



Career Cornerstone News

Volume IV, Issue XI

November, 2008



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>Number Sense: Easy as 1, 2, 3</i>	1
<i>Scientists Unmask Brain's Hidden Potential</i>	1
<i>Average Salary to New Grads Up 7.6%</i>	2
<i>Degree Profile: Podiatrist</i>	2
<i>Center Brings Together Biologists & Mathematicians</i>	3
<i>Student Develops Hurricane Evacuation System</i>	4
<i>NSF STEM Program for Historically Black Colleges and Universities</i>	4

Number Sense: Easy as 1, 2, 3

Knowing how precisely a high school freshman can estimate the number of objects in a group gives you a good idea how well he has done in math as far back as kindergarten, researchers at The Johns Hopkins University found.

Some intuition about numbers, counting and mathematical ability is basic to almost all animals. For example, creatures that gather or hunt for food keep track of the approximate number of food items they procure. The Johns Hopkins team wondered whether this basic, seemingly innate

number sense had any bearing on the formal mathematics that people learn in school.

Good "number sense" at age 14 correlates with higher scores on standardized math tests throughout a child's life and weaker "number sense" at 14 predicts lower scores on standardized tests, says Justin Halberda, assistant professor of psychological and brain sciences in the university's Krieger School of Arts and Sciences.

"We discovered that a child's ability to quickly estimate how many things are in a group significantly correlates with that child's



performance in school math for every single year, reaching all the way back to when he or she was in kindergarten," Halberda said.

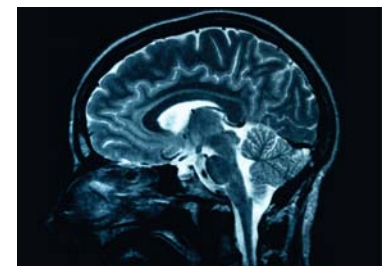
Find out about careers in mathematics at www.careercornerstone.org.

Scientists Unmask Brain's Hidden Potential

Previous research has found that when vision is lost, a person's senses of touch and hearing become enhanced. But exactly how this happens has been unclear. Now a long-term study from the Berenson-Allen Center for Noninvasive Brain Stimulation at Beth Israel Deaconess Medical Center (BIDMC) demonstrates that sudden and complete loss of vision leads to profound – but rapidly reversible -- changes in the visual cortex. These findings not only provide new insights into how the brain compensates for the

loss of sight, but also suggest that the brain is more adaptable than originally thought.

The studies showed that even in an adult, the normally developed visual system quickly becomes engaged to process touch in response to complete loss of sight. The speed and dynamic nature of the changes we observed suggest that rather than establishing new nerve connections – which would take a long time – the visual cortex is unveiling abilities that are normally concealed when sight is



intact. The scientists had previously shown that study subjects with normal vision who are blindfolded for a five-day period performed better than non-blindfolded control subjects on Braille tests. Subsequent brain scans found that blindfolded subjects also experienced dramatic changes in the brain's visual cortex.

Average Salary to New Grads Up 7.6%

Despite negative trends in many parts of the economy, the college Class of 2008 ended the year on a positive note, according to results of a new survey conducted by the National Association of Colleges and Employers. Survey responses revealed that 94 percent of all disciplines had increases to their average starting salary offers. In fact, the average starting salary offer to all college graduates in the Fall 2008 Salary Survey is up 7.6 percent to \$49,224. For example, the average salary offer made to this year's group of computer and information sciences graduates is up from \$51,992 to \$58,677—a healthy

12.9 percent increase. In addition to demand for these graduates, the offers made by computer and electronics products manufacturers may have contributed to the large increase; these employers made a fair number of salary offers that exceeded \$70,000.

Falling in line with computer and information sciences graduates are engineering graduates, another collection of highly sought-after candidates. The average salary offer to these graduates rose 6.6 percent, from \$53,710 to \$57,250. The average salary offer to chemical



engineering graduates grew by 7.7 percent to \$63,773. The news was also good for computer engineering graduates, whose average salary offer topped out at \$60,280, a 7.8 percent increase.

Find out more about salary levels in over 200 fields at www.careercornerstone.org.

Degree Profile: Podiatrist

The human foot is a complex structure. It contains 26 bones -- plus muscles, nerves, ligaments, and blood vessels -- and is designed for balance and mobility. The 52 bones in the feet make up about one-fourth of all the bones in the human body. Podiatrists, also known as doctors of podiatric medicine (DPMs), diagnose and treat disorders, diseases, and injuries of the foot and lower leg.

Podiatrists treat corns, calluses, ingrown toenails, bunions, heel spurs, and

arch problems; ankle and foot injuries, deformities, and infections; and foot



complaints associated with diabetes and other diseases. To treat these problems, podiatrists prescribe drugs and physical therapy, set fractures, and perform surgery. They also fit corrective shoe inserts called orthotics, design plaster casts and strappings to correct deformities, and design custom-made shoes. Podiatrists may use a force plate or scanner to help design the orthotics: patients walk across a plate connected to a computer that "reads" their feet, picking up pressure points and weight distribution. From the computer readout, podiatrists order the correct design or recommend another kind of treatment.



Podiatrists must be licensed, requiring 3 to 4 years of undergraduate education, the completion of a 4-year podiatric college program, and passing scores on national and State examinations.

