



Career Cornerstone News

Volume VI, Issue I

Winter, 2010



Career Cornerstone News is a Publication of the Sloan Career Cornerstone Center, the Premier Online Resource for Exploring Career Paths in Science, Technology, Engineering, Mathematics, Computing, and Healthcare.

Inside this issue:

<i>Associate Degrees Trend Upward</i>	1
<i>NASA Student Launch Initiative</i>	1
<i>Get Ready for National Lab Day!</i>	2
<i>Degree Profile: Mathematics</i>	2
<i>Riding on the Crest of Wave Energy</i>	3
<i>Boosting Graduation Rates with Technology</i>	4
<i>Online Labs Can Enrich High School Science</i>	4

Associate Degrees Trend Upward

A new report from the National Center for Education Statistics outlines growing trends in the number and type of postsecondary awards below the bachelor's degree (certificates and associate's degrees) conferred over the decade between 1997 and 2007. The report showed that the total number of certificates and associate's degrees conferred increased 28 percent between 1997 and 2007, to 1.5 million. Fifty eight percent of these degrees are awarded by community colleges, and health care is the most common field of study in which subbaccalaureate

credentials are awarded -- at 31%. Women earn a majority of certificates and associate's degrees (62 percent in 2007). The Sloan Career Cornerstone Center provides extensive information about career paths in science, technology, engineering, and healthcare that launch from a two year degree. A new site section easily points out career areas that require associate degrees, and also explains salary expectations, employment trends and what an average day might be like for these fields. Many of the fastest growing occupations require an associate degree education. Some of those



profiled on www.careercornerstone.org/degrees/assocdegree.htm include medical assistants, engineering technologists, science technicians, veterinary technicians, physical therapist assistants, dental hygienists, and dental assistants. A link to the new report and more about associate's degrees is at www.careercornerstone.org/degrees/assocdegree.htm.

NASA Student Launch Initiative

NASA has invited more than 350 student rocketeers from 37 middle & high school, college, and university teams to take part in NASA Student Launch Projects. The challenge is to build powerful rockets of their own design, complete with a working science payload, and launch them to an altitude of 1 mile.



These annual rocketeering projects are the Student Launch Initiative for middle school and high school teams and the University Student Launch Initiative for colleges and universities. Both challenges are designed to inspire students to parlay their interests in science, technology, engineering and mathematics into rewarding careers in fields critical to NASA's mission of exploration and scientific discovery. Beginning in the fall

school term, each team spends eight months designing, building and field-testing their rocket. They address the same physics, propulsion and flight challenges faced by professional rocket engineers. The students also must challenge themselves as scientists, creating a unique, on-board science experiment that can survive the mile-high flight and yield test results after the vehicle parachutes back to Earth. Find out more about this and other STEM programs and projects at www.careercornerstone.org.

Get Ready for National Lab Day!

A coalition of educators, science and engineering associations, philanthropies and other organizations including the Sloan Career Cornerstone Center is supporting the launch of National Lab Day, a new grassroots initiative designed to reinvigorate science and math education in the nation's schools and after-school programs and lead to increased U.S. competitiveness.

National Lab Day aims to inspire a wave of future innovators and foster U.S. competitiveness by improving the quality STEM (science, technology, engineering,

and mathematics) education in America. The initiative will connect students in grades 6-12 to hands-on learning experiences and promote tinkering in laboratory settings. National Lab Day will promote hands-on learning throughout the year and culminate each year with special events the first week of May. Volunteer science and technology professionals and educators will work together with students to improve America's science labs and offer inquiry-



based STEM experiences in classrooms, learning labs, and after-school programs. Find out more at www.nationallabday.org, and explore career paths in STEM at www.careercornerstone.org.

