OAKLAND UNIVERSITY RESEARCH

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RESEARCH

RESEARCH AT OAKLAND UNIVERSITY

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On the Cover

Junior Biomedical Science student Joshua Hohlbein (left) and Assistant Professor of Biomedical Sciences Dao-Qi Zhang, Ph.D., in the lab at Oakland University's Eye Research Institute, where Dr. Zhang has a five-year, $1.8 million NIH grant to study the dopaminergic system in normal and diseased retinas.

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Drs. Lauridsen, Lentini and Mitchell with OU President George W. Hynd.

Dr. Lentini introduces Dr. Lauridsen at Orchestra Hall.

A unique creative research activity was presented to Oakland University music students and faculty with a visit to campus by the American choral composer and National Medal of Arts winner **Morten Johannes Lauridsen**. *Dr. Lauridsen's work occupies a permanent place in the standard vocal repertoire of the 21st century. His eight vocal cycles, instrumental works, art songs and series of motets are performed throughout the world.*

Dr. Lauridsen collaborated with instrumental and vocal students and conducting faculty Gregory Cunningham and Michael Mitchell, who were preparing to perform Dr. Lauridsen's original choral works at Orchestra Hall in Detroit. With the master composer present, they were able to share ideas about how to uniquely interpret his music using subtle differences in tempo, dynamics, sonorities and blend, while still giving a performance that met that composer's intentions.

On April 1, the Oakland Symphony Orchestra, Oakland University Symphony Chorus, Oakland University Wind Symphony and the Oakland Chorale performed Dr. Lauridsen's "Lux Aeterna" for orchestra and chorus; "O Magnum Mysterium," arranged for wind ensemble; "Sure on This Shining Night" for chorus and piano; and additional works conducted by Professors Cunningham and Mitchell. Soloists were Department of Music, Theatre and Dance faculty Alta Dantzler, mezzo-soprano; Drake Dantzler, tenor; Nadine DeLeury, cello; Rebecca Happel, piano; and George Stoffan, clarinet.

Colleagues,

As one of the nation's 92 Carnegie Foundation doctoral research universities, Oakland University follows a teaching and scholarship model that provides our students with significant opportunities to conduct meaningful research with our faculty.

In just under 60 years of existence, Oakland University has made significant strides in research. Our scientists are making world-renowned, breakthrough accomplishments in their respective fields. Our Eye Research Institute (ERI), which has conducted vision research for more than 40 years, is among the examples featured in this issue of the *OU Research Magazine*. The ERI has received more than $50 million from external agencies such as the National Eye Institute. The ERI is formally associated with William Beaumont Hospital, its Department of Ophthalmology and Associated Retinal Consultants.

Within the ERI, NIH-supported work of biomedical scientist Dao-Qi Zhang, Ph.D., reveals how light signals travel through the retina's photoreceptors to release dopamine, an essential neurotransmitter for visual information processing, eye development and gene expression.

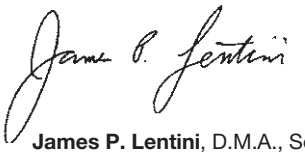
Theoretical physicist Ken Elder, Ph.D., has developed a phase field crystal model now considered part of mainstream physics. Physicists worldwide apply Dr. Elder's model to simultaneously study a wide range of crystal growth phenomena.

Jing Tang, Ph.D., a researcher in our Biomedical Imaging Laboratory, is creating algorithms to improve images generated by certain imaging systems, part of a revolution that is improving diagnosis and treatment.

Tamara Hew-Butler, Ph.D., with an international research reputation in hypotnatremia, was lead author of the Statement of the Third International Exercise-Associated Hyponatremia Consensus published this summer in the *Clinical Journal of Sport Medicine*.

Thomas Raffel, Ph.D., known internationally for his research on disease ecology, seeks to apply a metabolic theory of immune response for all species based on his work with amphibians.

I hope you enjoy reading about these and other student and faculty researchers at Oakland University, and are inspired as I am by their promise to make our world a better place.



James P. Lentini, D.M.A., Senior Vice President for Academic Affairs and Provost

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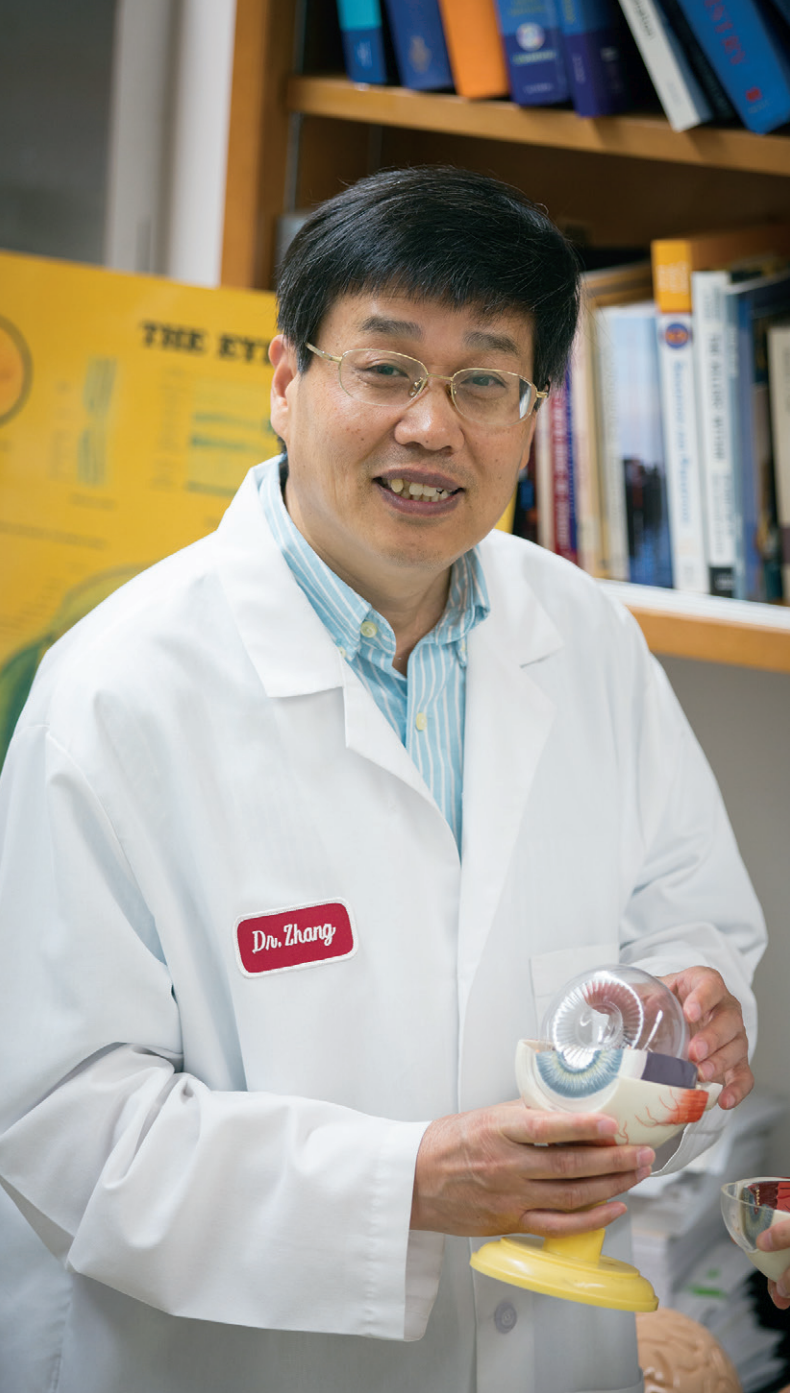
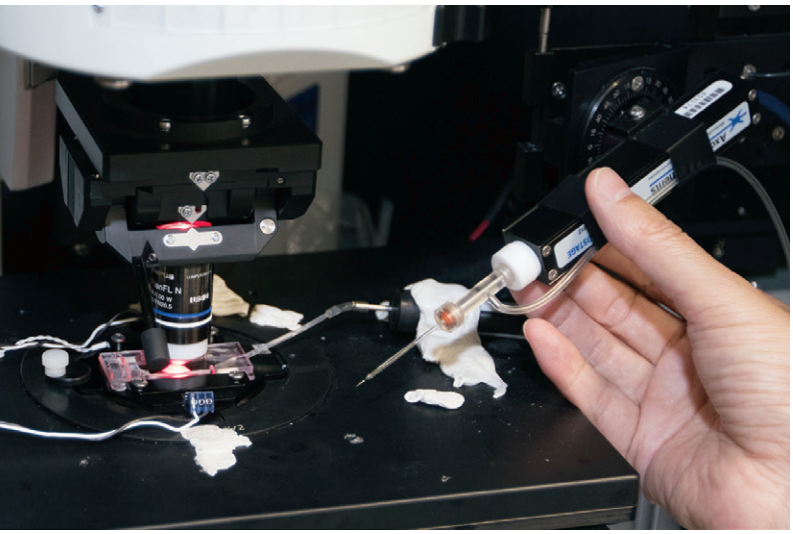
James Lentini *is the senior vice president for Academic Affairs and provost at Oakland University. Formerly the dean of the School of Creative Arts at Miami University in Ohio, he has also served as the founding dean of the School of Art, Media and Music at the College of New Jersey and as acting chair of Wayne State University's Department of Music. A native Detroiter, Lentini earned his Doctor of Musical Arts degree from the University of Southern California, his Master of Music degree from Michigan State University and his Bachelor of Music degree from Wayne State University. His other studies include management in leadership and education at Harvard University.*





An Eye on Dopamine

Discovering the neurotransmitter's role in the retina

We often say that our eyes "light up" at the sight of something pleasing. In fact, our eyes continually light up — with electrical signals.

Research by Dao-Qi Zhang, Ph.D., is uncovering the paths these signals take within the retina and how they affect light and the release of dopamine. Dopamine is important to the retina because it regulates adult eye development, mediates visual sensitivity and controls daily renewal of photoreceptor membranes.

A lack of sufficient dopamine in the retina gives rise to neuro-degenerative diseases that cause visual defects, Dr. Zhang says. These include diabetic retinopathy, Parkinson's disease and retinopathy of prematurity (ROP). Lower dopamine levels in premature babies with ROP cause their eyes to grow too much and the babies to develop myopia (nearsightedness).

Special neurons within the retina called photoreceptors convert light to electrical signals. These photoreceptors are known as rods and cones and a more recently discovered class known as the intrinsically photosensitive Retinal Ganglion Cell (ipRGC). When light travels through these photoreceptors, it reaches a subclass of neurons called dopamine amacrine cells.

Researchers like Dr. Zhang have long been intrigued by how light signals travel through photoreceptors to the dopamine amacrine cells and cause dopamine to be released.

Understanding the process has important implications for treating neuro-degenerative diseases, visual information processing, gene expression and eye development.

A five-year, $1.8-million grant from the National Institutes of Health supports Dr. Zhang, assistant professor of Biomedical Sciences at Oakland University, and his team at Oakland's Eye Research Institute.

So far, Dr. Zhang has discovered at least four light signal pathways in the network of neurons that release dopamine in the retina. Three signal pathways are from rod and cone photoreceptors and one is from the ipRGCs. Significantly, he

Dao-Qi Zhang, Ph.D., joined Oakland University's Eye Research Institute in 2010 as an assistant professor of Biomedical Sciences. He had previously been with Vanderbilt University as research assistant professor in the Department of Biological Sciences.

He holds a doctoral degree in Neurobiology from the Shanghai Institute of Physiology, Chinese Academy of Sciences in Shanghai; a master of science in Neurobiology from the Xi'an Jiaotang University School of Medicine in Xi'an, China; and a bachelor of science in Medicine from Binzhou Medical College in Binzhou, China.

confirmed what researchers have speculated for decades: that the ipRGC is "a retrograde signaling pathway.

"We discovered that dopamine amacrine neurons are a key conduit for retrograde signaling in the retina," Dr. Zhang says. "Our data provides anatomical and physiological evidence of the route of this retrograde neural pathway, which reverses the canonical flow of visual information from rod and cone photoreceptors."

"The pathway is essential for the visual system to adjust and adapt its sensitivity to a wide range of light intensities from dim starlight to bright daylight," Dr. Zhang says.

Dr. Zhang and his team have located and mapped the light resource: a photo pigment known as melanopsin. They found that the axon collaterals that branch from the ipRGC formed the precise route of the path to "exciting" the dopamine amacrine cells. These branch from the ipRGC's primary axon before projecting to the brain.

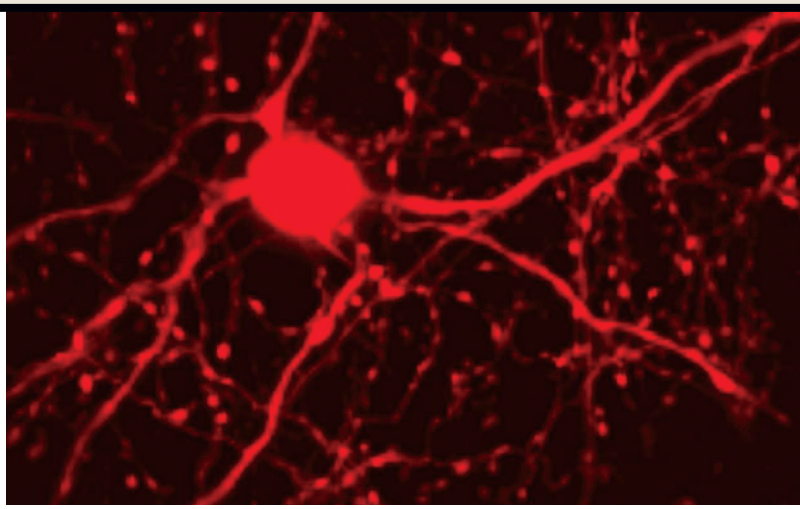
Mediating the signal transmission to the dopamine amacrine cells are pre-synaptic voltage-gated calcium channels and post-synaptic excitatory glutamate receptors.

"Now, we must map the same for the other three pathways," he says.

Researchers also discovered that through a "two-way street" of different neural connections, light can generate an electrical response in the visual pigment in two different cell layers on either side of the retina.

To determine if dopamine is being released by retinal cells, Dr. Zhang uses mouse retinas, which most closely resemble those of humans. However, "mouse retina cells do not have photo pigment to directly respond to light, so a single mouse cell is genetically modified already for us in protein," he says. "Fluorescent protein allows us to visualize the cell for recording."

Dr. Zhang activates the retina's photoreceptors by stimulating the cells with a UV or blue light source. Using a glass pipette with a micrometer-sized tip under a high-powered fluorescent microscope, he encloses a cell membrane surface area or "patch" to capture the electric signal through an electrode.



