Sloan Career Cornerstone Center
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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, Healthcare and Medicine.

Inside this issue:

The Quest for Absolute Zero

In the 1830's, when the Industrial Revolution was in full swing, scientists studied the way steam engines turned heat into motion. They realized how connected movement and temperature were: the more atoms move about inside an object, the hotter it becomes. This energy can be induced in an object -- be it solid, liquid or gas -- in a variety of ways. It can occur by adding heat from a separate hotter body, increasing the pressure (a pressure cooker creates higher heats through increased pressure) or doing work on it (a drill creates heat through doing work on a piece of wood and creating friction).

In turn, scientists realized that things became colder as the atoms deep inside moved less and lost energy. It was this insight that would fuel the next century's quest for absolute zero. From refrigeration to MRIs, the study of cold has transformed modern life.

Still from "Absolute Zero" showing James Dewar in the lab with his two assistants Robert Lennox and John Heath. *Credit: "Absolute Zero"*

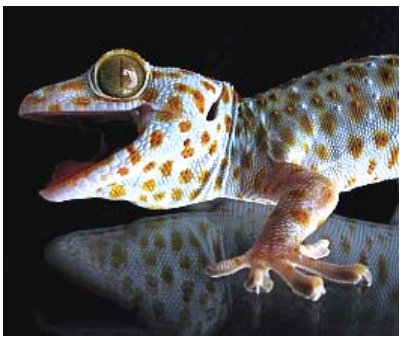
A NOVA documentary, "Absolute Zero," features the struggle of scientists, philosophers, and engineers over four centuries as they attempt to understand the nature of cold, to explore its deepest reaches, to create the "cold technologies" that have transformed society and to seek a deeper insight into matter itself.

More information about careers in physics is at www.careercornerstone.org. Additional information about low temperature physics and absolute zero see www.absolutezerocampaign.org.

New Adhesive Mimics Gecko's Foot

Building upon several years of research into the gecko's uncanny ability to climb sheer walls, researchers at the University of California, Berkeley, have developed an adhesive that is the first to master the easy attach and easy release of the reptile's padded feet. The material could prove useful for a range of products, from climbing equipment to medical devices.

Unlike duct tape or glue, the new material is crafted from millions of tiny, hard, plastic fibers that establish grip; a mere square two centimeters on a side can support 400 grams (close to a pound). While tape sticks when it presses onto a surface, the new adhesive sticks as it slides on a surface and releases as it lifts -- this is the trick behind a gecko's speedy vertical escapes.



There are other synthetic adhesives inspired by gecko feet and they adhere much like conventional tape. In contrast, the new adhesive brushes along a surface to develop traction. While ideal for hanging posters, the characteristic is even more important for any application that requires movement, such as climbing. The new material is also novel in that it gets stronger with use.

More details are at http://robotics.eecs.berkeley.edu/~ronf/Gecko/.

Salaries Strong for Scientists and Engineers

Employers are projecting a 16% increase in college hiring in 2007-08, the fifth consecutive year of double-digit increases, and starting salaries are reflecting this positive growth, according to the 22nd edition of Salaries of Scientists, Engineers and Technicians: A Summary of Salary Surveys, recently released by the Commission on Professionals in Science and Technology. Among the findings:

- Chemical engineering bachelor's degree recipients received the highest average starting salary offer in summer 2007 ($59,361). In contrast, psychology graduates received an average offer of just $31,631.
- Gains were seen in starting salary offers across all science and engineering fields in summer 2007, with the most significant increases in chemical engineering (up 5.4%), civil engineering (up 5.4%) and computer engineering (up 4.8%).
- By occupation, median salaries were highest at the bachelor's level in 2003 in engineering ($70,000) and computer science and mathematics ($68,000), and lowest in the life sciences ($42,000) and social and behavioral sciences ($45,000).
- Information technology (IT) salaries are back on the rise after three years of relatively stagnant pay. In 2007, IT staffers can expect to earn a median base salary of $74,000, and $78,000 in total compensation. IT man-agers can expect to earn a median base salary of $97,000, and $105,000 in total compensation.

Find out more about salary ranges for careers in science, technology, engineering, mathematics, computing, and medicine at www.careercornerstone.org/salary.htm.