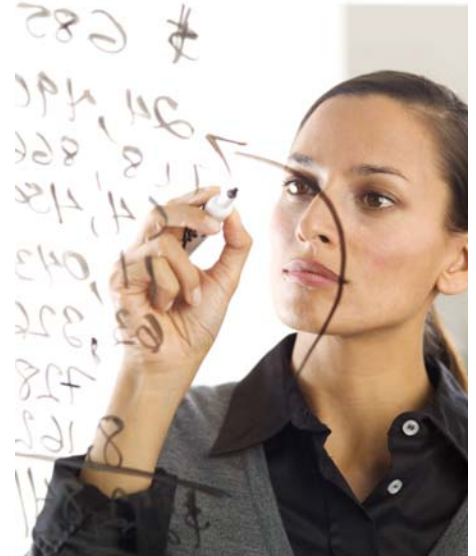
Degree Profile: Mathematics

Degrees in mathematics can lead to a variety of career options. The Sloan Career Cornerstone Center offers resources to explore career paths in actuarial science, mathematics, and statistics.

Actuarial Science: One of the main functions of actuaries is to help businesses assess the risk of certain events occurring and to formulate policies that minimize the cost of that risk. For this reason, actuaries are essential to the insurance industry. Actuaries assemble and analyze data to estimate the probability and likely cost of the occurrence of an event such as death, sickness, injury, disability, or loss of property. Applicants for beginning actuarial jobs usually have a bachelor's degree in mathematics, actuarial science, statistics, or a business-related discipline such as economics, finance, or accounting.

Mathematics: Mathematicians use mathematical theory, computational techniques, algorithms, and the latest computer technology to solve economic, scientific, engineering, physics, and business problems. The work of mathematicians falls into two broad classes -- theoretical (pure) mathematics and applied mathematics.

Statistics: Statistics is the scientific application of mathematical principles to the collection, analysis, and presentation of numerical data. Statisticians contribute to scientific inquiry by applying their mathematical and statistical knowledge to the design of surveys and experiments; the collection, processing, and analysis of data; and the interpretation of the results. Statisticians may apply their



knowledge of statistical methods to a variety of subject areas, such as biology, economics, engineering, medicine, public health, psychology, marketing, education, and sports.

More about careers in actuarial science, mathematics, and statistics is at www.careercornerstone.org.

Riding on the Crest of Wave Energy

The ocean is a potentially vast source of electric power, yet as engineers test new technologies for capturing it, the devices are plagued by battering storms, limited efficiency, and the need to be tethered to the seafloor.

Now, a team of aerospace engineers is applying the principles that keep airplanes aloft to create a new wave-energy system that is durable, extremely efficient, and can be placed anywhere in the ocean, regardless of depth.

While still in early design stages, computer and scale-model tests of the system suggest higher efficiencies than wind turbines. The system is designed to effectively cancel incoming waves, capturing their energy while flattening them out, providing an added application as a storm-wave breaker.

Supported by a grant from the National Science Foundation, the researchers developed a system that uses lift instead of drag to cause the propeller blades to move.

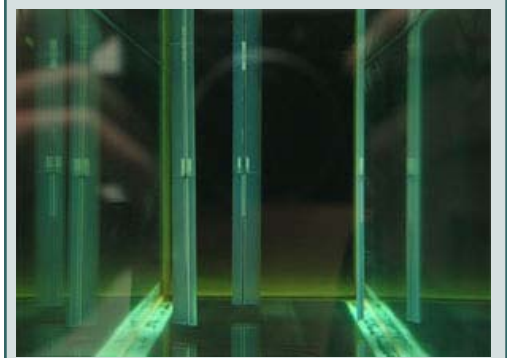
"Every airplane flies with lift, not

with drag," says lead researcher Stefan Siegel from the U.S. Air Force Academy. "Compare an old style windmill with a modern one. The new style uses lift and is what made wind energy viable--and it doesn't get shredded in a storm like an old windmill. Fluid dynamics fixed the issue for windmills, and can do the same for wave energy."

Windmills have active controls that turn the blades to compensate for storm winds, eliminating lift when it is a risk, and preventing damage.

