from universities all over the United States.

Web Page: <http://www.shpe.org/>

Golden Key International Honour Society

Description: Golden Key recognizes outstanding academic achievement without forgetting diversity and community service. Among its activities, you will find civic, social and tech

Web Page: <http://www.ece.uprm.edu/~golden/>

American Society of Mechanical Engineers (ASME)

Description: ASME student chapter holds open house for high school students, offers tutorships, technical and social activities for Mechanical Engineering students.

<http://me.uprm.edu/ASME%20WEB/asmerum.htm>

Other Mechanical Engineers student societies (ASME)

<http://me.uprm.edu/Organizations/organizations.html>

American Chemical Society (ACS)

Description: The world's largest scientific society, an organization with more than 163,000 members worldwide. The UPR student chapters hold technical and social activities throughout the year. Some benefits of membership include access to scientific abstract database and discount prices for over 40 chemical magazines. To subscribe to a student branch: <http://www.cnnnet.clu.edu/quim/acssa/10Join.html> or <https://center.acs.org/applications/acsmembership/join.cfm>

Mentorships and Ushers

There are several outreach programs devoted to introduce science and engineering to K-12 grades that need university students to serve as ushers. Jobs vary from being a mentor, to giving lab demonstrations, talking about your experiences as an undergraduate or just show them around your campus. Some are volunteer jobs, while others provide with some remuneration. Among these are:

Excite Summer Camps

Description: Groups of elementary school girls are introduced to engineering. Frequently, faculty in charge needs undergraduate students to help in the laboratory demonstrations and other activities.

For more information on EXITE, contact Dr. Sonia Bartolomei (sonia@ece.uprm.edu)

Junior Engineering Technical Society (JETS)

Description: JETS is a national non-profit education organization that has served the pre-college engineering community for over 50 years. Through competitions and programs, JETS serves over 30,000 students and 2,000 teachers, and holds programs on 150 college campuses each year. The program is sponsored by companies and agencies. <http://www.jets.org/index.htm>

Future Scientist and Engineers of America (FSEA)

Description: Students grades 4th through 12th experience science and engineering through hands-on science and engineering projects. Clubs are formed in each participating school and volunteer students work with the club after school for one hour one day a week. Competitions for creative design are performed among the school students. More information on <http://www.fsea.org/founder/>

Pre-Engineering Program at UPRM

Description: Two two-week sessions are held every summer at UPR-Mayaguez, each with 15 male and 15 female students, with the objective of motivating participants to pursue a career in engineering. Volunteer undergraduate students serve as mentors and ushers in the programs' activities, which include, seminars, creativity design competitions, field trips and others. <http://fie.engrng.pitt.edu/fie98/papers/1176.pdf>

ISMUL Integrated Science Multi-use Laboratory

WEB Page: <http://ismul.upr.clu.edu/espanol/espanol.html>

Requisites: University Students, High School Teachers from 7th to 11th grade.

Description: This program promotes the advance in scientific education and promotes non-traditional teaching tools and the integration of multidisciplinary fields. The UPR at Arecibo is the base place for this endeavor. Offers several types of workshops. ISMuL is the model for the science classroom of the future. Participants have access to a computer network, and several laboratories including a NASA aeronautics lab.

Application Form: Become a member at their web page

Deadline: no specific deadlines.