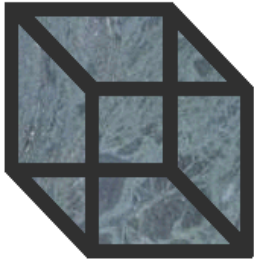


# Career Cornerstone News

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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, and Mathematics.

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## NASA Heads Back to the Moon

Before the end of the next decade, NASA plans for astronauts to once again explore the surface of the moon. Building on the best of Apollo and shuttle technology, NASA plans to create a 21st century exploration system that will be affordable, reliable, versatile, and safe. The centerpiece of this system is a new spacecraft designed to carry four astronauts to and from the moon, support up to six crewmembers on future missions to Mars, and deliver crew and supplies to the International Space Station.

The new spacecraft will have solar panels to provide power, and both the capsule and the lunar lander will use liquid methane in their engines. Why methane? NASA is thinking ahead, planning for a day when future astronauts can convert Martian atmospheric resources into methane fuel.

Once a lunar outpost is established, crews could remain on the lunar surface for up to six months. The spacecraft can operate without a crew in lunar orbit, eliminating the need for one astronaut to stay behind while others explore the surface.

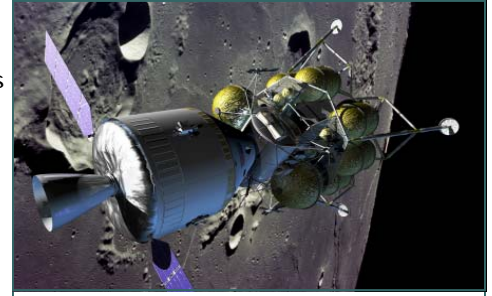


Photo Credit: NASA/John Frassanito and Associates

NASA says that the plan is that in just five years, the new ship will begin to ferry crew and supplies to the International Space Station. Plans call for as many as six trips to the outpost a year. In the meantime, robotic missions will lay the groundwork for lunar exploration.

Find out more at [www.nasa.gov/missions/solarsystem/cev.html](http://www.nasa.gov/missions/solarsystem/cev.html). Explore career paths in Aerospace Engineering and other science, technology, engineering, or mathematics fields at [www.careercornerstone.org](http://www.careercornerstone.org).



Photo Credit: NASA/John Frassanito and Associates

## Explore the Careers of Engineers, Scientists, and Mathematicians

Hundreds of professionals who have chosen career paths in engineering, mathematics, or the physical sciences are profiled as part of the Sloan Career Cornerstone Center. On the site you can read about how degrees in science,

technology, engineering, or mathematics can lead to interesting careers in just about any industry. The individuals who are profiled explain how they balance work and personal life, how their educational background prepared them for the

work they do, and how mentors may have made a difference. Many offer tips to students considering working toward a degree in these fields, and discuss the importance of coops and internships. Find out more by exploring profiles at [www.careercornerstone.org](http://www.careercornerstone.org).

## 2006 USA Biology Olympiad

Registration has begun for the 2006 USA Biology Olympiad (USABO), a four-tiered competition open to all U.S. high school students. It is aimed at selecting the USA Biology Olympiad National Team, a four-person team that will compete in the 2006 International Biology Olympiad to be held in Rio Cuarto, Argentina.

The International Biology Olympiad (IBO) is the annual World Championship Biology Competition for high school students. The first international

academic Olympiads were launched under the auspices of the United Nations in the 1960's. The programs have expanded gradually to include over seventy participating countries across five continents.

Currently, international academic Olympiads are held annually in mathematics, physics, chemistry, computer science, biology and astronomy. The USA Biology Olympiad and the International Biology Olympiad award individual achievement in theoretical and practical biology knowledge.



The competition begins each February with a multiple-choice exam administered nationwide to all interested U.S. high school students nominated by their teacher. Students do not need to be currently enrolled in a biology class, or have taken AP biology, in order to participate in the USABO.

Registrations are accepted through January 23, 2006. For details, visit [www.cee.org/usabo](http://www.cee.org/usabo).