The Air Force Academy researchers used the same approach with a hydrofoil (equivalent to an airfoil, but for water) and built it into a cycloidal propeller, a design that emerged in the 1930s and currently propels tugboats, ferries and other highly maneuverable ships.

The researchers changed the propeller orientation from horizontal to vertical, allowing direct interaction with the cyclic, up



Shown is the view from the far downstream end into the test section of the U.S. Air Force Academy water tunnel. Three blades of the cycloidal turbine are visible at the far end. Engineer Stefan Siegel and his colleagues test the turbine using the tunnel, with both steady and oscillating flow conditions simulating a shallow-water wave-flow field.

Credit: SSgt Danny Washburn, U.S. Air Force Academy, Department of Aeronautics

and down motion of wave energy. The researchers also developed individual control systems for each propeller blade, allowing sophisticated manipulations that maximize (or minimize, in the case of storms) interaction with wave energy.

Find out more about career paths in engineering at www.careercornerstone.org/eng/eng.htm.

Sponsor Career Cornerstone News!



Career Cornerstone News is provided free of charge and without advertising. If you would like to support the newsletter, we do welcome sponsorships and support! Just visit www.careercornerstone.org/sponsorship for more details or email sponsors@careercornerstone.org.



More details on sponsorship: www.careercornerstone.org/sponsorship

Boosting Graduation Rates with Technology

The Bill & Melinda Gates Foundation recently announced \$12.9 million in technology-related grants that promise to fundamentally change how community college students are educated and, ultimately, improve their graduation rates. While more students are enrolling in some kind of educational program after high school than ever before, not nearly enough leave with a degree in hand.

Three-quarters of first-time community college students do not graduate within three years. Often it's not a question of effort or motivation. Rather, these students face multiple challenges: many are not academically ready for college-level work; they juggle school and family responsibilities; the courses take too much time or cost too much; or the class work is not engaging or relevant. The Gates Foundation aims to double the number of low-income students

who earn a postsecondary degree or credential by age 26. The new funding is designed to help advance the role of technology at community colleges beyond online courses. The emerging technologies that will receive funding from these grants promise to change the community college landscape for all students, but especially those that are least prepared when they arrive on a college campus and who also often face the pressure of balancing work, school, and family responsibilities. For example, online and digital courses have the potential to greatly reduce costs and promote flexible scheduling, allowing students to learn when and where it is convenient for them. Multimedia elements, social



networking, and educational games can make learning interactive, enjoyable, and relevant. Recent trends suggest that teachers and technology developers are finally poised to make a substantial impact on our educational system. For instance, 20 percent of college students already take at least one online course, and Congress is weighing legislation that could pump \$500 million into the creation of open, online courses.

Online Labs Can Enrich High School Science

"There is a growing gap between the practice of science the way researchers at Northwestern University and other institutions are conducting it -- and what science looks like in high school," says Kemi Jona, research associate professor at Northwestern University. To help close this gap, Jona and his partners at the Massachusetts Institute of Technology (MIT) received a \$1 million grant from the National Science Foundation to take the concept of online laboratories, or iLabs, and put them into high schools. iLabs are experimental facilities that can be accessed through the Internet, allowing students to complete experiments from anywhere, at any time via a webcam and remote controls. The high tech equipment at iLabs is real and yields real scientific data. The nine instruments available on the site include an inverted pendulum at the University of Queensland, and a microelectronics device characterization lab, a dynamic signal analyzer, an educational laboratory virtual instrumentation suite, a polymer crystallization experiment, a shake table, a heat exchanger, a force on a dipole lab, and neutron spectroscopy labs, all at MIT. Visit <http://ilabcentral.org> and also explore science career paths at www.careercornerstone.org.



Physics teacher Dan DuBrow assists a student in remotely accessing radiation equipment at the University of Queensland in Australia. DuBrow's classroom at Evanston Township High School in Illinois, was selected for iLabs pilot testing last summer.
(Credit: Amanda Morris, Office for Research, Northwestern University)