WebSights

Dan MacIsaac, Column Editor
Physics Department, SUNY-Buffalo State College
Buffalo, NY 14222; macisadl@buffalostate.edu

WebSights *offers a selection of sites appropriate for teaching a standard-topic year-long introductory physics survey course. Next month will feature sites for teaching introductory modern physics. All sites are copyrighted by the authors. This column is also available as a web page at http://PhysicsEd.BuffaloState.Edu/pubs/WebSights. If you have successfully used a site to teach physics that you feel is outstanding and appropriate for* WebSights, *please email me the site and how you use it for possible inclusion in our column. The person submitting the best site monthly will receive a T-shirt.*

Web Resources for Teaching Introductory Optics

The Mechanical Universe. Fifty-two half-hour university physics lessons streamed as video-on-demand free of charge. Program 40, Optics, addresses wave properties of light such as reflection, refraction, and diffraction, and Program 39, Maxwell's equations, builds the electromagnetic field theory of light. http://www.learner.org/progdesc/series42.html.

Optics simulations are particularly powerful examples of technology supporting learning; my personal favorite JAVA applet is Thin Lens, http://www.phy.ntnu.edu.tw/java/Lens/lens_e.html, which allows the direct manipulation of a simple thin lens or mirror, animating the ray diagram for the standard situations and problems. I use this applet both for instructional visualization and for student problem checking. The author has many other applets dedicated to simple optical phenomena (reflection, refraction, transmission, colors, prisms, rainbows, etc.) on his site.

A more sophisticated geometric optics applet supporting multiple optical components is found at http://www.highpoint.edu/~atitus/physlets/optics/index.html.
Suggested by J. Digiacomo, D. Doty, and S. Walters

Some wave optics simulations showing how wave fronts behave during refraction and reflection (Huygens' principle) include http://www.phy.ntnu.edu.tw/java/propagation/propagation.html and http://physics.ham.muohio.edu/p171s01/wave.htm.
Suggested by D. Doty and B. Thompson

I believe *Young's double-slit experiment* is one of the most important topics in wave optics, and a visualization/simulation applet is found at http://vsg.quasihome.com/interfer.htm. A useful collection of images of interference patterns on a water surface is at http://physics.nad.ru/Physics/English/waves.htm. Wiley has produced a nice single-slit simulation (amongst many others) at http://www3.interscience.wiley.com:8100/legacy/college/cutnell/0471151831/concepts/.
Suggested by B. Mauser, N. Stenz, and S. Walters

K-12 and middle-school-appropriate optics sites include: http://www.opticalres.com/kidoptx.html and http://www.opticsforkids.org; the latter site includes lesson plans by grade level.
Suggested: N. Golembieski

An artist's site exploring optics is Bob Miller's Light Walk, http://www.exploratorium.edu/light_walk/.

Atmospheric optical phenomena can be seen at http://www.sundog.clara.co.uk/atoptics/phenom.htm, with discussion at http://mintaka.sdsu.edu/GF/explain/atmos_refr/astr_refr.html. More images are found at http://www.weather-photography.com/gallery.php?cat=optics.
Suggested by D. Graf

Graphs and Tracks: A 1-D motion-teaching applet and discussion recently spotted on Modeling-L:

Recently a discussion on the Modeling-l listserv revealed a JAVA applet partially replicating the famous *Graphs and Tracks* software used for physics education research by Trowbridge and McDermott (published in the *American Journal of Physics*). The applet, http://dept.physics.upenn.edu/courses/gladney/mathphys/java/sect2/RollBall.html, allows students to design track geometry, roll a ball down the track, view graphs of position, velocity, or acceleration vs. clock reading, and roughly fit conics to these graphs. There are curricular materials for this software found on the modeling website (Unit II worksheet 2) at http://modeling.asu.edu/Modeling-pub/Mechanics_curriculum. A more comprehensive (commercial) version of this software with teaching guide is available from Physics Academic Software at http://webassign.net/pas/graphs_and_tracks/gandt.html.
Suggested by Modeling-L posters