Each cell has a single ion channel, which will either be open (high-conductance) or closed (low-conductance). The signal will pass through the cell's single ion channel, Dr. Zhang explains, to the dopamine electrical neuron and light up the dopamine electrical neuron and release dopamine.

"When the cell is recorded, you can see how the light affects the activity of the cell. Increased activity by light tells researchers that dopamine is being released. The more and greater the signal, the more the dopamine," he continues. "This could tell you if dopamine can be or cannot be released."

When the project is complete, Dr. Zhang says that new research will be available about retinal dopamine subtypes and each subtype's light response characteristics. Research will be available on the neural pathways that convey photosensitive cell signals to dopamine neurons and a framework for how retinal dopamine neurons encode light stimuli through three photosensitive cell classes over the entire visual range. Dr. Zhang's team will also supply the underlying mechanisms of retinal circadian rhythm.

The second part of Dr. Zhang's NIH grant explores how alterations in dopamine neurons lead to visual defects and myopia in oxygen-induced retinopathy of prematurity. "Our goal is to develop preventive and treatment strategies and increase understanding of cellular mechanisms responsible for eye disorders in ROP."

By Donna Mirabito, OU Research Magazine *executive editor*

Water Advisory: ‘Drink According to Thirst’

Athlete deaths from overhydrating are 100 percent preventable

Near tragedy in the heat of a Texas marathon 15 years ago sent runner Tamara Hew-Butler into the midst of an exercise mystery: how athletes died — not from drinking too little water — but from drinking too much.

The associate professor of Exercise Science at Oakland University, herself a long-distance runner, was completing a podiatry surgical residency and fellowship in Houston. If she wasn’t running a marathon herself, Dr. Hew-Butler liked to help out at races and was often assigned to the medical tent.

In the brutal heat of one particular marathon, four runners were rushed to the medical tent. Figuring the runners were dehydrated, volunteers administered IVs. One runner had a seizure; all fell into comas. Hospitalized and on ventilators, they all nearly died.

Dr. Hew-Butler was in disbelief. “This was my family, my running family. I had to find out what went wrong.”

The diagnosis came later: exercise-associated hyponatremia. The athletes drank too much fluid during the race, causing their sodium levels to drop and their cells to swell.

When the cells swell, an athlete’s lungs can fill with fluid and cause pulmonary edema. Low sodium levels also cause the brain to swell beyond the 5 to 8 percent capacity that the skull can accommodate, which is how athletes die from hyponatremia.

While the Houston marathon runners survived, others — including a Boston, Marine Corp and London Marathon runner — have all died from exercise-associated hyponatremia.

“Who knew water could kill?”

The question drove Dr. Hew-Butler to put podiatry aside to earn a second doctoral degree in Exercise Science with emphasis on research from the University of Cape Town, which she chose because it was home to a scientist noted for his hyponatremia research on marathon runners.

South Africa was a long way from where Dr. Hew-Butler began her educational journey. Her bachelor’s degree in Kinesiology is from UCLA and her doctor of Podiatric Medicine is from Philadelphia’s Temple University.

Along the way, Dr. Hew-Butler realized that “while I liked treating runners, I discovered that I liked conducting research even more.”

Zeal to solve the mysteries of hyponatremia, as well as the endocrine control of fluid and temperature balance, brought her to Oakland University in 2010 after postdoctoral work as a research assistant at Arizona State University.

“Oakland has been so supportive, always helping with my equipment needs,” she says.

Dr. Hew-Butler supports the OU community as a mentor to graduate and undergraduate students and oversees their testing on OU athletes. She teaches Biomechanics and is an advisor to the running club.

“Tami does something not a lot of researchers do — and that’s conduct field research, where she’s with an athlete while training, as well as in a controlled lab,” says Dr. Sandra Fowkes Godek, a Sports Medicine professor at Pennsylvania’s West Chester University and director of HEAT Institute, which studies heat-related illness in athletes.

Tamara Hew-Butler, Ph.D., arrived at Oakland University in August 2010 to begin work as an assistant professor of Exercise Science. She has a dual clinical and research background, working as a sports medicine clinician in Houston for eight years before pursuing a research degree at the University of Cape Town in South Africa.

Both doctoral degrees consolidate her lifelong passion for sports — particularly long-distance running — and athletic care. Her clinical passion is biomechanics, namely keeping athletes "on their feet" by focusing on injury prevention as an integral part of an athlete's treatment plan. Her research passion is on the endocrine control of fluid and temperature balance, with an emphasis on the investigation of exercise-associated hyponatremia (low blood sodium).

> **"This was my family, my running family. I had to find out what went wrong."**

"Such field research is very rigorous, but you learn so much more than in a controlled lab," Dr. Fowkes Godek adds, "because it's an authentic athletic experience. It says a lot about her."

Dr. Hew-Butler's research reputation is international. Audiences ask to be part of her lab and are reading the July *Clinical Journal of Sports Medicine* (see related story), as well as her 40 other peer-reviewed publications.

As important as her work is, Dr. Hew-Butler knows she's not done yet: athletes keep dying. In August 2014, two high school football players with leg cramps were told to drink more. Both died because of hyponatremia.

"The running community has heard the message, but coaches and parents of athletes in other sports apparently haven't," she says. "People should trust their body and only drink when thirsty. These deaths are 100 percent preventable."

By Rene Wisely, a freelance writer.

Fluid Intelligence

Dr. Tamara Hew-Butler is taking every opportunity to spread the word when it comes to her research on exercise-associated hyponatremia: athletes can die if they overhydrate themselves.

The Oakland University associate professor of Exercise Science has been quoted in 100 different media, including the *Washington Post, Times of India*, the *Weather Channel* and *CBS News*.

"I thought we were getting the message out, but when two high school football players died last summer, I knew that wasn't the case," she says.

In February, the world's foremost researchers on hydration and hyponatremia gathered at a conference in Carlsbad, California, to set the record straight on hydration and save lives.

"Tami is the first person I called about this conference," says Dr. Sandra Fowkes Godek, a Sports Medicine professor at Pennsylvania's West Chester University and director of HEAT Institute, which researches heat-related illness in athletes.

Dr. Hew-Butler was invited to present her research and plan the 2015 CrossFit Conference on Exercise-Associated Hyponatremia organized by the HEAT Institute.

From a panel of 17 international experts, the latest scientific data and recommendations about educating key stakeholders emerged as the Statement of the Third International Exercise-Associated Hyponatremia Consensus, with Dr. Hew-Butler as the lead author. (She was also lead author of the Second Consensus statement in 2008.)

The July edition of the *Clinical Journal of Sport Medicine* published the statement and a set of guidelines, which have gained worldwide attention.

Yet even with an abundance of physiological evidence supporting the presence of "hardwired" mechanisms which protect us against dehydration, Dr. Hew-Butler and her colleagues realize they are "competing against industry" when advising others to drink only when thirsty.

"You have the beverage industry promoting all kinds of products to make you think dehydration is bad and everyone needs to drink more," she says. "What the advertisements don't tell you is that drinking too much of anything is not only potentially hazardous to your health, but can also be fatal."

Dr. Hew-Butler goes on to say that, "there are even water bottles programmed to tell you how much to drink, but your brain already does that for you: when you need fluids, you get thirsty and will drink only as much as you need."

Dr. Hew-Butler vows not to give up, however. "I hope that through our research and educational efforts, no more athletes will ever die of hyponatremia. We need to stop listening to advertisements and start listening more closely to what our bodies are actually telling us."

Recommendation for Athletes

The next step for the hyponatremia consensus group is dissemination of information to all stakeholders and athletes. "Our goal is that no other athletes die from EAH."

Drink according to thirst.

Recent evidence suggests that the brain has adapted mechanisms to avoid both inadequate and excessive fluid intake, with activation of areas in the mid-cingulate cortex, insula, amygdala, and periaqueductal gray which make both water lack and overdrinking feel unpleasant.

Alternative hydration strategy: Estimate hourly sweat losses during exercise and avoid consuming amounts that are greater than this amount during endurance or other athletic events.

This can be accomplished by serial measure of weights during and after exercise with the goal to maintain weight or even finish exercise with a slightly lower weight. This strategy may be particularly attractive to certain sporting events such as football, where sideline scales can easily be available to guide fluid intake.

Institute athlete and team educational strategies to improve knowledge of safe hydration practices and reduce overemphasis on high fluid intakes.

An education program for an Ironman triathlon advising athletes of the risks, plus decreasing the number of water stations, reduced the incidence of EAH.

Disseminating appropriate drinking advice has been shown to reduce the incidence of EAH in a 90km foot race.

Athletes may weigh themselves before and after training to gauge their sweating rates as an estimate of fluid replacement needs.

The presence of weight gain is a positive indicator that fluid intake has been in excess of fluid losses and water overload is present.

Determining the optimal place for cycling fluid stations at triathlons and at marathon running stations at different terrains and temperatures needs further study.

Studies demonstrate that fluid stations placed 20km apart during cycling and 5km apart during running events has reduced the incidence of hyponatremia. However, alternative strategies will be needed where aid stations are not provided and/or where athletes transport their own fluids.

Source: Statement of the Third International Exercise-Associated Hyponatremia Consensus Development Conference, Carlsbad, California, 2015. *Clinical Journal of Sport Medicine*: July 2015, Volume 25, Issue 4, pp. 303-320.

Exercise-Associated Hyponatremia

Risk factors

Overdrinking water, sports drinks and other hypotonic beverages

Weight gain during exercise

Exercise duration > 4 h

Event inexperience or inadequate training

Slow running or performance pace

High or low body mass index (BMI)

Readily available fluids

Symptoms and signs

Mild

Lightheadedness*

Dizziness*

Nausea*

Puffiness

Body weight gain from baseline

Severe (life-threatening)

Vomiting*

Headache*

Altered mental status* (confusion, disorientation, agitation, delirium, feelings of "impending doom," obtundation: mental blunting; mild to moderate reduction in alertness; diminished pain sensation) Dorland's Medical Dictionary for Health Consumers

Phantom running

Seizure*

Coma*

Signs of impending brain herniation (decorticate posturing mydriasis)

Dyspnea (non-cardiogenic pulmonary edema)

Frothy sputum (non-cardiogenic pulmonary edema)

** Signs and symptoms related to other conditions associated with exercise-associated collapse.*

Events where symptomatic EAH has been reported

Endurance competitions (marathon*, canoe race*, ultramarathon, triathlon, swimming)

Hiking*

Military exercises*

Police training*

American rules football*

Fraternity hazing*

Bikram yoga

Lawn bowling

** Activities in which known deaths have occurred.*

Decoupling Danger

Managing catastrophe by taking things apart

Approximately one-half to two-thirds of Americans killed or wounded in combat in the Iraq and Afghanistan wars have been victims of improvised explosive devices (IED) planted in the ground, in vehicles or buildings, or worn as suicide vests, according to data from the Pentagon's Joint IED Defeat Organization (JIEDDO).

That's more than 3,100 dead and 33,000 wounded.

Michael Latcha, Ph.D., an Oakland University Mechanical Engineering associate professor, and his research team have created a device to potentially reduce the deadly impact of such explosives when troops are in military vehicles. The device also has implications in other transportation systems such as reducing the catastrophic impact of automobile crashes and train derailments.

Dr. Latcha, along with other School of Engineering and Computer Science researchers — Sayed Nassar, Ph.D., OU professor of Mechanical Engineering, and Mehmet Uras, a consultant — invented a system that decouples the fasteners supporting a military vehicle floor in order to dissipate the force of a blast from an IED.

Dr. Latcha says the research project began in the fall of 2010, when the U.S. Army's Tank Automotive Research Development and Engineering Center (TARDEC) approached Oakland University to develop this false floor technology for military transport vehicles.

"When an IED hits the underbody of the vehicle, the explosion sends a shockwave that impacts the people inside. Bones are broken, pulverized, and severe injuries or death can occur," Dr. Latcha says. "This new fastening device will detect the explosion, decouple the floor from the vehicle, and significantly reduce the shock, thereby hopefully reducing injury to the vehicle's occupants."

Initially, creating a system that would deploy and decouple a structure fast enough was the team's biggest challenge.

Michael Latcha, Ph.D., is an associate professor of Mechanical Engineering. He earned his doctorate from Wayne State University, where he also studied for his bachelor's and master's degrees. On the faculty of Oakland University since 1993, his research includes modeling of multi-body dynamic systems; structural, numerical and visco thermal acoustics; vibrations; computational mechanics; machine design; and numerical methods.

Dr. Latcha is a member of the American Society of Engineering Education and the American Society of Mechanical Engineers. He is also a reviewer for the ASME *Journal of Vibration and Acoustics*. Dr. Latcha has served as a U.S. Army summer faculty research engineer, Tank-Automotive Command, in Warren, Michigan.

"In order to achieve this goal, a system had to be developed that would be able to decouple a structure bearing significant loads in no more than 400 microseconds," he says.

Dr. Latcha's team made that happen.

The OU team's rapid decoupling and isolation technology relies on small pyrotechnic devices that are included in common automotive airbag systems to provide the power necessary for structural decoupling.

"Originally, when we looked at airbag technology, the deployment time was ten times longer than our goal, yet when we had more discussions about the airbag mechanism, we were able to modify the sparking system used," he explains. "Using this technology, when an external explosion is detected, within those 400 microseconds, another smaller explosion occurs within the device, sending the drive pin out like a pistol bullet, and completely separating the floor from the vehicle."

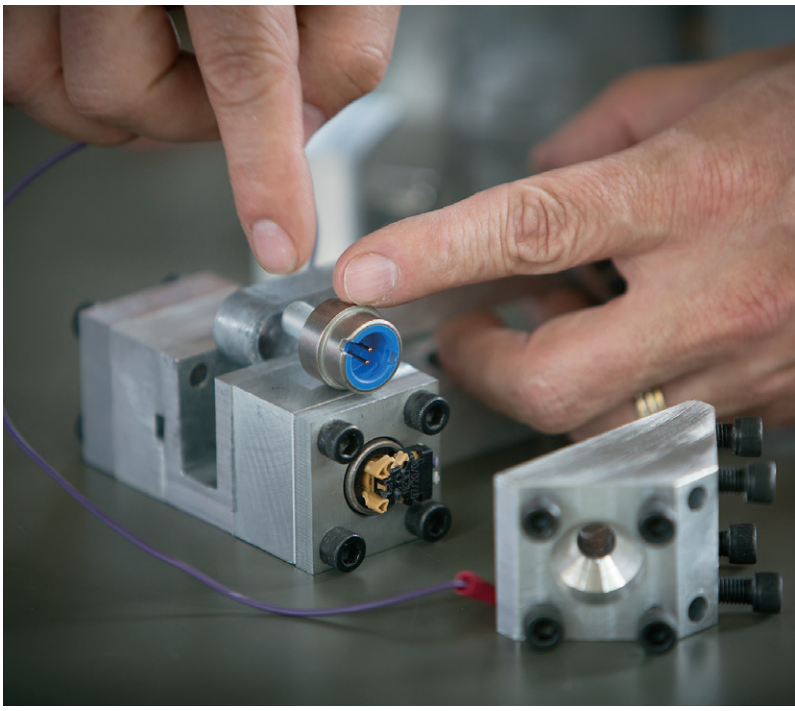
Dr. Latcha says the rapid decoupling and isolation technology has been extensively tested under professional laboratory conditions more than a dozen times, including using drop towers to simulate underbody vehicle explosions.