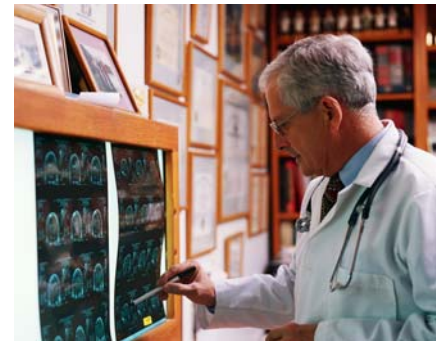
## Degree Profile: Bioengineering

Bioengineering or Biomedical Engineering is a discipline that advances knowledge in engineering, biology, and medicine -- and improves human health through cross-disciplinary activities that integrate the engineering sciences with the biomedical sciences and clinical practice. Bioengineering combines engineering expertise with medical needs for the enhancement of health care. It is a branch of engineering in which knowledge and skills are developed and applied to define and solve

problems in biology and medicine.

Biomedical engineers may be called upon to design instruments and devices, to bring together knowledge from many sources to develop new procedures, or to carry out research to acquire knowledge needed to solve new problems.

Bioengineers design devices used in various medical procedures, such as the computers used to analyze blood or the laser systems used in corrective eye surgery. They develop artificial organs, imaging systems such as magnetic resonance, ultrasound, and x-ray, and devices for automating insulin injections or controlling body functions. Most engineers in this specialty require a sound background in one of the basic engineering specialties, such as mechanical or electronics



engineering, in addition to specialized biomedical training. Some specialties within bioengineering or biomedical engineering include biomaterials, biomechanics, medical imaging, rehabilitation engineering, and orthopedic engineering.

Major advances in Bioengineering include the development of artificial joints, magnetic resonance imaging (MRI), the heart pacemaker, arthroscopy, angioplasty, bioengineered skin, kidney dialysis, and the heart-lung machine. Find out more about Careers in Bioengineering at [www.careercornerstone.org](http://www.careercornerstone.org).



## 2004 Engineering Grads Better Prepared Than Those of a Decade Earlier

Students who earned undergraduate engineering degrees in 2004 are better prepared to enter their profession than were similar students who finished their degrees in 1994, according to a 3½-year study recently completed by the Penn State Center for the Study of Higher Education and commissioned by ABET, Inc., the accrediting body for U.S. college and university engineering programs.

"In all nine engineering knowledge and skill areas emphasized by the new standards, the 2004 graduates in the aggregate have significantly, and often substantially, higher skill levels than did their counterparts from a decade earlier," according to Dr. Lisa R. Lattuca, study director and assistant professor and research associate in the Center. The skills examined include basic math and science, design and problem solving, experimental skills,

engineering science applications, technical and interpersonal communications, as well as working in teams and life-long learning. The 2004 graduates also have greater knowledge of societal and global issues, as well as ethics and professional standards.

The CSHE study draws on information from 5,500 graduates of the Class of 1994 and 4,300 Class of 2004 graduates at 40 U.S. institutions. The report details a number of changes that have occurred between 1994 and 2004 in program curricula, as well as in engineering faculty members' teaching practices and perspectives on undergraduate education. Program heads report greater curricular emphasis since 1994 on students' communications skills and ability to work in groups, as well as on the application of modern engineering tools.

Dr. J. Fredericks Volkwein, a co-principal investigator, noted that industry representatives report seeing somewhat less change in the preparation levels of graduates than is suggested by program chairs, faculty members, and the two classes of graduates themselves. Nonetheless, in assessing the skills of recent graduates, 92% of the employers report that the recent graduates they hired are "adequately prepared" or "well-prepared" in their use of math, science, and technical skills. Fewer employers (52%) consider recent graduates to be adequately or well prepared in their ability to understand important contextual considerations and constraints on engineering. Employers are mixed in their assessments of whether recent graduates are better prepared than graduates a decade ago. The full report will be released in March 2006 at [www.ed.psu.edu/cshe](http://www.ed.psu.edu/cshe).

## Link to Career Cornerstone From Your Counseling, School, or Department Website!

Many college career centers and admissions offices -- along with engineering, math, and sciences departments -- are linking to the Sloan

Career Cornerstone Center from their websites to help students and others tap into Career Cornerstone's free career resources. High School counseling departments also link to Career Cornerstone to provide college-bound students with university and career information. Visit [www.careercornerstone.org/linksupport.htm](http://www.careercornerstone.org/linksupport.htm) for a variety of graphics and other support to help you share Career Cornerstone with parents, teachers, and both current and prospective students.

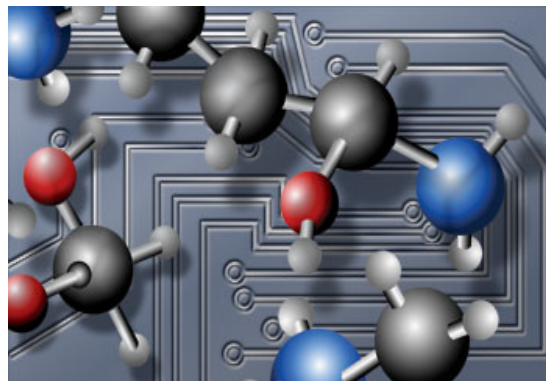


*Find out more at [www.careercornerstone.org](http://www.careercornerstone.org)*

## Chemistry Meets Computer, Data, and Networking Technologies

The National Science Foundation has announced new grants in "cyber-enabled chemistry," a program developed by its chemistry division to explore how researchers and educators in that field can fully exploit the potential of cyberinfrastructure. The lead principal investigators for the four awards include two researchers in separate projects at the University of California, Berkeley, and one each at the University of Illinois at Urbana-Champaign and The Pennsylvania State University. The awards represent a combined investment of about \$10 million over a 5-year period, including co-funding from NSF's former Division of Shared Cyberinfrastructure.

"Cyberinfrastructure" is an umbrella term meant to encompass the vast webs of computer, data, and networking technologies that have infiltrated every aspect of modern life, and that are now beginning to revolutionize science and engineering research. The goal of the cyber-enabled chemistry program is to ensure that chemists can take full advantage of that revolution. One goal of the program is to impact the day-to-day practice of chemistry through advances such as scientific portals, workflow management, computational modeling, and data and molecular visualization.



Chemistry meets computer, data and networking technologies in cyber-enabled chemistry awards. Credit: Nicolle Rager-Fuller, NSF Foundation

The team at the University of California, Berkeley will seek to develop and validate new ways of simulating biological molecules, while those at The Pennsylvania State University plan to develop a database to improve communication among scientists working in various disciplines.

## Foreign Born Workers Account for Growing Share of STEM Occupations

A growing share of workers in scientific, technological, engineering, and mathematical (STEM) occupations in the U.S. are foreign born, according to a new report from the Commission on Professionals in Science and Technology. By 2002, the foreign born accounted for nearly one out of every six individuals employed in these occupations. Analyzing data on the employment of the foreign born in STEM occupations from 1994 to 2002, the Commission found that the total number of foreign born STEM workers increased from 764,000 in 1994 to 1.2 million in 2002, accounting for 38% of the growth in the STEM workforce during these years. The largest percentages of the foreign born occur in the natural sciences, where in 2002 they accounted for 31.8% of all medical scientists, 27.1% of all physicists and astronomers, and 22.8% of all chemists. The greatest growth in the time period occurred in computer science occupations (computer scientists, systems analysts, programmers and faculty). These occupations accounted for nearly 80% of the growth of the entire STEM workforce between 1994 and 2002. For more details, visit [www.cpst.org](http://www.cpst.org).

### Organizations Contributing Content to the Sloan Career Cornerstone Center:

- ◆ 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
- ◆ ASME
- ◆ IEEE
- ◆ JG Perpich, LLC
- ◆ Mathematical Association of America
- ◆ NASA
- ◆ Society for Industrial and Applied Mathematics
- ◆ The Minerals, Metals & Materials Society
- ◆ US Department of Labor, Bureau of Labor Statistics
- ◆ Whitaker Foundation