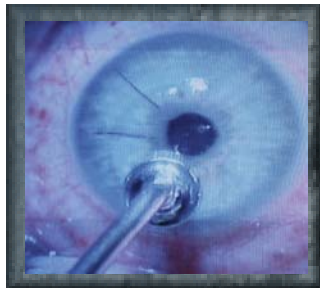




Career Cornerstone News

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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.

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Billiards: Engineering Teaching Tool

Dave Alciatore has taught mechanical engineering at Colorado State University for 18 years, but students still don't call him professor. To them, he's "Dr. Dave" - a billiards expert who uses the mechanics of pool to help his students learn mechanical engineering and physics principles. Most recently, Alciatore and his students worked with a private cue manufacturer who expressed interest in reducing "squirt" - the angle that is produced in the initial cue ball's path by an off-center hit. The students built a cue-testing machine from scratch to measure and

compare different cue sticks by measuring the squirt. Next, they plan to add sensors to measure vibrations and speed of the cue. The grand plan? To design the ideal pool cue.



"We finally get to apply everything we learn on an actual project," said Chris Ward, one of Alciatore's senior mechanical engineering students. "Unfortunately, I'm still a pretty awful pool player." Mike Palmquist, director of The Institute for Learning and Teaching at CSU, said Alciatore's work is particularly interesting because he connects

important engineering concepts to what students already know. "This is one of the keys to good teaching - helping students understand how they can make these connections," Palmquist said.

Find out more about careers in mechanical engineering at www.careercornerstone.org.

Collaboration for Study of Climate Change

The National Oceanic and Atmospheric Administration (NOAA) and Virgin Galactic (VG) are exploring the use of VG's vehicles for climate science and other research relevant to NOAA's mission. The collaboration is looking to fly NOAA science instruments onboard the VG carrier vehicle and SpaceShipTwo. The first of these instruments would provide data on atmospheric composition - particularly CO2 and other greenhouse gases - that will increase

understanding of important global climate science. A central component of NOAA's mission is to understand and predict changes in Earth's environment, and a major focus of the Virgin Group is playing its part in answering the challenge of climate change throughout its global businesses. Atmospheric scientists, commonly called meteorologists, study the atmosphere's



physical characteristics, motions, and processes, and the way in which these factors affect the rest of our environment. More about careers in atmospheric science is at www.careercornerstone.org.

Pulling Pure Oxygen from Water at MIT

Using a surprisingly simple, inexpensive technique, chemists have found a way to pull pure oxygen from water using relatively small amounts of electricity, common chemicals and a room-temperature glass of water. Because oxygen and hydrogen are energy-rich fuels, many researchers have proposed using solar electricity to split water into those elements--a stored energy source for when the sun goes down. One of the chief obstacles to that green-energy scenario has been the difficulty of producing oxygen without large amounts of energy or a high-maintenance environment. Now, Massachusetts

Institute of Technology chemist Daniel Nocera and his postdoctoral student Matthew Kanan have discovered an efficient way to solve the oxygen problem. To produce oxygen, Nocera and Kanan added cobalt and phosphates to neutral water and then inserted a conductive-glass electrode. As soon as the researchers applied a current, a dark film began to form on the electrode from which tiny pockets of oxygen began to appear, eventually building into a stream of bubbles. Nocera and Kanan believe the film (cobalt-phosphate mixture,



A snapshot showing the new, efficient oxygen catalyst in action at MIT. Credit: MIT/NSF

possibly combined with phosphate) is the catalyst that helps break apart the water molecules to create oxygen gas. Find out more about chemistry careers and others at www.careercornerstone.org.

Degree Profile: Mathematics

The work of mathematicians falls into two broad classes -- theoretical (pure) mathematics and applied mathematics. These classes, however, are not sharply defined and often overlap. The world is full of places to do rigorous mathematics. As you begin to identify potential outlets for your talent, it may be useful to get a sense of the dimensions of the 'field' in its entirety. Business, industry, and government use mathematical expertise, often in the



context of applications.

The use of mathematics is pervasive in modern industry. The result is that mathematicians are found in almost every sector of the job market, including engineering research, telecommunications, computer services and software, energy systems, computer manufacturers, aerospace and automotive, chemicals and pharmaceuticals, and government laboratories, among others.

A bachelor's degree in mathematics is offered by most colleges and universities. Because of the diversity of the type of work mathematicians do and their employers, the



range of compensation is extremely broad. Mathematicians hold about 3,000 jobs in the United States. Many people with mathematical backgrounds also worked in other occupations. For example, there were about 54,000 jobs as postsecondary mathematical science teachers.

Find out more about careers in mathematics at www.careercornerstone.org.

The Link Between Community Colleges & Healthcare

Did you know that 59% of new nurses and many other new healthcare workers are educated at community colleges? And, the healthcare industry will generate 3 million new wage and salary jobs between 2006 and 2016, more than any other industry -- and most workers have jobs that require less than 4 years of college education.

Healthcare is the prevention, treatment, and management of illness and the preservation of mental and physical well being through the services offered by a wide range of professions including allied health, medical technology, medicine, and nursing. Within these broad categories are dozens of



interesting career paths.

While some fields in healthcare, such as pharmacists, physicians, and surgeons require advanced degrees, other career paths in healthcare require associate degrees

which can be completed in two years, and are often offered at community colleges.

For example, a physical therapist assistant helps physical therapists to provide treatment that improves patient mobility, relieves pain, and prevents or lessens physical disabilities of patients. They

generally prepare by earning an associate degree from an accredited physical therapist assistant program, many of which are offered at community colleges.

An associate degree is a college degree awarded after the

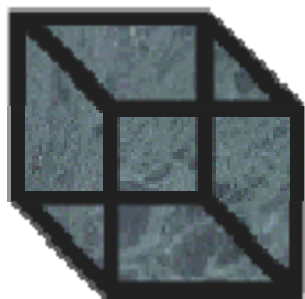


completion of about 20 courses. Associate degrees are available from public community colleges, private 2-year colleges, for-profit technical institutes, and many 4-year colleges and universities.

There are about 1200 community colleges in the United States that serve close to half of the undergraduate students in the United States, which include about 6.5 million credit students annually.

Find out more about careers in healthcare and about community colleges and associate degrees at www.careercornerstone.org.

Link to the Sloan Career Cornerstone Center



Why not link to the Sloan Career Cornerstone Center from your website? Link to individual pages such as precollege resources, to degree profiles, or to our podcasts or newsletter. We're happy to provide you with a custom graphic or any materials you need!

Find out more at www.careercornerstone.org/addalink.htm

Making Science Make Sense for Women/Minorities

A survey commissioned by Bayer Corporation as part of its Making Science Make Sense® initiative says the current American pre-college education system is failing to engage girls and minorities to pursue STEM careers. In the latest Bayer Facts of Science Education Survey, senior executives leading some of the country's largest chemical, pharmaceutical, aerospace, semiconductor and other STEM industry companies were polled about a host of issues related to diversity and underrepresentation of women, African Americans, Native Americans and Hispanics in STEM fields and their impact on U.S. competitiveness. Almost all of the Fortune 1000 STEM executives (95 percent) are concerned that the U.S. is in danger of losing its global leadership position in science and technology due to a shortage of

STEM talent, with more than half (55 percent) reporting their companies are already experiencing such a shortage. Not surprisingly, almost all the senior executives (98 percent) say it is important for girls and minorities to receive a strong science and math education beginning in elementary school in order to reduce their underrepresentation in STEM fields. However, they believe the U.S. education system is falling short. Not one of the executives surveyed graded the U.S. an "A" when asked how good a job the U.S. pre-college system is doing in engaging and nurturing girls and minorities to pursue STEM careers. In fact, almost six-in-10 (55 percent) assigned it a failing grade of D or F. Recruiting women and minorities can be challenging and



frustrating, according to the executives. Four-in-five executives (80 percent) report their companies face challenges in hiring adequate numbers of women and minorities for STEM positions. Of those, half (50 percent) say they are frustrated by their companies' inability to hire adequate numbers of women and minority STEM workers. Find out more at www.bayerus.com/msms/Survey/summary_13.aspx.

Scientists Find Cells Coordinate Gene Activity

How a cell achieves the coordinated control of a number of genes at the same time, a process that's necessary for it to regulate its own behavior and development, has long puzzled scientists. Michael Elowitz, an assistant professor of biology and applied physics at the California Institute of Technology (Caltech), along with Long Cai, a postdoctoral research scholar at Caltech, and graduate student Chiraj Dalal, have discovered a surprising answer. Just as human engineers control devices ranging from dimmer switches to retrorockets using pulsed -- or frequency modulated (FM) -- signals, cells tune the expression of groups of genes using discrete bursts of activation. Using mathematical modeling, the researchers were then able to determine that the burst-like movement most likely serves to coordinate gene expression. The process is similar to how a dimmer switch on household lights works. Such knobs control the fraction of time that current, which switches on and off rapidly, goes to the light fixture. Rotating the knob varies the relative amount of time that current is on or off, and the resulting intensity of the light is proportional to the fraction of time the switch is on. "The idea of controlling a system by flipping it between extreme 'on' and 'off' states at different rates, rather than fine-tuning it, is sometimes called 'bang bang' regulation," Elowitz says.