"These tests clearly demonstrated that the technology was highly reliable and repeatable, with decoupling times from 130 microseconds to 240 microseconds and with peak acceleration reduction averaging nearly 60 percent from vehicle hull to false floor," he explains.

Dr. Latcha has continued to develop and refine the technology, including methods to direct and divert the energy from a catastrophic event by altering a structure during the event itself. Several types of quick-releasing structural joints have been designed and are ready for implementation, ranging from simple pin connections to telescoping joints to links that decouple through quick-acting cams, according to the team's abstract.

"This technology is remarkably mature and ready for market," Dr. Latcha says.

To do so, Dr. Latcha formed Fulcrum Engineering, LLC, and is working with the technology transfer program at Oakland University, as well as OU INC (a business accelerator) and the Macomb INCubator, to get the technology to the marketplace.



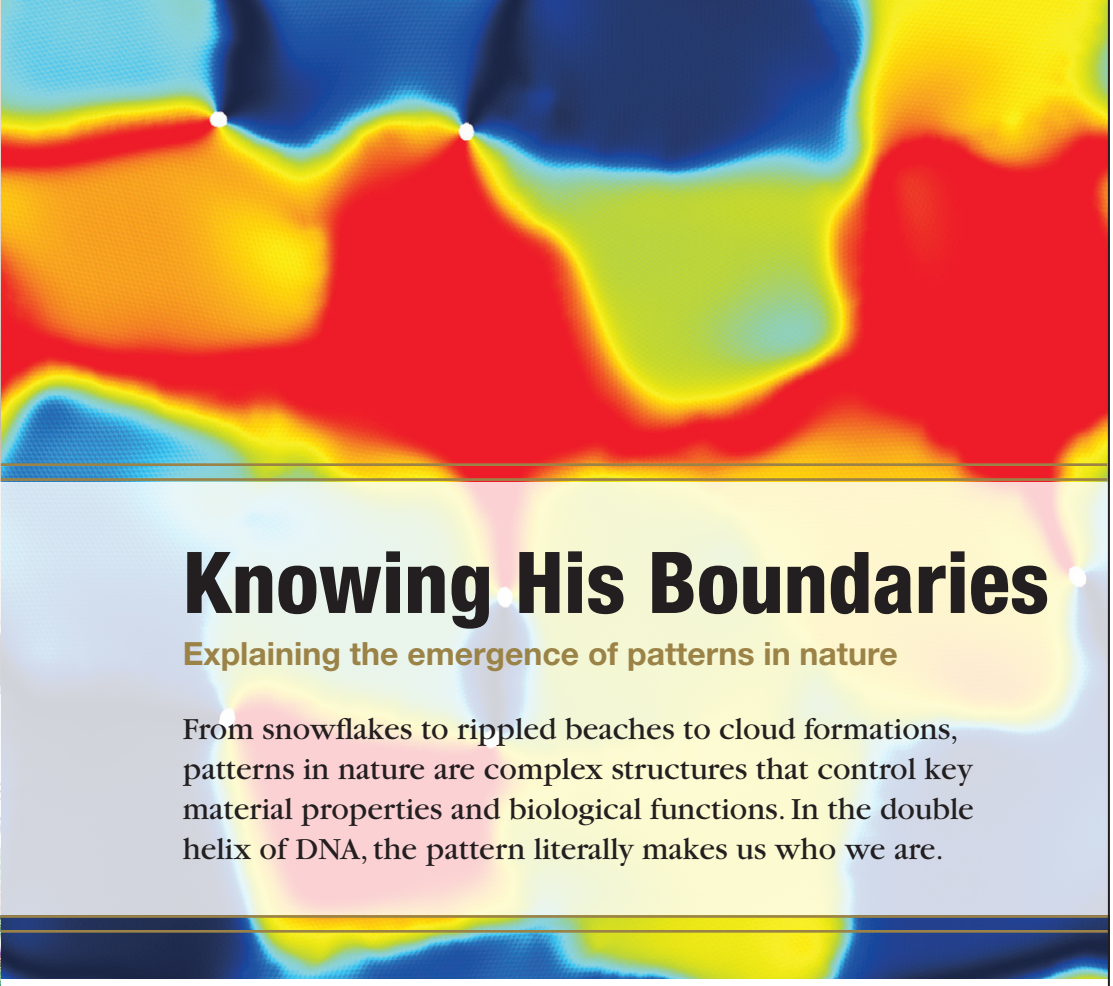
Along with military interest in the product, several military contractors and automotive suppliers have indicated possible collaborations.

In addition to the military uses, automobile structures can be designed to reconfigure in the midst of a catastrophic collision to better protect occupants from injury. Also, being able to remotely and rapidly decouple railroad cars from each other during a catastrophic event has the potential to save lives and lessen the severity of damage to the train, its passengers and cargo, and to the area surrounding the tracks.

"With this type of decoupling fastener, incidents like the recent train derailment in Pennsylvania would have been much less catastrophic," Dr. Latcha explains. "When a derailment occurs, one car pulls several others off the track. With this technology, the engineer could immediately decouple the cars … reducing damage and saving lives."

By Susan Thwing, a freelance writer.


Triangular, Honeycomb a
Green commens
Red and Blue "half" cor
(a)
(b)
HT
(d)
(e)
(f)
TT
Purple commensurate
Yellow and Cyan "half" commensu
SAMSUNG



Knowing His Boundaries

Explaining the emergence of patterns in nature

From snowflakes to rippled beaches to cloud formations, patterns in nature are complex structures that control key material properties and biological functions. In the double helix of DNA, the pattern literally makes us who we are.

Understanding the formation of such complex morphologies and unlocking their potential depends on making efficient predictions.

Theoretical physicist Ken Elder, Ph.D., an OU professor since 1995, has devoted his research to developing methods to model patterns or non-equilibrium phenomena in materials physics. Much of his work focuses on understanding the complex spatial structures that appear following a phase change, such as when a liquid turns into a solid or when a metal transitions from a non-magnetic to a magnetic state.

The task is complicated by interactions between systems. Yet it was at one of those moments when Dr. Elder was looking for a shorter way to model a huge, difficult equation that he hit on the "phase field crystal" method of computational modeling to study pattern formation in material science.

"I was interested in adding elasticity to a particular model," Dr. Elder says. He found that when modeling superconductivity, the patterns produced naturally incorporated elasticity. In continuing to explore this, he developed an offshoot of phase field model to include the influence of elasticity and plasticity in the formation of patterns.

Advantageously, it naturally incorporates the physics contained at the microscopic level on time scales many orders of magnitude larger than traditional atomic methods — it can be millions or billions times faster. The phase field crystal model can *simultaneously* model many phenomena in one situation: solidification, phase segregation, grain growth, elastic and plastic deformations, for example.

When Dr. Elder says he "stumbled into" this almost ten years ago, it was considered obscure. Now, phase field crystal model is mainstream physics. PFC models are applied to study a wide range of crystal growth phenomena such as structural defects, yield stress, fractal growth, surface ordering epitaxial growth, and transition from hard, glassy material to a soft, rubbery material (glass transition).

Sessions at large conferences and whole workshops are devoted to the topic. Several

"The next day, you think it was obvious and don't understand why it took so long to figure it out."

Ken Elder, Ph.D., joined Oakland University in 1995 and teaches introductory and advanced courses such as general physics, nuclear physics, electricity and magnetism, theoretical physics and quantum mechanics.

He holds bachelor and master's degrees in physics from the University of Guelph and a doctoral degree from the University of Toronto.

With an extensive background in research, Dr. Elder has received awards from the Natural Sciences and Engineering Research Council of Canada for undergraduate, graduate and postgraduate work. As an OU faculty member, his research has been supported by grants from the National Science Foundation and Research Corporation.

of Dr. Elder's publications, including the 2004 paper, "Modeling Elastic and Plastic Deformations in Non-Equilibrium Processing Using Phase Field Crystals," with Martin Grant of Montreal's McGill University, have been cited in hundreds of other publications.

In addition, Dr. Elder and McGill professor Nikolas Provatas, Ph.D., authored "Phase-Field Methods in Materials Science and Engineering" (Wiley 2010), considered the comprehensive textbook for phase-field methodology.

"When you first discover something, it seems surprising," he says. "The next day, you think it was obvious and don't understand why it took so long to figure it out."

The development of the phase field crystal method was an important step forward. However, Dr. Elder's more recent research employs an offshoot of the method developed by researchers at the University of Illinois at Urbana-Champaign.

In this work, he studies the ordering of ultra-thin films, either one or several monolayers, on metallic surfaces. The key to understanding this and many other pattern-forming systems is to understand the boundaries, surfaces or defects that define the patterns. For example, when two crystals hit each other, they form a grain boundary made up of defects or dislocations that can increase material strength.

"If you take a chunk of metal and slice it, you'll find a very small microstructure," he says. "The microstructure is what determines how strong the material is, and its electrical and optical properties. When you look at a pattern, it is really the boundaries between regions or defects that define it. The motion and evolution of these defects is what controls pattern formation and most of my work is dedicated to understanding the fundamental mechanisms behind the motion and evolution of defects."

Often the defects or boundaries can radically change a material's electric, mechanical and optical properties. The precise distribution of boundaries can often be controlled by altering the materials and conditions under which they grow, such as temperature and pressure.

From a more fundamental point of view, these films form interesting superstructures that appear as honeycomb, triangular, zigzag and striped patterns. The defects are what control the nature of the patterns. Because it is difficult to mathematically describe the motion of the defects in a simple way, Dr. Elder often uses computational methods to solve the relevant equations.

When the process of how these structures are formed is better understood, then the material properties such as strength and electrical resistance can be controlled. Developing methods to allow for the study of these processes on longer time scales would be a huge contribution to the fields of science and engineering.

In addition to his scientific research, Dr. Elder significantly contributes to teaching the next generation of physicists at OU. Several are now doctoral and post-doctoral students at top universities. His daughter, Kate, is studying mathematics and physics at McGill.

With a sabbatical in 2015-16, Dr. Elder will travel to Finland, Germany, Brazil and Budapest to visit collaborators and will give talks at several conferences in the U.S. He also plans to return to a project on state selection in non-equilibrium systems that he started 20 years ago.

"There are theories going back to the 1800s on how to determine what the lowest-energy equilibrium states are," Dr. Elder says. "When one drives a system by continuously adding energy, it never gets to an equilibrium state. Often quite interesting steady-state patterns emerge for which there are currently no exact formal methods for predicting.

"I plan to spend most of my sabbatical working on developing rigorous methods for determining state selection in such driven systems."

By Alice Rhein, a freelance writer.

Scanning the Horizon

Improving medical imaging scans for better patient care

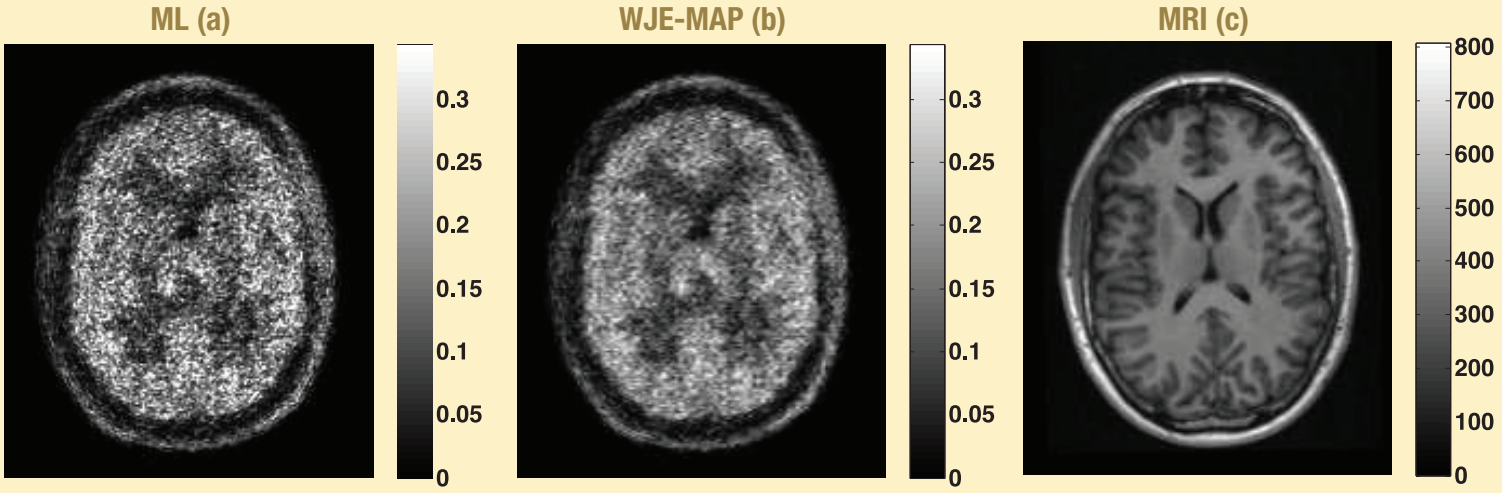
Medical imaging systems make it possible for health care professionals to see processes within the body so they can diagnose, monitor or treat medical problems. It's a growing industry — one market research company is forecasting growth from $30.2 billion in 2013 to $49 billion in 2020.

Oakland University researcher Jing Tang, Ph.D., ABSNM, and her small team in the Biomedical Imaging Laboratory in the School of Engineering and Computer Science, are part of the imaging revolution that is improving diagnosis and treatment.

Dr. Tang, assistant professor in the department and director of the imaging laboratory, leads research designed to improve medical image reconstruction, evaluation, and analysis techniques. More specifically, Dr. Tang, two graduate students and a postdoctoral researcher are working on algorithms that, when incorporated into equipment software, will improve the images generated by certain imaging systems.

Dr. Tang's current research, funded by a National Science Foundation CAREER Award, involves data from the emerging and cutting-edge hybrid PET/MRI (positron emission tomography/magnetic resonance imaging) biomedical imaging system. PET imaging, she says, measures functional information in the body, while MRI imaging provides anatomical information with better soft tissue contrast than a computer tomography (CT) — scan.

The hybrid imaging system is relatively new, having received Food and Drug Administration approval in 2011. The technology is used primarily for oncology, neurology and cardiology applications.



The brain PET image from a patient radiotracer (11C-DPA-713) study reconstructed using (a) the conventional reconstruction method and (b) the newly developed reconstruction method incorporating the anatomical information from (c) the corresponding MR image. The new method demonstrates its potential in clinical quantitative PET imaging. 11C-DPA-713 is a promising radiotracer for evaluating translocator protein (TSPO) binding with PET. TSPO can serve as a marker of neuro-inflammation.

Jing Tang, Ph.D., joined the Oakland University Electrical and Computer Engineering Department as an assistant professor. She received her Ph.D. in electrical engineering from the University of Illinois at Urbana-Champaign and her postdoctoral training (fellow) in medical imaging physics from the Department of Radiology at Johns Hopkins School of Medicine. Recent co-authored published papers include "Anatomy assisted PET image reconstruction incorporating multi-resolution joint entropy" in *Physics in Medicine and Biology* and "Four-dimensional image reconstruction strategies in cardiac-gated and respiratory-gated PET imaging" in *PET Clinics*.

"Whether the two systems are used sequentially or simultaneously, the hybrid PET/MRI system gives physicians more detailed and thorough information than a single system scan," Dr. Tang says. "Most prefer simultaneous scans, but even with both options in place, there are more technical difficulties to overcome," she adds.

Collaborating with OUWB School of Medicine

Dr. Tang's research into how to improve the images generated by the hybrid imaging systems involves close collaboration with Oakland University William Beaumont School of Medicine physicians.

"They are our real-world connections," Dr. Tang says. "They tell us what kind of image problems they would like us to solve and we develop algorithms to address them. For example, a doctor might say there are artifacts in certain areas of the images, and ask us to find a solution to that problem."

The work involves determining how to overcome obstacles involved with forming the image as well as how to make the most of the integrated data generated by both imaging methods — PET and MRI.

"The images generated by the data collected in the scans are already very good," Dr. Tang notes, "but there's room for improvement. For example, organ movement and signal loss when traveling through the body both have an impact on the resulting image that physicians study. How can we overcome those issues?"

The goal, she says, is to use modern techniques to extract more information from the data to create even higher quality images. The work could, ultimately, contribute to providing patients with personalized medicine.

"The better the image, the better able physicians will be to see what's going on and decide on the best, most targeted treatment," she says.

Sharing developments

The research results will eventually get translated into code that will be incorporated into medical imaging equipment software.

More immediately, the team's research results are shared in medical specialty conference papers and presentations. For example, team members made two presentations at the Society of Nuclear Medicine and Molecular Imaging annual meeting in

June, including “Anatomy-assisted direct 4D parametric image reconstruction for dynamic cardiac PET imaging.”

Dr. Tang also received funding through the National Science Foundation’s Broadening Participation Research Initiation Grants in Engineering to reach and engage historically under-represented minority students. Working with undergraduate students, she created and presented to Detroit-area high school students the “I See You” workshop on biomedical imaging.

“We want to interest underrepresented students, including young women, in engineering careers in general but also in biomedical engineering and biomedical imaging careers specifically,” Dr. Tang says. “We’ve recently been able to collaborate with the School of Engineering and the School of Medicine, so we have a greater variety of presenters and presentations.”

Providing better patient care

As Dr. Tang continues her research to improve the images generated by hybrid PET/MRI technology, she remains focused on her end goal: Better care for patients.

“For me, it’s not about publishing high-profile papers or moving up through the ranks in academia, although that’s all good. My ultimate goal is to contribute to the well-being of people throughout the world,” Dr. Tang says.

In fact, it is why she chose medical imaging over offers in other fields that included the oil industry.

“Improving health care is what’s in my heart,” she says. “My lab’s contribution right now is tiny, but we’re doing things that will help.”

By Sandra Beckwith, a freelance writer.

Schooled in the Value of Hip-Hop

Reaching students through aesthetic of self-expression

Emery Petchauer believes that hip-hop is the most important cultural phenomenon to emerge from the late 20th century.

"Hip-hop crosses race, culture, class, geography and gender lines. It has become an important subculture, one that often deliberately hides its affiliation, yet is as vital as any other group found on a college campus."

The assistant professor of Teacher Development and Educational Studies in Oakland University's School of Education and Human Services urges educators teaching a new generation to embrace this modern culture movement in the classroom.

"Hip-hop is an aesthetic — a self-expression," Dr. Petchauer continues. "It is linguistic (rapping, DJ-ing, emceeing); kinesthetic (b-boy and b-girl, or breakdancing); visual (graffiti); musical (beat-boxing) and filled with self-knowledge.

"People filter themselves and define themselves through *all* these elements — not just the music. It is one cultural resource we should take seriously and figure out how it can be used for teaching and learning."

Dr. Petchauer theorizes that hip-hop masks itself to avoid being painted with the broad brush of rap music or being dismissed as nothing more than "cursing, drugs and scantily clad women."

Students fear being perceived as anti-intellectual if faculty members discover their hip-hop interest. Others fear being accused of trying to "be black" when they aren't, he says.

Educators need to challenge themselves to create a hip-hop-friendly classroom, whether it is through attitudes, philosophies or inspired activities. Students should be encouraged to show who they truly are, an essential ingredient to any healthy learning environment.

Dr. Petchauer suggests that educators emphasize how students feel about something as an initial step in teaching.

"In hip-hop, feeling comes first, after experiencing something. Then you think about your feelings and what happened, and then you finally understand it," he says. "It's a fundamentally African-centered idea. It's even in the language — 'I feel you,' rather than, 'I understand.'"

To accomplish this before each lecture, Dr. Petchauer asks himself how students will respond to the material.

The classic circle time of kindergarten days is also essential to today's hip-hop-inspired college classroom.

Participants use a cypher, or circle, when they gather to rap, dance, DJ, and respectfully take turns at competing.

"The cypher is improvisational, but there is this unspoken organization where there is social exchange and social learning going on," he says. "Any classroom would benefit from a cypher."

Dr. Petchauer has written two books, *Schooling Hip-Hop: Expanding Hip-Hop Based Education Across the Curriculum* and *Hip-Hop Culture in College Students' Lives: Elements, Embodiment, and Higher Edutainment.* His course, "The Education of Hip-Hop Culture," is being taught at Oakland's Honors College this fall.

What is most important for educators is helping students be themselves.

Marcia Neel, a retired public school music educator who oversaw the Clark County School District in Las Vegas, won praise for adding a mariachi program that engages struggling students.

"The more a teacher can be open to trying new techniques, the better they will be and the better they will reach the student," says Neel, president of Music Education Consultants, Inc. "We need to find more creative ways to reach out to those who need to be reached."

Dr. Petchauer regularly lectures on his theories as a means of securing grants to further explore the topic. He might also be at clubs and special events showcasing his b-boy and DJ skills, kindled during high school after first seeing break dancing. His

interest continued at Wheaton College in Chicago, where he received his bachelor's degree in English.

The marriage of hip-hop and education occurred when Dr. Petchauer was teaching English at Mar Vista High School in Imperial Beach, California, living within a few blocks of the beach and a couple of miles from the Mexican border. He had his bachelor's and a master's degree in teaching, with no intention of pursuing a doctoral degree.

Remembering Dr. Petchauer's penchant for hip-hop, his mentor called him. "He suggested I study education and look into how hip-hop can impact it," Dr. Petchauer recalls. "It was a no-brainer."

Dr. Petchauer enrolled at Virginia's Regent University, winning the School of Education's outstanding doctoral student award in 2007.

Hip-hop's power today, he says, is wide-reaching, despite first emerging in New York in the 1960s.

"Without even trying, it has spread to every habitable continent around the world. It is evocative, provocative and attractive to them, so much where people have taken it up and reinterpreted it as their own, which makes it a highly leveraged practice.

"Any culture that powerful has to have educational potential."

By Rene Wisely, a freelance writer.

Emery Petchauer, Ph.D., joined Oakland University in 2012 from Lincoln University of the Commonwealth of Pennsylvania, where he spent six years as an assistant professor of Education. While there, he explored and immersed himself in Philadelphia's hip-hop culture.

Dr. Petchauer holds a bachelor's degree in English and master's and doctoral degrees in education. On arriving in Detroit, he was happy to discover that the hip-hop scene was fruitful. "It is all over," he says. "Yes, you'll even find it throughout Oakland University's campus."

Modeling Metabolic Responses to Conserve Endangered Species

Different species have different responses to temperature, making it difficult to predict how climate will influence the distribution and impact of deadly diseases. Could one metabolic model predict dozens of species' responses to temperature and acclimation in the fight to save them?

Infection by the fungus *Batrachochytrium dendrobatidis* (Bd) causes the disease chytridiomycosis, which threatens hundreds of amphibian species on six of seven continents.

“The pathogen attacks keratin on tadpoles’ mouth parts, which keeps them from eating properly,” says Thomas Raffel, Ph.D. “Keratin is also throughout the skin of adult frogs, which is important to their physiology because they breathe, get water, and maintain their ion balance through the skin. Bd infects the skin, disrupting these processes enough to kill frogs.”

Dr. Raffel’s research focuses on how fluctuations in temperature (as opposed to mean temperature) influence parasitic infection. He recently discovered that frogs and salamanders can acclimate their immune systems following a shift to a new temperature, making them more able to fight off infections at this temperature. However, “both host and parasite need time to acclimate after encountering an unpredictable temperature shift.” These delays can make frogs more susceptible to infectious diseases when temperatures fluctuate.

“We already knew that Bd infection was temperature-dependent, and not in a way that you can predict based on what it is doing in culture. There also has to be temperature-dependence with the host’s immune response,” says Dr. Raffel, assistant professor of Biology at Oakland University.

Dr. Raffel is creating mathematical models to describe the temperature dependence of Bd infection in the amphibian species he has studied. However, he believes they are still a long way from obtaining generalities, because the temperature-dependence of infection seems to vary among species and it would be impossible to run infection experiments for all the hundreds of species threatened by Bd.

One possible solution to this problem comes from metabolic theory, which predicts that the temperature-dependence of physiological processes (like the immune system) should reflect the temperature-dependence of whole-body metabolism. “The idea is to estimate key model parameters by measuring metabolic responses to temperature with dozens of species,” he says. “That is where I want to go. I am applying for NSF funds to collect data on temperature dependence of metabolism and Bd infection in multiple species of frogs.

“The core hypothesis that I want to test is based on metabolic theory,” he says. “The metabolic theory of ecology essentially states that ecological processes and responses to things like temperature are going to be driven largely by, and are going to depend a lot on, the metabolic rates of the organisms in the ecosystem.”

He got the idea while reading an article by Peter Molnár, whom he would later meet at the 90th Annual Meeting of the American Society of Parasitologists. “They wanted to describe how temperature influences the environmental stage of a nematode parasite and found that development and mortality rates could be predicted using metabolic models, which are based on the equations used to describe enzyme kinetics. So I adapted some of his ideas describing the interaction between host and parasites.

“In this case,” he continues, “the host has its own equation and the parasite has its own equation. The parasite’s equation describes how well it can infect the host at different temperatures. The host equation describes how well it can resist the parasite.

“The idea is we cannot measure parasite infectivity or host resistance by itself. They are only meaningful in terms of how many parasites actually were successful. However, we can measure other things about their metabolisms. For example, we can measure a parasite’s swimming speed as a proxy for their ability to infect hosts. For the hosts, we have been measuring oxygen consumption as a metabolic proxy.”

Dr. Raffel uses these measurements to estimate some of the model parameters describing how temperature should influence parasite infectivity and host resistance. “We then take the actual

Thomas Raffel, Ph.D., joined the Biology Department at Oakland University in 2012 and teaches courses in parasitology and ecology.

His research explores climate effects on diseases, with specific emphasis on amphibian diseases. He believes that parasite ecologists must work across multiple scales and disciplines, considering potential interactions with factors such as predation, environmental temperature, and host immunity.

Dr. Raffel has worked for many years to publicize the importance of accounting for temperature variability when studying climate-disease interactions. Collaborating with researchers from the University of South Florida, and aided by an Environmental Protection Agency grant, he began an acclimation study in 2007 that resulted in the article, "Disease and thermal acclimation in a more variable and unpredictable climate," published in *Nature Climate Change* in 2012. The acclimation study inspired additional research projects, notably a National Science Foundation-sponsored project that examines the acclimation effects on trematode parasites in tadpoles.

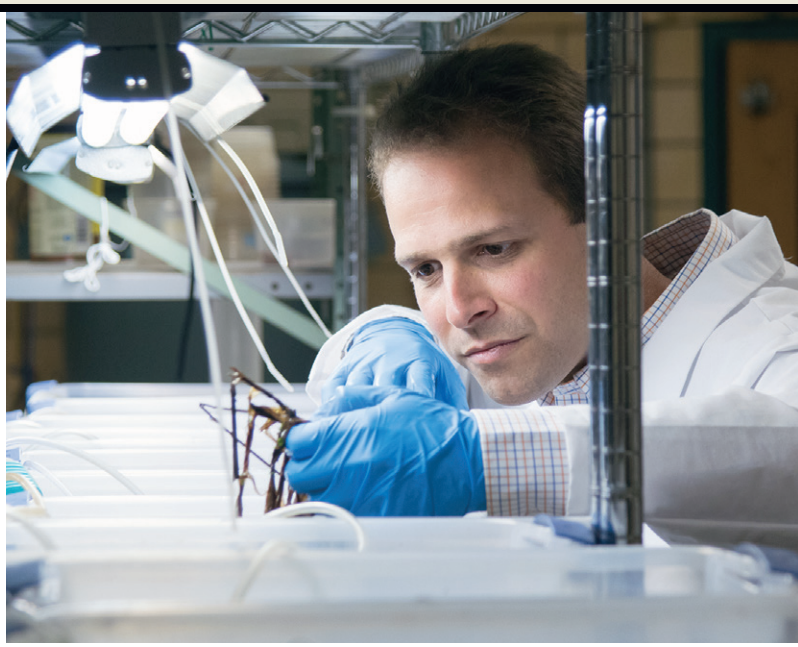
Dr. Raffel earned his doctoral degree in Biology from Pennsylvania State University in 2006. He holds a bachelor of arts degree in Zoology from Ohio Wesleyan University.

