



Career Cornerstone News

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College Finance Planning Tool

The U.S. Department of Education has unveiled a new online tool to help students and families financially prepare and plan for college before a student's senior year of high school. Called the FAFSA4caster (www.federalstudentaid.ed.gov), it provides students with an early estimate of their eligibility for federal financial aid, which could include a Pell grant of up to \$4,310.

The FAFSA4caster instantly calculates a student's eligibility for federal student aid, including grants, reduces the time it will take to complete the

Free Application for Federal Student Aid (FAFSA), and simplify the financial aid process for students and families.

In addition to helping families make informed decisions as they plan for college, the FAFSA4caster will also reduce the application time when students file their FAFSA in their senior year in high school. The FAFSA4caster pre-populates 51 of the 102 questions on the FAFSA, significantly reducing the time it takes for the student to



complete the FAFSA in their senior year of high school.

In September, the Department will release an expanded feature, which will estimate a student's federal entire aid package, including eligibility for federal student loans.

Your PC is a Telescope!

Astronomy obeys Moore's law: it is producing about two times more data each year. Current instruments typically produce nearly a terabyte per night. Managing huge data archives and processing complex data are now among the major astronomy challenges.

The Sloan Digital Sky Survey (SDSS) is a good example. It is a 5-band optical survey of the northern sky, observing about 400 million sources

as images and 1 million with spectra. These spectra allow detailed studies of large star and galaxy populations.

Now everyone can use one of the world's best telescopes. An online catalog of the SDSS data as a web-accessible database and visual analysis tools are at <http://skyserver.sdss.org>. The site has been a big



success -- about 10 percent of the visitors are students using online courses, but the main users are astronomers analyzing the available data.

Microsoft and Carnegie Mellon Establish Center for Computational Thinking

Microsoft Corp. and Carnegie Mellon University have announced the creation of the Microsoft Carnegie Mellon Center for Computational Thinking. The center represents a long-term collaboration between Microsoft Research and Carnegie Mellon's Computer Science Department and will support research in emerging areas of computer science, particularly those that can influence the thinking of other disciplines.

"Increasingly, scientists and researchers rely on computer science to enable them to sift

through massive amounts of data and find breakthroughs that could provide new insights into the human body, the earth we live on and even the universe," said Rick Rashid, senior vice president of Microsoft Research.

Computational thinking, as developed by Jeannette M. Wing, head of Carnegie Mellon's Computer Science Department, involves solving problems, designing systems and understanding human behavior by drawing on the concepts fundamental to computer science. The new center will support

research in core computer science areas and researchers from a variety of fields will address specific, real-world problems; initial topics include privacy, e-commerce, multicore computing and embedded medical devices. In addition, the center will develop and disseminate courses and curricula suitable for graduate and undergrad students, as well as K-12 classes. The center will also host a series of "mindswaps" for the purpose of data sharing, problem solving, resource sharing and collaborating on bigger computer challenges. Find out more about the center at <http://research.microsoft.com>.

Degree Profile: Electrical and Electronics Engineering

Electrical and electronics engineers conduct research, and design, develop, test, and oversee the development of electronic systems and the manufacture of electrical and electronic equipment and devices.

From the global positioning system that can continuously provide the location of a vehicle to giant electric power generators, electrical and electronics engineers are responsible for



a wide range of technologies. Electrical and electronics engineers design, develop, test, and supervise the manufacture of electrical and electronic equipment. Some of this equipment includes broadcast and communications systems; electric motors, machinery controls, lighting, and wiring in buildings, automobiles, aircraft, and radar and navigation systems; and power generating, controlling, and transmission devices used by electric utilities. Many electrical and electronics engineers also work in areas closely related to computers.



Electrical engineers direct systems control at Walt Disney World in Florida, manage graduate programs at Intel in California, design aircraft electrical power systems at Boeing in Seattle, and research electrochemotherapy for biomedical companies nationwide.

Find out more about career paths in electrical and electronics engineering, and explore profiles of many people working in the field at www.careercornerstone.org.

Bizarre Hexagon Observed on Saturn

An odd, six-sided, honeycomb-shaped feature circling the entire north pole of Saturn has captured the interest of scientists with NASA's Cassini mission. NASA's Voyager 1 and 2 spacecraft imaged the feature over two decades ago. The fact that it has appeared in Cassini images indicates that it is a long-lived feature.

A second hexagon, significantly darker than the brighter historical feature, is also visible in the Cassini pictures. The spacecraft's visual and infrared mapping spectrometer is the first instrument to capture the entire hexagon feature in one image.

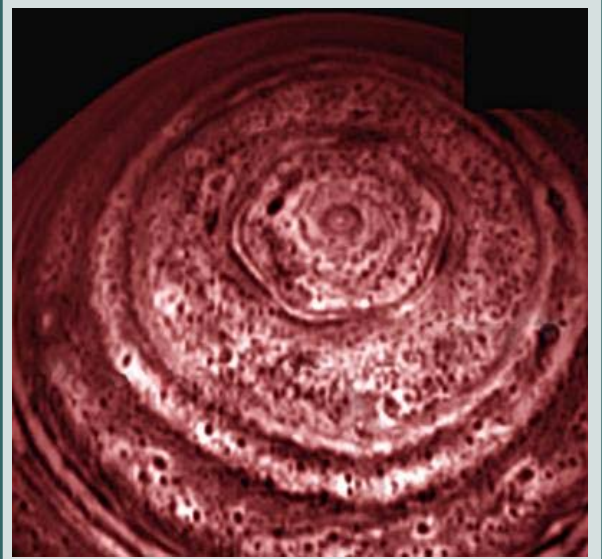
"We've never seen anything like this on any other planet. Indeed, Saturn's thick atmosphere where circularly-shaped waves and convective cells dominate is perhaps the last place you'd expect to see such a six-sided geometric figure, yet there it is," said Kevin Baines, atmospheric expert and member of Cassini's visual and infrared mapping spectrometer

team at NASA's Jet Propulsion Laboratory, Pasadena, CA.

The hexagon is similar to Earth's polar vortex, which has winds blowing in a circular pattern around the polar region. On Saturn, the vortex has a hexagonal rather than circular shape. The hexagon is nearly 25,000 kilometers (15,000 miles) across. Nearly four Earths could fit inside it.

The new images taken in thermal-infrared light show the hexagon extends much deeper down into the atmosphere than previously expected, some 100 kilometers (60 miles) below the cloud tops. A system of clouds lies within the hexagon. The clouds appear to be whipping around the hexagon like cars on a racetrack.

The hexagon appears to have remained fixed with Saturn's



Saturn's Active North Pole
Photo Credit: NASA/JPL/University of Arizona

rotation rate and axis since first glimpsed by Voyager 26 years ago. The actual rotation rate of Saturn is still uncertain. "Once we understand its dynamical nature, this long-lived, deep-seated polar hexagon may give us a clue to the true rotation rate of the deep atmosphere and perhaps the interior," added Baines.

More details are <http://saturn.jpl.nasa.gov>.

Organizations Contributing Content to Career Cornerstone:

- American Chemical Society
- American Geological Institute
- 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



Find out more at www.careercornerstone.org

Stem-Cell Treatment for Heart Attacks

Dramatic findings have been released by Joshua Hare, M.D., chief of the Division of Cardiology and director of the Interdisciplinary Stem Cell Institute at the University of Miami's Miller School of Medicine, on the first human clinical trial to test a stem-cell based treatment for heart attack patients. The phase one trial was designed to determine the safety and efficacy of infusing adult human mesenchymal stem cells intravenously in patients within days of a myocardial infarction, or heart attack, to lessen damage to the heart muscle.

Fifty-three patients, who had suffered a first heart attack within one to ten days, were enrolled at ten medical centers across the U.S. beginning in February 2005. "Over the six month follow-up period the stem cell treated patients had

lower rates of side effects such as cardiac arrhythmias, and they had significant improvements in heart, lung and global function," said Hare. "Echocardiography showed improved heart function, particularly in those patients with large amounts of cardiac damage."

As a cell-based therapy, mesenchymal stem cells have several unique advantages: they can be taken from genetically distinct donors, are easy to prepare, and have a tendency to collect within injured areas. This year an estimated 700,000 Americans will suffer a heart attack, and despite the best care many will go on to develop congestive heart failure from the muscle damage caused by the heart attack. The promise of stem cell therapy in reversing or preventing that damage provides a



Joshua Hare, M.D

significant benefit in an area of unmet medical need.

To learn more, visit <http://umstemcell.com>.

Extreme Data Computing

Boeing and Sun Microsystems Federal, a wholly owned subsidiary of Sun Microsystems, Inc., have announced plans to launch an industry-leading, open architecture that will enable organizations to collect, process, and store massive amounts of data at extremely high rates of speed. Capable of processing more than 10 gigabits of data per second, the joint solution is designed to foster data analysis, sharing and decision making for a variety of markets, including government, life science, energy, education, aerospace, entertainment and media. Ten gigabits per second is equivalent to processing 250 copies of the complete works of Shakespeare or 125 chest x-rays in one second. The architecture addresses the computing demands of several data-intensive tasks, including: operational intelligence and surveillance, epidemic trend analysis and prediction, failure analysis of aircraft and ships, predictive traffic management, weather and ocean forecasting, and virtual design. Target applications for the 10 gigabit technology include experimental analyses and simulations in scientific disciplines such as high-energy physics, climate modeling, earthquake engineering, astronomy, human genomics and the development of nano-scale electronic devices. In such applications, massive datasets must be shared by a community of hundreds or thousands of researchers distributed worldwide.