Podiatrists enjoy very high earnings. Median annual earnings of salaried podiatrists are about \$108,220. Find out more about careers in podiatry at www.careercornerstone.org/podiatrist/podiatrist.htm.

Center Brings Together Biologists & Mathematicians



Biologists and mathematicians from around the world will take part in a new institute dedicated to bringing top researchers

together to find creative solutions to pressing problems in both scientific fields. Known as the National Institute for Mathematical and Biological Synthesis, or NIMBioS, the center is funded by a \$16 million award from the National Science Foundation (NSF) and is located at the University of Tennessee Knoxville.

Mathematical biology is a growing field that applies the power of mathematics and modeling to the questions at multiple scales of space and time faced by biologists. Whether developing better strategies to control the spread of invasive species or determining the best way to combat wildfires, the techniques allow researchers to

take a larger, more systematic approach to finding the best possible solutions.

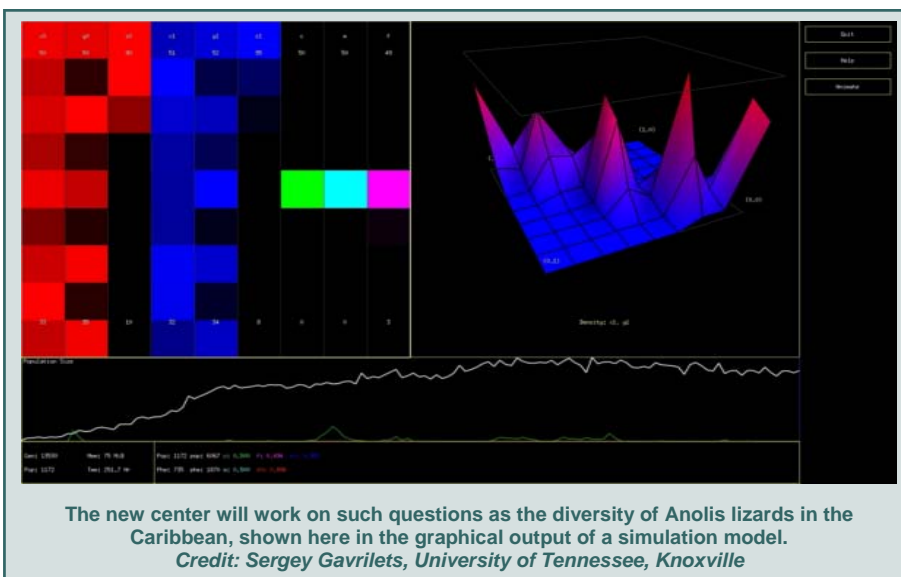
Other challenges NIMBioS scientists will address include fundamental science questions such as the way in which the components of cells work together to create a fully functional system, and developing new paradigms in mathematics.

NIMBioS will bring together small groups of researchers from

mathematics, biology and other fields to approach very specific issues that face the country.

In addition to small working groups, the institute will host larger gatherings on biological topics and on how to apply the tools of computational biology in general.

Find out more about careers in mathematics and biology 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
- 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

Student Develops Hurricane Evacuation System

Hundreds of lives and hundreds of millions of dollars could potentially be saved if emergency managers could make better and more timely critical decisions when faced with an approaching hurricane. Now, an MIT graduate student has developed a computer model that could help do just that. Michael Metzger's software tool, created as part of the research for his PhD dissertation, could allow emergency managers to better decide early on whether and when to order evacuations -- and, crucially, to do so more efficiently by clearing out people in stages. The tool could also help planners optimize the location of relief supplies before a hurricane hits.

By analyzing data from 50 years of hurricanes and detailed information on several major ones, and by comparing the information available at various times as a

hurricane approached with data from the actual storm's passage, Metzger said he was able to produce software that provides a scientifically consistent framework to plan for an oncoming hurricane. The concept of evacuating an area in stages -- focusing on different categories of people rather than different geographical locations -- is one of the major innovations to come out of Metzger's work, since congestion on evacuation routes has been a significant problem in some cases, such as hurricanes Katrina and Rita. Metzger suggests that, for example, the elderly might be evacuated first, followed by tourists, families with children, and then the remaining population. The determination of the specific



categories and their sequence could be determined based on the demographics of the particular area.

Metzger is a research assistant in the MIT Engineering Systems Division's Center for Engineering Systems Fundamentals, and a PhD student in the Operations Research Center.

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

NSF STEM Program for Historically Black Colleges and Universities

The Historically Black College and Universities Program (HBCU-UP) of the National Science Foundation provides awards to enhance the quality of undergraduate science, technology, engineering, and mathematics (STEM) education and research at Historically Black Colleges and Universities as a means to broaden participation in the nation's STEM workforce. HBCU-UP is committed to increasing the number of students participating in STEM programs and research at HBCUs. HBCU-UP recognizes and supports the important role that HBCUs play in increasing the numbers of underrepresented ethnic minorities that are well prepared for participation and leadership at every level of education and research in STEM. HBCU-UP currently impacts access and the quality of STEM education for more than 30,000 students majoring in STEM at HBCUs through a diverse set of programs. More than 16,000 STEM students have graduated from HBCU-UP supported institutions since 1998. Find out more at <http://www.nsf.gov/funding>, then search for program 5481.