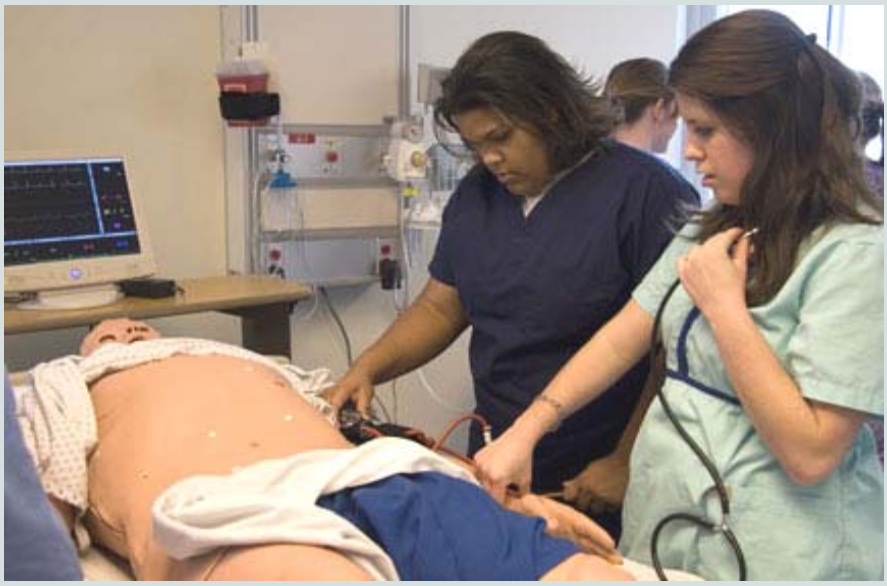
Degree Profile: Information Systems

How and when companies and organizations use technology are critical to remaining competitive. Computer and information systems managers play a vital role in the technological direction of their organizations. They do everything from constructing the business plan to overseeing network security to directing Internet operations. Computer and information systems managers plan, coordinate, and direct research and facilitate the computer-related activities of firms. They direct the work of systems analysts, computer programmers, support specialists, and other computer-related workers. These managers plan and coordinate activities such as installation and upgrading of hardware and software, programming and systems design, development of computer networks, and implementation of Internet and intranet sites. They are increasingly involved with the upkeep, maintenance, and security of networks. They analyze the computer and information needs of their organizations from an operational and strategic perspective and determine immediate and long-range personnel and equipment requirements. They assign and review the work of their subordinates and stay abreast of the latest technology to ensure the organization does not lag behind competitors.

Find out more about careers in information systems at www.careercornerstone.org.

College Nursing Lab Features 'Stan the Man'

They named him Stan, and he's the man – or mannequin – in demand in the new nursing lab at St. Charles Community College (SCC) in Cottleville, MO. Spring 2008 classes are featuring Stan -- a computerized teacher for all levels of nursing students working on their associate's degrees. The official name of this computerized patient simulator is Emergency Care Simulator (ECS). The ECS provides an anatomically correct, feature-rich mannequin that allows for the physical demonstration of various clinical signs including breathing, blinking eyes, blood pressure, bowel sounds, pulses, bleeding, and more.



Laquicia Turner and Michelle Beckman, students from the Lewis & Clark Career Center, test the blood pressure of 'Stan the Mannequin,' a new patient simulator, during a tour of the nursing lab at St. Charles Community College in Cottleville, MO.

Stan the mannequin responds to medications and other clinical scenarios to deliver a realistic and objective training ground for learners to practice and perfect their patient care skills without risk to real patients, according to SCC nursing faculty. The simulator mannequin is operated by computer software offering various case studies or scenarios for student learning and practice. "This direct application has an important role in today's nurse education," said Patricia Porterfield, dean of math, science, and health at SCC. "It enhances critical thinking and better prepares our students to enter their clinical training in area hospitals. The new simulator will allow us to keep current with trends in nursing education." "We can stop the program mid-stream and investigate the problems...that's something that can't be done when students advance to actual clinical training in the hospitals." said Mary VanNoord, who coordinates the ECS learning program. Find out about careers in nursing at www.careercornerstone.org.

Our Partner Organizations Include:

- **American Association for the Advancement of Science (AAAS)**
- **American Board of Medical Specialties**
- **American Chemical Society**
- **American Geological Institute**
- **American Institute of Biological Sciences**
- **American Institute of Chemical Engineers**
- **American Institute of Physics**
- **American Mathematical Society**
- **American Nuclear Society**
- **American Society of Civil Engineers**
- **American Statistical Association**
- **American Society of Mechanical Engineers**
- **Casualty Actuarial Society**
- **Institute of Electrical and Electronics Engineers**
- **JGPerpich, LLC**
- **Mathematical Association of America**
- **NASA**
- **Society for Industrial and Applied Mathematics**
- **Society of Actuaries**
- **The Minerals, Metals, and Materials Society**
- **US Department of Labor, Bureau of Labor Statistics**
- **Whitaker Foundation**

Mathematics, Statistics, and Voting

The theme for Mathematics Awareness Month 2008 (www.mathaware.org) is "Math and Voting." This election year, the term “voting” brings to mind national elections. Candidates are vying for attention in debates and primaries, polls are taking the pulse of the electorate, blogs are offering opinions on everything candidates say, and, ultimately, a general election leads to the selection of the next President of the United States. Most people wonder at some point: “Does my vote matter? Is the election process fair? Are the votes being counted correctly?” The answers to these questions are incredibly complex, but, fortunately, mathematics and statistics provide the means to deal with the complexity of how votes are cast and counted and how that influences the outcome. For example, statistics provides ways to identify, measure, and address sources of error, and mathematics provides insights into the effect of different voting systems on the outcome of an election. Voting is not just about electoral politics, however; it’s part of everyday life. "Voting" is something that happens in many contexts not related to politics. In any situation in which preferences are expressed — what movie to see, where to meet after school, who makes the team, etc. — voting in some way occurs. Surprisingly, different voting systems often yield different outcomes.

Resources for this year's Mathematics Awareness Month are designed to help explain what makes these votes matter, as well as how the voting system used affects the outcome, regardless of the context of the voting.

Throughout April, many college

and university departments, institutional public information offices, student groups, and others are sponsoring events and developing resources to help explore the interaction of mathematics, statistics, and voting.

The Sloan Career Cornerstone Center provides extensive resources about careers in mathematics, statistics, and actuarial science. Find out more at www.careercornerstone.org.

High School Students Dual Enroll in College

High school students are taking advantage of programs to earn college credits, according to the National Center for Education Statistics. According to two reports, more than half of all colleges and universities in the nation enrolled high school students in courses for college credit, commonly called "dual enrollment," which translates into about 813,000 or about 5% of high school students. Of the 57% of postsecondary institutions that had high school students who took college courses during the 2002-03 academic year, 85% had high school students taking them in dual enrollment programs, and 55% had students who simply enrolled in college courses and were treated as regular college students. About 98% of public two-year institutions had high school students taking college courses during the 2002-03 academic year, compared to 77% of public 4-year institutions, 40 percent of private four-year institutions and 17% of private two-year institutions. Among the estimated 2,050 institutions with dual enrollment programs, about 110, or 5%, had dual enrollment programs specifically geared toward high school students at risk of education failure.