> **"The idea is we cannot measure parasite infectivity or host resistance by itself."**

parasite infection data and use statistics to fit it to a fairly complicated model that mathematically includes both host and the parasite responses. Normally it would be difficult to fit a model like this to raw data, but by estimating some of the parameters from our metabolic proxies, we can really simplify the model-fitting process."

This is the first time someone has tried describing a host-parasite interaction using metabolic theory, but Dr. Raffel is excited about the potential for the new approach. "I've been amazed by how well these models have worked so far. In several cases we've been able to estimate model parameters separately using both respirometry and infection experiments, and the parameter estimates have been remarkably similar."

Beyond frogs, there are common patterns to how metabolism works across all species of animal, plants, and microbe and fungus. "We all respond to temperature and body mass in similar ways — these are called metabolic scaling laws." Metabolic scaling laws are useful because once established, one can predict how almost any organism is going to change its metabolism based on its size and the temperature.



"You do not have to measure the metabolic responses of all species to get to that kind of generality," he says. "If you look at enough species and you find that there is a strong correlation with species' geographic ranges or life history traits, and you can predict how other species are likely to respond."

From the perspective of amphibian disease ecology, conservation is the most immediate benefit of Dr. Raffel's research. "There are hundreds of species of conservation concern that are declining or almost extinct due to infectious diseases. The ones that we are most concerned about are endangered. You cannot do these experiments with them."

By Donna Mirabito, OU Research Magazine *executive editor*

A Model for the Marriage Experience

Unique study follows couples nearly three decades

Social psychologist Terri Orbuch, Ph.D., has researched the same 373 married couples for nearly 30 years. The couples — 199 black Americans and 174 white Americans — were married in 1986 in Wayne County, Michigan.

They are part of the Early Years of Marriage (EYM) project funded by the National Institutes of Health. EYM is the only U.S. study to follow the same group of married couples for almost three decades.

Dr. Orbuch, a Sociology professor at Oakland University, has examined marriage's external stressors such as money and in-laws, as well as internal relationship factors such as sexuality, conflict and communication.

Couples were interviewed together and separately. When these couples are compared to national married couples using Census data, she says, "these couples look similar to married couples across the country."

Emerging from the EYM project is a sociodemographic portrait of marriage that considers factors that differentiate couples, revealing "what makes couples compatible, how happy couples stay resilient in the face of extreme challenges, and which specific behaviors erode happiness over time and inevitably lead to divorce," Dr. Orbuch says.

More than 100 articles, conference presentations and books have been created from the research, including insight into emotional ties to family, who will divorce, and the effects of marital boredom on future satisfaction in the marriage. In addition to adding to the body of knowledge about marriage, practitioners can share new insights gleaned from the EYM project with couples who seek premarital and marital education and counseling.

For example, a couple's relationship with in-laws early in a marriage can affect whether they might divorce later. Dr. Orbuch studied early family ties and marital stability over 16 years in the context of race and gender. The study revealed that black couples were more likely to form stronger ties with in-laws, visit family more, and argue less about family matters than white couples. These close bonds, considered critical to happiness, equated in the study with less likelihood to divorce for the black couples over time.

"The study's results highlight the need to explore in-law ties prior to and after couples make the transition to marriage," Dr. Orbuch

says. “Premarital counselors and educators can draw on these findings when discussing challenges that couples may face in the early years of marriage as they negotiate their family-of-origin relationships.”

As divorce rates skyrocketed in America, the literature had generally given greater attention to the structural (oppressive social conditions, lower status positions in society) rather than the interpersonal (i.e., burdens of parenthood) factors as explanations for divorce and low marital quality.

Analyzing 14 years of data from the EYM couples, Dr. Orbuch and her colleagues found that in addition interpersonal factors, race and education played strong roles in predicting divorce over time.

“We found that only for black couples did the husband’s participation in household tasks reduce the risk of divorce,” Dr. Orbuch says. “This phenomenon was true for black couples, whether the assessment of participation was from the wife’s or the husband’s viewpoint. Moreover, there was a slight trend for an increased risk for divorce in white couples when husbands reported especially high participation in household tasks.”

The study found that the more education the wife had, the less likely the couple was to divorce. “We found that the odds of divorce decrease by a factor of .76 for each additional year of wives’ schooling,” Dr. Orbuch says. “This protective factor was true regardless of race. However, the effect of the husband’s education was conditioned by race.”

Satisfaction over the long term of a relationship can also be influenced by simple boredom, according to Dr. Orbuch’s research. In her 2009 study “Marital Boredom Now Predicts Less Satisfaction 9 Years Later,” Dr. Orbuch found that greater boredom in the seventh year of marriage predicted significantly less satisfaction at the sixteenth year, even after controlling for satisfaction in year seven. “However, greater satisfaction in year seven did not significantly predict less boredom in Year 16,” she says.

Dr. Orbuch says that short-term experiments demonstrate that couples can reduce boredom by doing exciting activities together. “The findings suggest that benefits may be substantial and long lasting for both husbands and wives and across racial groups.”

Other findings from Dr. Orbuch’s research, from her book *5 Simple Steps to Take Your Marriage from Good to Great*:

- Couples whose parents divorced are just as happy as those whose parents stayed married.
- Couples are less likely to divorce when wives attend religious services and activities often.
- Courtship stories that continue to be romantic and full of emotion over the years predict of unhappiness for wives. Clear, detailed and well-crafted stories of the wedding and honeymoon over the years are also predictive of unhappiness for wives. Happier wives maintain overall positive affect about the wedding and honeymoon, but they tend to have lost the details.
- Being interdependent or intertwined (socially, emotionally and financially) is more critical to the happiness of white couples than black couples.

By Donna Mirabito, OU Research Magazine *executive editor*

Terri Orbuch, Ph.D., a sociology professor at Oakland University, studies interpersonal relationships, race/gender, interrelationships between relationships, marital stability and quality, sexuality and sexual norms, account-making and narratives.

She directs the Early Years of Marriage Project (1986-present), is a family and marriage therapist and a marriage enrichment workshop leader.

Her doctoral and master’s degrees in sociology are from the University of Wisconsin-Madison. Dr. Orbuch has published more than 50 articles on relationships, marriage and divorce, parent-child relationships, love and sexuality; presented at national and international conferences, and written five relationship books.

Oakland University welcomed the following assistant and associate professors during 2015-16.

Terressa Benz, Ph.D.

Assistant Professor of Sociology, Anthropology, Social Work and Criminal Justice
College of Arts and Sciences

Dr. Terressa Benz attended the University of California Irvine, receiving her master's in Social Ecology in 2007 and a Ph.D. in Criminology, Law and Society in 2011.

Her areas of interest include criminological theory, policing, white-collar crime, firearms, gentrification and situational crime prevention. Dr. Benz has been working as an assistant professor of Sociology at the University of Idaho, during which time she spent her summers interviewing Detroit residents regarding their strategies of self-protection. Additionally, Dr. Benz is working collaboratively on a survey examining attitudes about legislation being enacted in several states regarding guns on campus.

Timothy Donahue, Ph.D.

Assistant Professor of English
College of Arts and Sciences

Dr. Timothy Donahue received his bachelor's degree from Xavier University in 2003 and his master's degree from the University of Chicago. Between 2009 and 2015, he completed two additional master's degrees and a doctoral program at Columbia University.

Dr. Donahue's professional expertise includes 19th century U.S. Literature, 19th century Latin American literature, Early American literature, history and culture of the U.S.-Mexico Borderlands, history and theory of the novel, and such political theories as nationalism and sovereignty.

Martha Escobar, Ph.D.

Associate Professor of Psychology
College of Arts and Sciences

Dr. Martha Escobar received her bachelor's degree from Deusto University in Bilbao, Spain, in 1997. She went on to complete her master's (2001) and doctorate (2002) from SUNY-Binghamton.

Dr. Escobar's areas of professional expertise include cognitive and behavioral science, as well as behavioral models of cognitive dysfunction. Her research focuses primarily on learning and memory mechanism in normal and psychopathological states, with a concentration on fear learning and memory dysfunction, as well as STEM education in underrepresented minorities. Her research has resulted in more than 35 publications and has secured funding from the NIH, NSF and the Auburn University Research Initiative in Cancer (AURIC).

Joyce C. Havstad, Ph.D.

Assistant Professor of Philosophy
College of Arts and Sciences

Dr. Joyce C. Havstad received her bachelor's degree from the University of California, San Diego. She then obtained a master's degree from San Diego State University, returning to UC San Diego later to complete her doctorate degree.

Dr. Havstad's areas of professional expertise include philosophy of biology, philosophy of chemistry, philosophy of science and science and technology studies. Dr. Havstad's current philosophical work focuses on the study of biology, chemistry, ecology and paleontology, as well as on issues in biomedical ethics, environmental ethics and research ethics.

Mary Jamieson, Ph.D.

Assistant Professor of Biological Sciences
College of Arts and Sciences

Dr. Mary Jamieson received her bachelor's degree from the University of Kansas in 2001. She completed her master's degree in 2004 at the University of Texas and earned a doctoral degree from the University of Colorado in 2010.

With professional expertise in plant and insect ecology, Dr. Jamieson's research integrates multiple levels of biological organization, spans local and regional spatial scales and links applied and theoretical concepts in ecology and evolutionary biology.

Dr. Jamieson looks forward to learning more about the Campus Student Organic Farm. She hopes to get involved with this group and explore their research and outreach opportunities.

Tian Tian, D.M.A.

Assistant Professor of Music, Theatre and Dance
College of Arts and Sciences

Dr. Tian Tian attended the Julliard School, receiving her bachelor's degree in 2006 and her master's degree in 2008. She completed her doctoral degree at Eastman School of Music in 2011.

Dr. Tian's areas of professional expertise include piano performance, pedagogy and literature. She presents lectures to teacher organizations across the country and travels to China annually to present concerts, lectures and master classes, which has earned her the title of Honorary Professor at nine different universities.

Kareen Tonsing, Ph.D.

Assistant Professor of Sociology, Anthropology,
Social Work and Criminal Justice
College of Arts and Sciences

Dr. Kareen Tonsing received her Ph.D. from the University of Hong Kong in 2012. Her areas of professional expertise focus on examining factors associated with adaption processes of immigrants.

Aside from her research on immigration, Dr. Tonsing's other interests are aimed at researching children and family welfare and mental health and family violence. Her studies can be found throughout multiple peer-reviewed journals. Dr. Tonsing has presented her work at various international academic conferences in the United States, United Kingdom, Sweden and Hong Kong.

Helen Levenson, J.D.

Assistant Professor of University Libraries
Kresge Library

Helen Levenson completed her bachelor's degree at the University of Michigan, Ann Arbor, in 1977. Levenson then completed her A.M.L.S. degree in Ann Arbor in 1985 before heading to Wayne State University, where she received her *juris doctor* in 1998.

Her areas of professional interest include collection development and management, library budget management, library space planning and usage, information literacy instruction and electronic resources acquisition and access.

Levenson is experienced in developing collections, teaching information literacy and implementing enhanced library services and was a moderator, coordinator and speaker at the 2011 American Association of Law Libraries Annual Conference and program coordinator for the first Special Libraries Association Great Lakes Regional Conference.

Emily Spunaugle, M.S.L.S.

Assistant Professor of Research Services
Kresge Library

Emily Spunaugle received her bachelor's degree at Olivet Nazarene University in 2012 and her master's degree at Loyola University at Chicago in 2013. Two years later, Spunaugle completed her M.S.L.S. degree at the University of North Carolina at Chapel Hill.

She is particularly passionate about student research and reframing the research process as a narrative responsive to fluctuating information contexts. Apart from teaching information literacy, Spunaugle's professional interests also include institutional logics that prohibited suspected Communist literatures from entering Soviet-era American libraries.

Amy DeBaets, Ph.D.

Assistant Professor of Biomedical Sciences
Oakland University William Beaumont School of Medicine

Dr. Amy DeBaets received her bachelor's degree from Truman State University in 1997. She obtained her master's degree from Trinity International University in 2000. She then completed her Master of Divinity and Master of Theology degrees between 2006 and 2007. In 2012, Dr. DeBaets earned her doctoral degree from Emory University.

Her areas of professional expertise include bioethics, particularly spirituality and medicine, emerging technology ethics, and research ethics. Dr. DeBaets looks forward to helping OUWB's students to engage ethical issues to develop themselves as humanistic physicians.

Sarah Lerchenfeldt, Pharm.D.

Assistant Professor of Biomedical Sciences
Oakland University William Beaumont School of Medicine

Dr. Sarah Lerchenfeldt completed her pharmaceutical degree from Ohio Northern University in 2009. Between 2010 and 2012, Dr. Lerchenfeldt completed her pharmacy residencies at Harper University Hospital and Karmanos Cancer Center in Detroit.

Her areas of professional expertise include hematology and oncology. Dr. Lerchenfeldt's practiced interests include the prevention and management of infection in immunocompromised hosts, as well as the prevention and management of graft-versus-host-disease in stem-cell transplant patients. Dr. Lerchenfeldt looks forward to working with medical students and getting them excited about pharmacology by applying pharmacological principles to real-life situations.

Ameed Raoof, Ph.D.

Associate Professor of Biomedical Sciences
Oakland University William Beaumont School of Medicine

Dr. Ameed Raoof received his Doctor of Medicine and master's in science from the University of Baghdad College of Medicine. Dr. Raoof then completed his Ph.D. at the University of Dundee, Scotland, U.K. before completing the Medical Education Scholars Program at the University of Michigan Medical School, Ann Arbor.

Dr. Raoof's professional expertise includes teaching gross human anatomy and neuroanatomy. His research work has focused on enhancing the role of plastinaton — in anatomy education, assessing and improving the effectiveness of peer presentations/evaluations during gross anatomy lab sessions, as well as assessing the effectiveness of innovative teaching methods in undergraduate anatomy courses.

Stefan Walter, Ph.D.

Assistant Professor of Biomedical Sciences
Oakland University William Beaumont School of Medicine

Dr. Stefan Walter received his Ph.D. from the University of Bayreuth, Germany, in 1996.

His areas of professional expertise include biochemistry, protein folding, protein chemistry, enzymes, and biophysics. Dr. Walter has conducted research in the area of molecular chaperones at Yale Medical School, the Technical University of Munich, Germany, and the University of Michigan, Ann Arbor. Over this time span, Dr. Walter published more than 20 peer-reviewed papers in various scholarly journals. He is most looking forward to contributing to the notion of making the OUWB into a medical school with a nationwide recognition for training outstanding, empathetic doctors.

Caitlin Demsky, Ph.D.

Assistant Professor of Management and Marketing
School of Business Administration

Dr. Caitlin Demsky received her bachelor's degree from Central Michigan University in 2010, and two years later received her master's degree from Portland State University. In 2015, Dr. Demsky completed her doctoral program at Portland State University.

Her areas of professional expertise include workplace aggression, recovery from workplace demands, work-life balance, workplace interventions, occupational health psychology and employee stress and well-being. Dr. Demsky is a recipient of the National Science Foundation Graduate Research Fellowship. At Oakland University, Dr. Demsky looks forward to conducting applied research in the metro Detroit area.

Larry Buzas, Ph.D.

Assistant Professor of Organizational Leadership
School of Education and Human Services

Dr. Larry Buzas completed his bachelor's, master's, and doctoral degrees at Western Michigan University. He has served as the program coordinator for Western's Master of Leadership for Organizational Learning and Performance in the Department of Educational Leadership, Research and Technology.

Dr. Buzas's research interests include transfer of learning and leadership and team development, while his professional practices include learning and performance consultant roles in the private sector, state government, and nonprofit organizations.

Erik Fredericks, Ph.D.

Assistant Professor of Computer Science and Engineering
School of Engineering and Computer Science

Dr. Erik Fredericks graduated from Lake Superior State University in 2007 with his bachelor's degree in computer science and engineering. Dr. Fredericks went on to complete his master's degree at Oakland University in 2011, and his doctoral program at Michigan State University in 2015.

His areas of professional expertise include search-based software engineering, evolutionary computation, software testing, requirements engineering and model-driven engineering. Dr. Fredericks has published several conference publications and an article in the "Journal of Empirical Software Engineering." At Oakland University, Dr. Fredericks looks forward to new research collaborations with the diverse range of interests among Oakland University faculty.

Peng Zhao, Ph.D.

Assistant Professor of Mechanical Engineering
School of Engineering and Computer Science

Dr. Peng Zhao graduated in 2009 from the University of Science and Technology of China with his bachelor's degree in thermal science and energy engineering. Dr. Zhao completed his master's degree in mechanical and aerospace engineering in 2011 and his doctoral program in 2015 from Princeton University.

Dr. Zhao's areas of professional expertise include combustion and reacting flows, internal combustion engines, chemical kinetics, environmental science and energy conversion. Dr. Zhao has published research articles in peer-reviewed journals such as "Combustion and Flame" and "Proceedings of the Combustion Institute."

At Oakland University, Dr. Zhao looks forward to building close ties with the local auto industry and to bridging fundamental combustion research with advanced engine technologies.

Mozhgon Rajaee, Ph.D.

Assistant Professor of Health Sciences
School of Health Sciences

Dr. Mozhgon Rajaee received her bachelor's degree in 2007 from Spring Arbor University. She completed her master's and doctoral degrees between 2012 and 2015 at the University of Michigan.

Dr. Rajaee's areas of professional expertise include environmental health and justice of vulnerable communities through community-based research and initiatives to influence healthy behaviors and policy. She has engaged in research projects focusing on environmental health with small-scale gold mining and electronic waste in Ghana.

At Oakland University, Dr. Rajaee looks forward to making local and community connections and collaborating with other faculty to initiate projects that improve environmental and overall health.

Christopher Wilson, Ph.D.

Assistant Professor of Physical Therapy
School of Health Sciences

Dr. Christopher Wilson graduated from Oakland University with his bachelor's degree in Health Science in 1999 and completed his master's degree in Physical Therapy in 2001. He received his transitional doctoral degree in Physical Therapy from the University of St. Augustine in 2005. In 2015, he completed his doctorate in Physical Therapy (DScPT) from Oakland University.

Dr. Wilson was honored by the American Physical Therapy Association (APTA) with the APTA Emerging Leader Award in 2009 and the Signe Brunnström Award for Excellence in Clinical Teaching in 2015. He is active in clinical research in the areas of Hospice/Palliative Care and Safe Patient Handling and Mobility.

Meriam Caboral-Stevens, Ph.D.

Assistant Professor of Nursing
School of Nursing

Dr. Meriam Caboral-Stevens received her bachelor's degree from the University of Santo Tomas, Philippines, in 1985. Dr. Caboral-Stevens completed her master's degree in 2002 from Molloy College, New York, and was awarded her doctoral degree from the Graduate Center City University of New York in 2015.

Her areas of professional expertise include cardiovascular disease, particularly heart failure and adult health, with interests in older adults and their use of technology. Dr. Caboral-Stevens has published 17 articles in peer-reviewed journals.

At Oakland University, she looks forward to the opportunity to work with nursing colleagues in the Midwest, and to collaborate in inter-professional research activities.

Lan Yao, Ph.D.

Assistant Professor of Nursing
School of Nursing

Dr. Lan Yao received her Ph.D. in Nursing from the University of Michigan, Ann Arbor, in 2004.

Her areas of professional expertise include mental and physical health of family caregivers of people with Alzheimer's disease, tailored exercise/physical activity intervention for frail older adults, and trans-cultural comparisons of nursing care in older adults.

Dr. Yao's research aims to reduce falls and improve functional mobility, psychosocial well-being and the quality of life in vulnerable older adults.

American Heart Association 2015 Thomas Willis Lecture Award on Biomedical Research

Michael Chopp, Ph.D.

Distinguished Professor of Physics, Department of Physics

An internationally recognized expert in the development and treatment of stroke, Dr. Chopp was one of a small international group of scientists invited by the World Health Organization to Geneva to discuss how best to study and treat this disease.

He continues to lead a research group at Henry Ford Hospital (HFH), receiving major grants from the National Institutes of Health. A significant number of OU pre-doctoral students work in his laboratory.

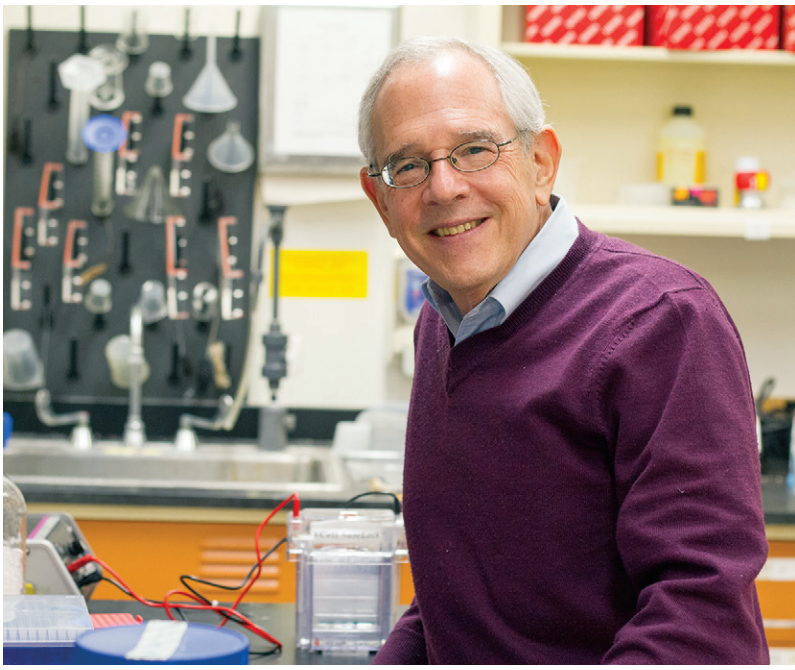
Dr. Chopp has uncovered therapeutic approaches for injured brain tissue that can significantly reduce neurological damage and neurological deficits arriving from stroke, neural injury and degeneration. These novel therapeutic approaches are focused on developing treatments to salvage brain tissue after injury and damage, and to remodel and rewire the nervous system.

After the onset of a stroke, brain cells undergo self-destruction, a form of cell death programmed by genetic alterations. Dr. Chopp and his group have identified proteins and genes responsible for the promotion of this form of cell death. With this knowledge, they may be able to intervene to inhibit this process.

Dr. Chopp and his group have also recently identified methods to induce the production of new brain cells, a discovery that may yield important therapeutic benefits for a broad range of neurological injuries and degenerative diseases.

They have also found that after a stroke, secondary events contribute to the growth of the dead tissue. A major contributing factor to this secondary injury is the influx of white blood cells into the region of damage. They have identified the signaling molecules that target these cells to the site of injury and have blocked the function of these molecules. Their data indicate that using this therapeutic approach the amount of injured brain tissue is decreased by a factor of two and that they can significantly reduce damage from stroke.

Dr. Chopp and his group have also developed novel imaging methods using MRI that permit the non-invasive evaluation of the health status of brain tissue. These techniques allow them to identify whether brain cells are simply affected and compromised by the stroke, are in the process of dying, or are already dead.



Although the Thomas Willis Lecture Award was granted primarily to recognize Dr. Chopp's contributions to stroke research, it also reflects his role as a teacher and trainer of graduate students who subsequently become his collaborators in his quest to improve treatments for debilitating illnesses. As part of his Thomas Willis lecture, Dr. Chopp will discuss his recent pioneering efforts on using biological nanoparticles, exosomes for the treatment of neurological and neurodegenerative diseases.

New Investigator Research Excellence Award

Lisa L.M. Welling, Ph.D.

Assistant Professor, Department of Psychology

Dr. Lisa Welling is a biological and evolutionary psychologist with primary research interests in hormonal influences on behavior, sources of variation in adaptive preferences and mate choice and romantic relationships.

Dr. Welling's research was the first to investigate how natural hormonal variation across the menstrual cycle influences women's preferences for cues to mate quality using measured hormone levels. More recently, she has investigated the role of the dose of synthetic hormone in hormonal contraceptives in jealous behaviors and personality. In the area of interpersonal relationships, Dr. Welling has examined varied topics that influence relationship satisfaction.

She has recently secured three internal grants and funding from the Natural Sciences and Engineering Research Council, the Penn State Social Science Research Institute and the American Institute of Bisexuality. Dr. Welling has authored more than 50 publications and her work has been published in leading outlets such as *Evolution and Human Behavior, Personality and Social Psychology Bulletin* and *Hormones and Behavior.*

Research Excellence Award

XiangQun Zeng, Ph.D.

Professor of Analytical Chemistry, Department of Chemistry

Dr. Xiangqun Zeng's laboratory studies fundamental and applied interfacial phenomena, which describes what happens on the surface of electrodes. Her students use the findings to design and build a variety of sensors to address problems associated with the determination of materials and amounts of material from medical, environmental and other fields. These highly interdisciplinary projects require significant collaborative efforts from a diverse group of individuals.

Dr. Zeng serves as the focus of these efforts and brings people together as a result of the breadth of her knowledge and the respect she has earned through the demonstrated ability to get things done on time and with high quality.

Dr. Zeng currently has two active research grants. Previous support for her work has come from the National Institutes of Health (NIH), National Institute for Occupational Health and Safety, Office of Naval Research, American Chemical Society, National Institute for Environmental Health and Safety and private corporations. These awards total more than $6 million.

2015 University Research Committee Faculty Fellowship Awards

These awards promote and foster Oakland University faculty member research endeavors in any combination of stipend and research expenses. Recipients undertake a 15-week period of full-time research.

Nicole Asmussen
Department of Political Science
Amending Activity and the Shifting Dimensions of Partisan Conflict in the Post-Reform Congress

Fabia Battistuzzi
Department of Biological Sciences
Beyond Fossils: Optimizing Molecular Clock Calibrations for Large Microbial Datasets

Miles Brown
Department of Music, Theatre and Dance
Miles Brown's Middle Game CD Recording

Aycil Cesmelioglu
Department of Mathematics and Statistics
Understanding Blood Artery Interaction: A Numerical Study

Jeffrey Chapman
Department of English
Exile: A Graphic Novel

Shravan Chintala
Eye Research Institute
Role of CREB and DREAM Proteins in the Death of Retinal Ganglion Cells in Glaucoma

Erin Dwyer
Department of History
A Proposal to Fund Research for a Second Book Project on Slavery and Poison in the United States and the Caribbean

Todd Estes
Department of History
The Length of Their Shadows: Federalist Funerals, Commemoration, and Partisanship in the Early American Republic

Matthew Fails
Department of Political Science
The Curse of Oil: Why Cheap Gasoline is Good for Dictators but Bad for Citizens, the Economy, and the Environment

Rebekah Farrugia
Department of Communication and Journalism
A Pure Girl Meets Mic Against All Odds: The Power and Production of Socially Conscious Rap Music in Detroit

Stephen Goody
Department of Art and Art History
The Transitional Article: Meta-Forms, and Synthesis in the Millennial Object

Wendi Johnson
Department of Sociology and Anthropology
Parental Influence on Stability and Change of Children's Antisocial Behavior Across Adolescence and Young Adulthood

Ali Woerner, Thayer Jonutz
Department of Music, Theatre and Dance
Disorder to Order: Take Root and the Gwang Jin International Summer Dance Festival

Evgeniy Khain
Department of Physics
Evolution of Cell Size Distributions in Expanding Dense Cell Cultures

Heidi Lyons
Department of Sociology and Anthropology
Casual Sex and Condom Use During Emerging and Older Adulthood

Khalid Mahmood
Department of Computer Science and Engineering
Bridging the Semantic Communication Gap Between Physicians and Electronic Medical Records Through Semantic Web and Wearable Computing Technologies

Melissa McDonald
Department of Psychology
Menstrual Cycle Shifts in Women's Mating Preferences: Extensions to Intergroup Dating

Daniel L. Obregon
Department of Electrical and Computer Engineering
Self-Reconfigurable Architectures for the Next-Generation Video Compression Standard: High-Efficiency Video Coding

Maria Paino
Department of Sociology and Anthropology
Academic Achievement in Michigan Charter Schools: 1994-2013

Lakshmi Raman
Department of Psychology
Children's and Adults' Recognition of the Role of Parentage, Nutrition, and Physical Activities on Height and Weight

Elizabeth Shesko
Department of History
Conscript Nation: Negotiating Authority and Belonging in the Bolivian Barracks, 1900-1956

Sally Tardella
Department of Art and Art History
Memory Palace

Nghia Tran
Department of Mathematics and Statistics
Full Stability Approach to Augmented Lagrangian Methods in Nonlinear Programming

Yuejian Wang
Department of Physics
Nano Crystalline Semiconductors Under High-Pressure Conditions

Lisa Welling
Department of Psychology
Hormonal Variation and Human Mate Preferences

Anja Wieden
Department of Modern Languages and Literatures
Gendered Investigations of the Holocaust: The Jewish Rape Victim in Postwar German Literature and Film

Jeff Youngquist
Department of Communication and Journalism
The Relationship Between Interruptions, Resisting Topic Changes, and Perceptions of Dominance

FY2015 POSTDOCTORAL SCHOLARS AT OAKLAND UNIVERSITY

The following doctoral-level researchers at Oakland University are engaged in advanced education and training designed to prepare them for an academic and/or research career.

Ana Maria Arcila

Current Project: Symmetry, local-environment and time-dependent effects in nanoscale systems; a synergistic approach

Department: Physics

Faculty Mentor: Professor George Martins

Xiaowei Chi

Current project: Autonomous Electrochemical Gas Sensor Detection Microsystem for Mine Safety

Department: Chemistry

Faculty Mentor: Professor Xiangqun Zeng

Wei Deng

Current Project: Direct 4D PET Parametric Image Reconstruction

Department: Electrical and Computer Engineering

Faculty Mentor: Professor Jing Tang

Sreenivasulu Gollapudi

Current Project: Self-Assembled Multiferroic Nanostructures and studies on Magnetoelectric Interactions

Department: Physics

Faculty Mentor: Professor Gopalan Srinivasan

Roman Khymyn

Current Project: Coherent Information Transduction between Photons, Magnons, and Electric Charge Carriers

Department: Physics

Faculty Mentor: Professor Andrei Slavin

Ivan Lisenkov

Current Project: Dynamically Controlled Artificial Magnonic Materials Based on Arrays of Nano-sized Magnetic Dots

Department: Physics

Faculty Mentor: Professor Andrei Slavin

Mukulesh Mondal

Current Project: Catalytic Asymmetric Heterodimerization of Ketenes and Applications

Department: Chemistry

Faculty Mentor: Professor Nessan Kerrigan

Rakesh Pathak

Current Project: Mechanisms of RSC Recruitment and its Role in Transcription

Department: Biological Sciences

Faculty Mentor: Professor Chhabi Govind

Yongan Tang

Current Project: Wearable Microsystem Array for Acute Multi-Pollutant Exposure Assessment

Department: Chemistry

Faculty Mentor: Professor Xiangqun Zeng

2015 University Research Committee

Meadow Brook Hall Research Conference Award

The University Research Committee annually funds a faculty research conference and the University's historic Meadow Brook Hall contributes in-kind use to promote visibility at the regional, state, national or international level. Proposals clearly articulate how the conference would impact research at OU.

Jacqueline Wiggins

Department of Music, Theatre and Dance

Arts Education Research Conference

STUDENT RESEARCH AWARD RECIPIENTS, 2014-15

Student award recipients receive financial assistance to support their research as well as the opportunity to receive travel support to present their research at a professional conference. The program is sponsored by the University Research Committee and the Office of the Provost.

Graduate Recipient

Toward Multicultural Narratology: A Narrative Approach to Examine Persian Authenticity in Multicultural Children's Literature
Student Researcher: Taraneh Matloob
Faculty Mentor: Linda Pavonetti, Reading and Language Arts

Undergraduate Recipients

Assessing Agency in Endometrial Cancer Patients Through Social Media
Student Researcher: Robert Mey
Faculty Mentor: Dana Driscoll, Writing and Rhetoric

Driven to Distraction: Individual Differences Modulate How Alarms Impact Nursing Practice
Student Researcher: Adam Savine
Faculty Mentor: Barbara Penprase, Nursing

Student Travel Award, Graduate Recipients

Co-varying Characteristics that Affect Outcomes in Online Classes
Student Researcher: Daniel Arnold
Faculty Mentor: Julia Smith, Organizational Leadership

The Role of Community-Level Fish Excretion in Nutrient Cycling of Streams Along a Land-Use Gradient
Student Researcher: Howard Barrons
Faculty Mentor: Scott Tiegs, Biological Sciences

Reflections: How Leaders Can Shape a Culture of Thinking
Student Researcher: Todd Bidlack
Faculty Mentor: Eileen Johnson, Organization Leadership

Co-varying Characteristics that Affect Outcomes in Online Classes
Student Researcher: Nicholas Bongers
Faculty Mentor: Julia Smith, Organization Leadership

In Vivo and in Vitro Analysis of the Maize RNA Binding Motif Protein 48 Splicing Factor Essential for Seed Development and Plant Viability
Student Researcher: Christian Brigolin
Faculty Mentor: Shailesh Lal, Biological Sciences

Novel Smad Protein Dysmorphic Regulates Drosophila Tracheal Tub Size through Luminal Matrix Maintenance
Student Researcher: Rachana Chandran
Faculty Mentor: Lan Jiang, Biological Sciences

Design and Application of an Enhanced GA
Student Researcher: Hatem Elgothamy
Faculty Mentor: Hoda Zohdy, Electrical and Computer Engineering

A Pre-Operative 5-Meter Walk Test as a Predictor of Hospital Length of Stay and Intensive Care Unit Length of Stay in Individuals Following Open-Heart Surgery
Student Researcher: Shannon McPherson
Faculty Mentor: Jacqueline Drouin, Health Sciences

Quantification of Glycosaminoglycans in Articular Cartilage by Microcomputed Tomography
Student Researcher: Daniel Mittelstaedt
Faculty Mentor: Yang Xia, Physics

The Effects of Black Cohosh on the Regulation of Estrogen Receptor Alpha in Breast Cancer Cells
Student Researcher: Viktoria Mladenovik
Faculty Mentor: Sumi Dinda, Health Sciences

Polyamory and Monoamory: Alternative Approaches to Pursuing a Strategically Pluralistic Mating Strategy
Student Researcher: Justin Mogilski
Faculty Mentor: Lisa Welling, Psychology

Co-varying Characteristics That Affect Outcomes in Online Classes
Student Researcher: Shaun Moore
Faculty Mentor: Julia Smith, Organization Leadership

The 27th International Conference on Computer Applications in Industry and Engineering
Student Researcher: Linda Murphy
Faculty Mentor: Ka C Cheok, Electrical and Computer Engineering

Women's Sexual Strategies and Perceptions of Their Partners Over the Menstrual Cycle
Student Researcher: Claire Nicolas
Faculty Mentor: Lisa Welling, Psychology

Simulation of Wind Turbine Flow Using the Actuator Line Method in NEK5000
Student Researcher: Murphy Odea
Faculty Mentor: Laila Guessous, Mechanical Engineering

Development and Initial Validation of the Coalitional Mate Retention Inventory
Student Researcher: Michael Pham
Faculty Mentor: Todd Shackelford, Psychology

Reflections: How Leaders Can Shape a Culture of Thinking
Student Researcher: Julie Rains
Faculty Mentor: Eileen Johnson, Organization Leadership

Defining the Role of PP2A-SUR-6 in Centrosome Assembly
Student Researcher: Michael Stubenvoll
Faculty Mentor: Mi Hye Song, Biological Sciences

Neurorestorative Therapy of Stroke in Type Two Diabetes Rats Treated with Human Umbilical Cord Blood Cells
Student Researcher: Poornima Venkat
Faculty Mentor: Bradley Roth, Physics

Improved Myocardial Perfusion PET Imaging with MRI Learned Dictionaries
Student Researcher: Xinhui Wang
Faculty Mentor: Jing Tang, Electrical and Computer Engineering

A Pre-Operative 5-Meter Walk Test as a Predictor of Hospital Length of Stay and Intensive Care Unit Length of Stay in Individuals Following Open-Heart Surgery
Student Researcher: Mary Warren

Faculty Mentor: Jacqueline Drouin, Health Sciences

Student Travel Award, Undergraduate Recipients

Synthesis of Pyrazol-1-yl-benzenesulfonamides
Student Researcher: Miranda Belcher

Faculty Mentor: Roman Dembinski, Chemistry

Research Findings at ASA Conference's Undergraduate Honors Program
Student Researcher: Alaina Bur

Faculty Mentor: Heidi Lyons, Sociology and Anthropology

Is Low Distress Tolerance Linked to Addictive Eating?
Student Researcher: Lauren Caravello

Faculty Mentor: Andrea Kozak, Psychology

The Biotech Revolution: Corporate Collusion and Intervention Abroad
Student Researcher: Jane Dixon

Faculty Mentor: Alan Epstein, Political Science

Natural Resource Wealth and Norm Compliance: Rent Revenues and the Continuity of State Behavior in International Politics
Student Researcher: Marc DuBuis

Faculty Mentor: Matthew Fails, Political Science

An Active Fluorescence Method for Monitoring the Control of Microcystis Species
Student Researcher: Stephanie Fields

Faculty Mentor: David Szlag, Chemistry

Unifying Feedback: Encouraging Positive Relationships Between Students and Their Writing
Student Researcher: Laura Gabrion

Faculty Mentor: Bong Gee Jang, Writing and Rhetoric

Assessing Agency in Endometrial Cancer Patients Through Social Media
Student Researcher: Robert Mey

Faculty Mentor: Dana Driscoll, Writing and Rhetoric

Comparison of Electro-Reduction of Sulphur Dioxide in Ionic Liquid at Gold and Platinum Electrodes
Student Researcher: Min Guo

Faculty Mentor: Xiangqun Zeng, Chemistry

A Novel UWB Imaging System Setup for Computer-Aided Breast Cancer Diagnosis
Student Researcher: Xiang He

Faculty Mentor: Jia Li, Electrical and Computer Engineering

Wi-Fi-Based Indoor Localization with Adaptive Motion Model Using Smartphone Motion Sensors
Student Researcher: Xiang He

Faculty Mentor: Jia Li, Electrical and Computer Engineering

Assessing a Grammar of Comics Through Constraints Representing Author Intent
Student Researcher: Dawnelle Henretty

Faculty Mentor: John McEneaney, Reading and Language Arts

Unifying Feedback: Encouraging Positive Relationships Between Students and Their Writing
Student Researcher: Lisa Hine

Faculty Mentor: Bong Gee Jang, Reading and Language Arts

Life Event Levels Influence Resilience and Future Time Perspectives in Middle-Aged and Older Adults
Student Researcher: Nicole Jarrett

Faculty Mentor: Debra McGinnis, Psychology

Reflections: How Leaders Can Shape a Culture of Thinking
Student Researcher: Jennifer Johnson

Faculty Mentor: Eileen Johnson, Organizational Leadership

Combined Sections Meeting Conference
Student Researcher: Courtney Krawczyk

Faculty Mentor: Kristine Thompson, Physical Therapy

Gordon Research Conferences - Ionic Liquids
Student Researcher: Lu Lin

Faculty Mentor: Xiangqun Zeng, Chemistry

Rapid Testing for Beach Water Quality Using qPCR
Student Researcher: Joseph Love

Faculty Mentor: David Szlag, Chemistry

Magnetism and Magnetic Materials Conference
Student Researcher: Steven Louis

Faculty Mentor: Andrei Slavin, Physics

Immigration's Impact on the Resource Curse in the Gulf States
Student Researcher: Kendall Kosikowski

Faculty Mentor: Matthew Fails, Political Science

Mechanism for Measurement of Flow Rate of Cerebrospinal Fluid in Hydrocephalus Shunts
Student Researcher: Spencer Kovar

Faculty Mentor: Hongwei Qu, Electrical and Computer Engineering

An Examination of Workplace Bullying and Discrimination: Is Discrimination Inherently Bullying?
Student Researcher: Deanna Katto

Faculty Mentor: Karen Markel, Psychology

Emergency Legislation: A Case Study of the American Recovery and Reinvestment Act
Student Researcher: Ashton Prasatek

Faculty Mentor: Terri Towner, Political Science

What Hat Fits?
Student Researcher: Susan Schoenherr

Faculty Mentor: Roberta Michel, Intergrative Studies

FMRE
Student Researcher: Ellen Searle

Faculty Mentor: Jennifer Vonk, Psychology

Why Good Environmental Policies Have Failed in the Amazonian Eco-Ecoregion
Student Researcher: Mikaela Strech

Faculty Mentor: Diana Orces, Political Science

APA Convention: Cross-Cultural Differences in the Relationships Between Hope and Post-Traumatic Growth
Student Researcher: Aundreah Walenski

Faculty Mentor: Kanako Taku, Psychology

Midwest Political Science Association Annual Conference
Student Researcher: Nicholas Willis

Faculty Mentor: Cristian Cantir, Political Science

2015 UNIVERSITY RESEARCH COMMITTEE FACULTY RESEARCH AWARDS

These awards support a variety of Oakland University faculty member research endeavors, such as pilot projects, equipment, purchase of data and travel for archival or field research.

Claude Baillargeon
Department of Art and Art History
Nuclear Representations of the Nevada Test Site

Anica Bowe
Department of Teacher Development and Educational Studies
Instrument Development: Needs Assessment Tool for Health-Related Topics for the Parents at Alcott Elementary School, Pontiac

Cynthia Carver
Department of Education and Human Services
Teacher Leadership by Design

Myung Choi
Department of Exercise Science
Natural Products, Inflammation and Fat Metabolism in Humans

Drake Dantzler
Department of Music, Theatre and Dance
Advanced Role Study: Britten and Bernstein

Claudia Grobbel
School of Nursing
Using High-Fidelity Simulation to Improve Competencies in Leadership, Quality Care and Caring Practice for Undergraduate Nursing Students: A Pilot Project

Mary Hartson
Department of Modern Languages and Literatures
Casting Spanish Masculinity in a Consumer Age

Lynnae Lehfeldt
Department of Music, Theatre and Dance
Experiencing Speech

Susanah Lily Mendoza
Department of Communication and Journalism
Grounding Multicultural Communication in Reflexive Self-Exploration: Ethnoautobiography as Transformative Practice

James Naus
Department of History
Royal Ideology and the Crusades

Richard Olawoyin
School of Health Sciences
Analysis of Environmental Health Risk Perception and Communication from Directional Drilling and Hydraulic Fracturing from Proxy Communities

Cheryl Riley-Doucet
School of Nursing
Health Professions Students' Lifelong Learning Orientation: Associations with Self-Assessed Competency in Information Skills

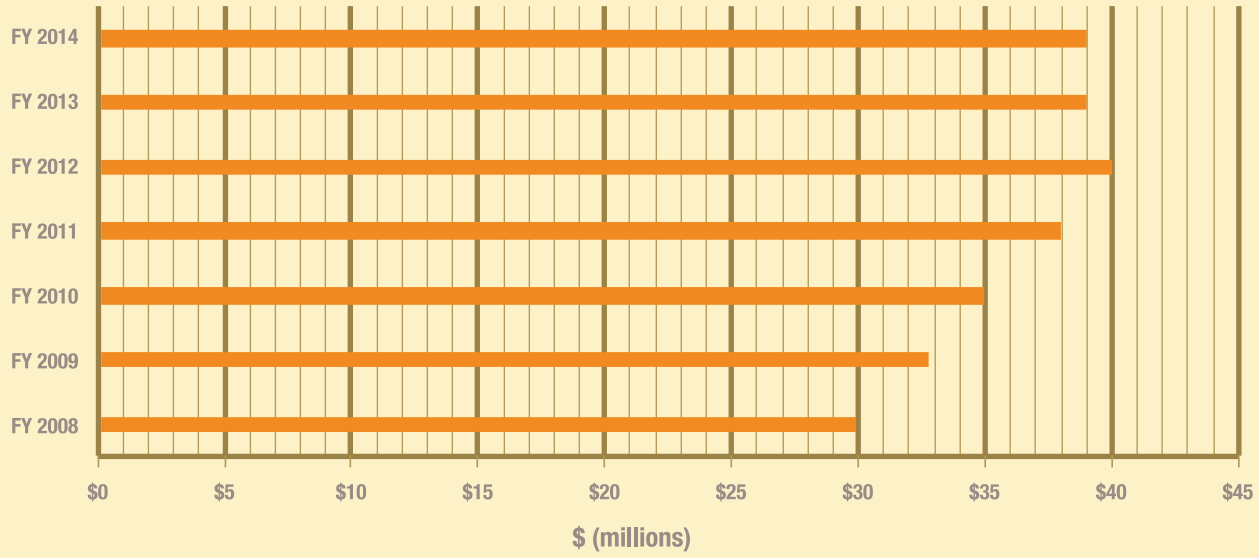
Galina Tirnanic
Department of Art and Art History
Triumphal Gateway of Venice

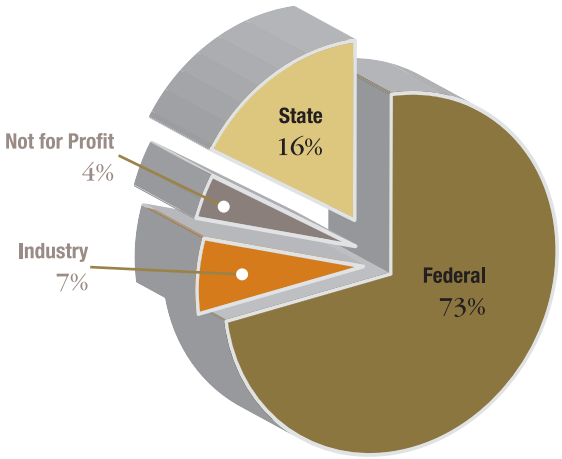
Elizabeth Kattner Ulrich
Department of Music, Theatre and Dance
From Totenmal to Trend: German Expressionist Choreography and the Development of American Modern Dance

Crystal VanKooten
Department of Writing and Rhetoric
Collecting Interview Data for a Multimodal Oral History

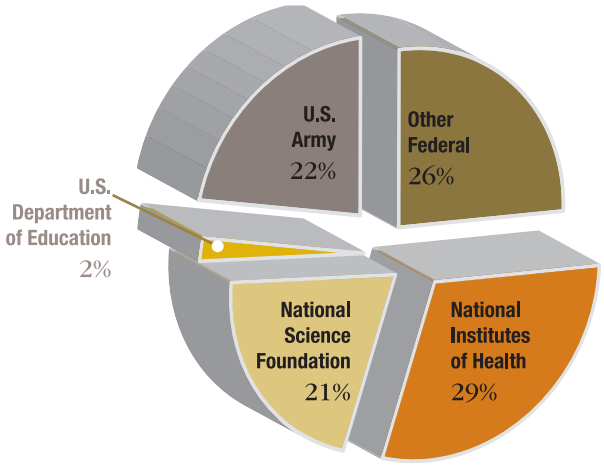
Byungwon Woo
Department of Political Science
Global-Local Politics of International Monetary Fund Programs: Austerity and Economic Reforms, Domestic Opposition, and the IMF

Research Expenditures from all Sources (external and internal)





Research Awards by Sources



Federal Research Awards by Agencies

The Automotive Tribology Center

The Automotive Tribology Center (ATC) is an academic research unit within the Mechanical Engineering department. It is the only university research center in the United States that is dedicated to automotive tribology research and is uniquely positioned to advance the reliability, mobility and efficiency of automotive components. The ATC is mainly dedicated to performing fundamental and applied research that lowers frictional energy losses. Particular emphasis is placed on engine and transmission tribology. The research results of ATC benefit the U.S. military and different governmental and industrial sectors of the economy.

Center for Applied Research in Musical Understanding

The mission of the Center for Applied Research in Musical Understanding (CARMU) is to build and advance a research-based pedagogy of teaching for musical understanding, as well as support pre-K-12 music educators in Michigan, the United States and internationally. The center seeks national and international eminence in applied research in musical understanding and supports faculty, graduate and undergraduate research in musical understanding.

Center for Autism Research, Education and Support

Oakland University Center for Autism Research, Education and Support (OUCARES) integrates academic coursework, knowledge and research with hands-on work to prepare professionals to be leaders in the autism community. Through these academic and service programs, OU also provides supportive individual and family programs. OUCARES encourages the exchange of ideas relating to the education and support of individuals with autism spectrum disorder as well as providing services and support needed to improve daily living.

Center for Biomedical Research

The mission of the Center for Biomedical Research is to vigorously promote and support biomedical research and education at Oakland University and allied institutions, to recruit and retain outstanding biomedical scientists, to facilitate collaborative biomedical research projects and to develop gift, grant, and contract support for biomedical research programs, graduate and undergraduate training, as well as core facilities and equipment.

Center for Creative and Collaborative Computing

The mission of the center is to provide an environment for students, faculty and participating industry professionals to collaborate and create novel information technology applications to keep our industry competitive and at the forefront of technology. The center is seen as an integral component of the future success of the computing and information technology-related undergraduate and graduate programs.

Center for Excellence in Teaching and Learning

The development and advancement of teaching excellence among faculty is central to a quality educational experience for students. This involves supporting faculty efforts to improve teaching by creating learning environments in which our diverse student body achieves maximal learning potential, and promoting a culture throughout the University which values and rewards effective teaching, and respects and supports individual differences among learners. This center is open to full-time and part-time faculty and graduate assistants who teach at Oakland University.

Center for Integrated Business Research and Education

Rapid changes in the business world — driven by globalization, technological advances and shifting economics — require business professionals, researchers and students to be prepared for anything. The Center for Integrated Business Research and Education (CIBRE) at Oakland University's School of Business Administration is harnessing the power of integration to do just that. CIBRE not only offers a mechanism to build the region's economic future, but is educating a workforce that will be fully prepared to find success in it.

Center for Robotics and Advanced Automation

Since its establishment in the 1980's, the Center for Robotics and Advanced Automation (CRAA) at OU has been at the forefront of research and development in the areas of controls, robotics, automation and machine vision. Over the last two decades, CRAA has successfully completed numerous R&D projects sponsored and funded by national research organizations and agencies, Department of Defense and military sectors, local automotive industries, and the State of Michigan.

Center for Robotics Unmanned and Intelligent Systems

The Center for Robotics Unmanned and Intelligent Systems (CRUIS) will facilitate opportunities for OU faculty to lead start-up initiatives to work with business and government agencies to transition technical knowledge from academia to industry commercialization opportunities by enabling research, development, test and evaluation capabilities. CRUIS will seek opportunities to support robotics and unmanned systems challenges in the defense industry that will lead to development of expertise that can be translated to various sectors — security, commercial, social, medical and others that are mainstream..

Center for Undergraduate Research and Leadership

Oakland's unique Center for Undergraduate Research and Leadership (CURL) supports undergraduate research initiatives and the key work of those actively developing undergraduate research. CURL promotes leadership and excellence among the Oakland University undergraduate community and the qualities of creativity, innovation and social and public enterprise. Based in The Honors College, the Center advances the idea that strong undergraduate research is the future of higher education, the engine powering the success of our colleges and universities and of the public and private sectors. Champions of Research are elected to CURL on a semester basis. These Champions are faculty and undergraduate students who exemplify world-class research.

Chrysler Learning and Innovation Center for Sheet-Metal-Forming Technology

Composed of university faculty, scholars, students, and industry experts, the Chrysler Learning and Innovation Center for Sheet-Metal-Forming (CLIC-form) Technology is an academic center at which training, applied research and intellectual property management in the area of sheet-metal forming are carried out. Collaborative initiatives at CLIC-form are open to all domestic and international entities. A unique feature of CLIC-form is its highly selective, industry-hosted internship program in which OU undergraduate students participate in research projects during the summer. In addition to providing educational training and engaging in collaborative research, the team at CLIC-form seeks to develop and commercialize intellectual property related to sheet-metal-forming technology.

Clean Energy Research Center

Energy affects all aspects of our lives, from the economy to health care. The Clean Energy Research Center (CERC) explores sustainable ways to meet our future energy needs utilizing unique renewable energy feed sources, from biomass to solar, with a focus on overall energy conservation. The CERC teaches and trains the next generation of students on energy issues and has begun the green campus initiative to demonstrate the benefit of alternative energy technology on campus CERC continues to perform research toward developing environmentally friendly technologies.

Counseling Center

The School of Education and Human Services Counseling Center is a teaching and research facility for the Counselor Education program that offers personal and career counseling to the community. The center enables graduate students to integrate and apply counseling theory with practice, as well as to provide supervised professional counseling assistance at no cost to persons in need.

English as a Second Language Center

The English as a Second Language Center (ESL) is charged primarily with monitoring and implementing the English Proficiency Requirement on campus. The center offers a full range of ESL courses at all skill levels and supervises the ESL Endorsement Program, the ESL Institute Programs, the Individual ESL Instruction Program and the Hispanic Outreach Program (HOP). During its eight years of operation, HOP has received financial support from the College of Arts and Sciences, local corporations and Michigan government agencies.

Eye Research Institute

The Eye Research Institute (ERI) has a history of over 40 years in vision research and has received over $50 million from external funding sources, mainly the National Eye Institute. Each year the Institute, in conjunction with the Center for Biomedical Sciences, awards competitive $3,500 Summer Vision Research Fellowships to OU undergraduate students. In addition to conducting vision research at OU, the ERI is also formally associated with the Department of Ophthalmology at William Beaumont Hospital.

Fastening and Joining Research Institute

The Fastening and Joining Research Institute (FAJRI) at Oakland University is the only known facility of its kind in the world: an academic, nonprofit research facility dedicated solely to the fastening and joining of materials. This facility pursues fundamental and applied research to develop and disseminate new technologies in fastening and joining engineering. Through its research, FAJRI helps improve the safety and reliability of equipment, machinery and mechanical structures. The research conducted also significantly improves the mobility and combat-readiness of military vehicles. On the civilian side, applications of FAJRI research benefit the automotive, aerospace, nuclear power and transportation industries.

Galileo Institute for Teacher Leadership

The Galileo Institute for Teacher Leadership is dedicated to improving the learning of all students, elevating the education profession, enhancing the leadership skills of teachers and fulfilling the vital role of public education in achieving a civil, prosperous and democratic society. The commitment to the concept of developing teacher leaders, to defining what teacher leadership is and why it is so important is at the heart of the institute.

Hardware in the Loop

Hardware-in-the-loop (HIL) simulation is used widely in the development and testing of complex real-time embedded systems, such as automotive engine controllers. The OU HIL Lab is a unique multidisciplinary academic facility established in 2012 with support from Chrysler LLC. The HIL lab contains five automotive-hardware-in-the-loop simulators that allow testing and development of production and prototype engine and transmission controllers using simulated (software) automobiles. Current research projects include fuel economy strategies, engine thermal modeling and advanced control techniques for transmission shift control.

Ken Morris Center for the Study of Labor and Work

The Ken Morris Center for the Study of Labor and Work is a division of the Department of Human Resources Development. Founded in 1972 as a Labor Education Program, the center was renamed in 1983 for Ken Morris. Its primary goal is to help develop potential leaders who possess the analytic, interpersonal and organizational skills to respond to human needs in an era of rapid social change. The program seeks to join education, skill development and service in the pursuit of this goal.

Lowry Center for Early Childhood Education

The Lowry Center offers early childhood education programming to children from 18 months to five years old using the newest innovative equipment, materials and practices to cultivate the development of young children. The center's mission is to provide an exemplary laboratory center for early childhood education for the University and the neighboring communities.

Prevention Research Center

The Prevention Research Center strives to promote community health through education, promotion, and translational research. Translational research discovers which strategies work in the community: the community of youth, or the community of women, or the community of senior citizens — all at high risk. The Center brings experts from OU and the community together to make a difference in people's lives.

Public Affairs Research Laboratory

The Public Affairs Research Laboratory (PARL), affiliated with the department of Political Science, provides services to local governments and municipalities as well as research opportunities for our students. Dr. Pat Piskulich is director of PARL at Oakland University, the public service and outreach unit of the College of Arts and Sciences.

Reading Clinic

Dedicated to helping children between the ages of 6 and 17 with any type of reading or writing difficulties including learning disabilities, dyslexia, Attention Deficit Disorder and Attention Deficit Hyperactive Disorders, the clinic diagnoses the nature and extent of a child's reading and writing capabilities and works to improve them.

OU SmartZone Business Incubator

Oakland University's SmartZone Business Incubator (OU INC) is a SmartZone Business Accelerator in collaboration with the City of Rochester Hills, Michigan Economic Development Corporation (MEDC) and various industry partners. OU INC's focus is in the Energy, Medical Device and Information Technology sectors, providing entrepreneurial resources and strategic business solutions for developing business ventures and accelerating ideas to market. OU INC fosters a healthy environment for the growth of new startup companies and provides support for existing entities through its facility and business development resources.

OFFICE OF RESEARCH ADMINISTRATION AGENCIES — FY2014

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American Educational Research Association
American Heart Association
American Medical Association Foundation
American Physical Therapy Association
Amerilodge Group LLC
Arnold P. Gold Foundation
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Axalta Coating Systems, LLC
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Beaumont Health System/NIH
Beaumont Research Institute
BETA CAE Systems USA
Blue Cross Blue Shield of Michigan Foundation
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Check Corporation
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ESI Group
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Health Resources and Services Administration
Huron Mountain Wildlife Foundation
International Reading Association
Intrepid Control Systems
Johnson Controls Foundation
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Michigan Economic Development Corporation
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Michigan State University/U.S. