

VOICES OF 2018-19 DISCOVERY

Elon College, the College of Arts and Sciences at Elon University is committed to engaging students and the community in the excitement and wonder of discovery. During the past two decades, scores of discoveries in molecular biology, atomic physics and computer technology have changed the face of science and brought dramatic changes to our world.

The Voices of Discovery speaker series brings to campus preeminent scientists and mathematicians who have left an indelible mark on the way we view the world. They share their remarkable experiences and perspectives with Elon students and the community. This series plays a fundamental role in the university's commitment to create a science-conscious community and to help students be informed citizens.

Voices of Discovery is just one element of Elon's efforts to provide outstanding science education. At the Dalton L. McMichael Sr. Science Center, students work in modern laboratories with cutting-edge research tools. They focus on discovery-based learning, undergraduate research and collaboration among the sciences, developing an appreciation for the scientific enterprise and how we acquire new knowledge.



RESTORING MOTOR FUNCTION IN AMPUTEES WITH SMART PROSTHETICS



Monday, **September 17, 2018** | McCrary Theatre | 7:00 p.m.

Helen Huang

Professor of Biomedical Engineering, Joint Department of Biomedical Engineering at the University of North Carolina at Chapel Hill and North Carolina State University
Director of the Rehabilitation Engineering Center at North Carolina State University

While humans have long benefited from science and technologies that restore and augment missing, damaged or less-than-optimal body form and function, the pace of advance toward what some see as our bionic and possibly post-human future is now fast and furious. One of many areas of biomedical engineering that illustrates this pace is the development of prosthetic limbs.

The Amputee Coalition recently estimated there are more than 2 million amputees in the United States alone with about half attributed to consequences of vascular disease and about half to trauma including outcomes of warfare. There is a push in prosthetic limb development toward advanced robotics or smart prosthetics. These increasingly bionic prostheses make use of neural-machine interfaces, such as myoelectric sensors, which enable the prosthetic device to respond to patient intent and function more intuitively with more flexible,

adaptable movement patterns and with greater safety.

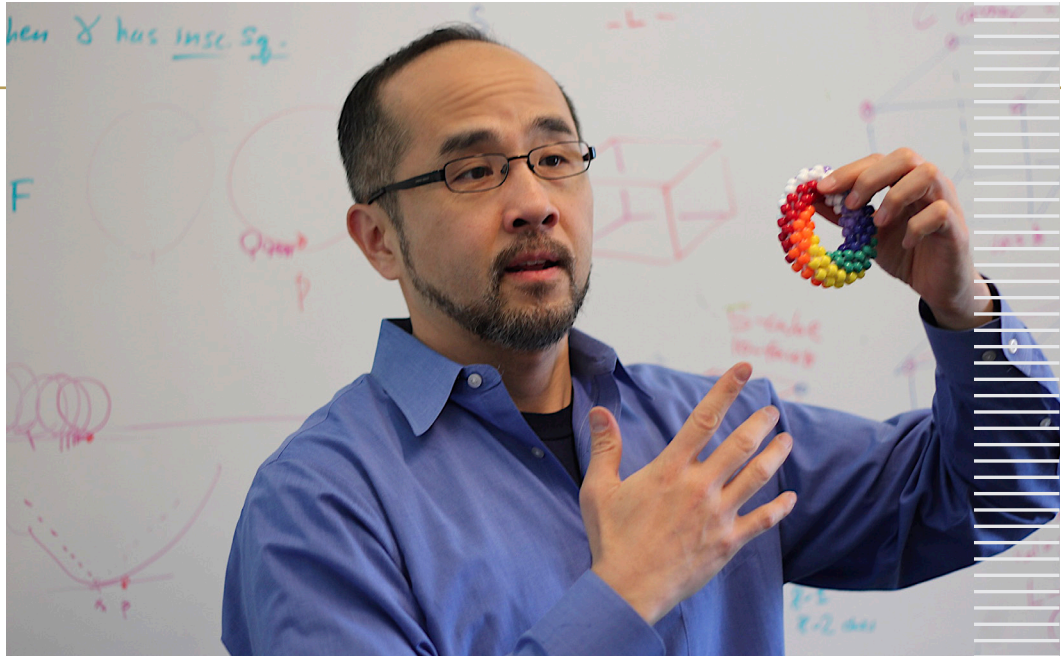
As the director of the Rehabilitation Engineering Center at N.C. State University, Helen Huang's chief research interest is understanding and developing neural-machine interfaces for applications that include artificial limbs and human robot interactions. Huang's research has been supported by several federal agencies including the Department of Defense and the National Institutes of Health as well as private companies.

Significant recognition of Huang's work includes receipt of the Delsys Prize for Innovation in Electromyography and a National Science Foundation Faculty Early CAREER Award. Huang is passionate about sharing the excitement of science and promoting the development of young scientists. She is active in promoting STEM (science, technology, engineering and math) education and career opportunities to K-12 students with a focus on minorities, women and students with disabilities.

ELON

VOICES OF
DISCOVERY

MATHEMATICS FOR HUMAN FLOURISHING



Monday, **October 22, 2018** | McKinnon Hall | 7:00 p.m.

Francis Edward Su

Benediktsson-Karwa Professor of Mathematics, Harvey Mudd College
Past President of the Mathematical Association of America

What is the purpose of math outside of the classroom? Mathematics is somehow involved in nearly everything that humans love, need, create and use including science and technological applications, social institutions, economies, defense and art. Many math teachers believe learning and doing mathematics should help anyone to better see things for what they are, understand their world, avoid biases, identify and understand significant problems, generate solutions and make the best decisions.

In their book, "Cake-Cutting Algorithms: Be Fair If You Can," Jack Robertson and William Webb said, "Many feel that mathematics will receive as much of its direction and vigor in the future from problems in the social sciences as it has received in the past from the physical sciences." In his review of their book, mathematician and past president of the Mathematical Association of America Francis Su wrote, "As I grow older, I find myself yearning more and more for a connection between my work and the complex problems facing the world. So

maybe mathematics has a strong purpose in issues of social justice."

Su writes eloquently of "mathematics for human flourishing," of the broad benefits of mathematics in promoting a life of beauty, truth, justice, play and love. He is passionate about the accessibility of mathematics to everyone and a strong advocate for addressing structural barriers in the teaching of mathematics that limit the access and participation of a much greater diversity of students. The power of diversity is as important in mathematics as in other academic fields and areas of human existence where the creativity of diverse minds and voices is essential to solve pressing problems of our times.

Su's professional interests are in geometric combinatorics, especially as applied to the social sciences; teaching mathematics for everyone; and popularizing and promoting the study of mathematics through prolific writing and speaking engagements. He is the recipient of several significant awards for teaching and writing from the Mathematical Association of America and served as its president from 2015 to 2017.

ELON

VOICES OF
DISCOVERY

FROM FAST TO ULTRA-FAST: THE BIOLOGICAL WORLD OF EXTREME MOVEMENT



Monday, **February 11, 2019** | McCoy Commons Oaks 212 | 7:00 p.m.

Sheila Patek

Associate Professor of Biology, Duke University

The approximately 3 billion years of life on our planet could be thought of as a very big, long and complex sequence of experiments that have tested innumerable materials, designs and processes associated with survival under challenging and changing conditions. The more than 8 million species estimated to be present today represent current outcomes of those evolutionary experiments. Their structures and functions are currently adaptive to specific contexts but always subject to modifications through natural selection. Applying highly sophisticated technologies, scientists are now able to more clearly observe and accurately measure the designs and strategies that enable even very small organisms to succeed in challenging environments.

Sheila Patek is an organismal biologist who studies innovative strategies for communication and movement in arthropods, using mantis shrimp and trap-jaw ant models. Her lab's chief focus on power amplification strategies in arthropods lies at the intersection of biology and physics. The biomechanics

system of mantis shrimp, for example, produces extremely fast and forceful movements of appendages involved in defense and feeding. Patek is especially interested in the evolution of such power amplification systems in organisms.

She advocates for basic research as a process that frequently and sometimes unpredictably reveals information that informs or inspires the development of practical applications for solving human problems. The study of natural systems has led to antibiotics from observing microbes, Velcro from plant burrs, a super adhesive modeled from Gecko appendages and sustainable cooling from the construction of termite nests.

Patek is chair of the Biomechanics Division of the Society for Integrative and Comparative Biology. She currently heads a multidisciplinary university research initiative funded by a grant from the Department of Defense. Patek was recognized by a National Science Foundation CAREER award in integrative organismal biology and received a Brilliant 10 Award from Popular Science that recognizes dynamic and promising young scientists.

ELON

VOICES OF
DISCOVERY

THE WIN-WINS OF FOSTERING A LOCAL FOOD SYSTEM IN NORTH CAROLINA



Monday, **March 18, 2019** | McCrary Theatre | 7:00 p.m.

Nancy Creamer

Director of the Center for Environmental Farming Systems
Distinguished Professor of Sustainable Agriculture and
Community-Based Food Systems, Department of Horticultural Sciences,
North Carolina State University

With global population predicted to reach nearly 10 billion by 2050 in a world facing the impacts of climate change, new strategies and approaches in agriculture are increasingly imperative. The current revolution in food production happening on a global scale focuses as never before on paradigms of sustainability and takes a systems approach. Sustainable agriculture connects production and economies with equity and environmental health and aims for long-term continuance of all of these elements. A food systems approach (whether local, regional or global) takes into account all of the processes and infrastructures, inputs and outputs — from growing to consuming and dealing with waste — that are involved in feeding people on an equitable basis.

North Carolina is part of the sustainable agriculture and food systems movement. Nancy Creamer is the director of the Center for Environmental Farming Systems (CEFS), a partnership of N.C. State University, North Carolina A&T University and the North Carolina Department of Agriculture and Consumer Services. Located in Goldsboro, the CEFS conducts research about efficient and sustainable agriculture and

food systems through basic studies and development of applications. It also does education and outreach to communities and various stakeholders. CEFS projects vary from developing community-based strategies to reduce hunger, promoting good farm financial management, developing more sustainable production practices, promoting leadership and expertise for women agriculturists and developing and strengthening food systems.

Creamer received her doctoral degree in horticulture from Ohio State University. Her research areas are in sustainable production practices such as cover cropping and in long-term farming system trials. She was a leader in North Carolina's Farm to Fork program and chaired the North Carolina Local Food Council for several years. Much to Creamer's credit, the CEFS received one of the highest awards given by the USDA in 2012 for "Assisting Rural Communities in Creating Prosperity so they are Self-Sustaining, Repopulating, and Economically Thriving." In 2015 Creamer was appointed as a board member for the Foundation for Food and Agriculture Research, which received significant funding through the 2014 U.S. Farm Bill to support research in agriculture.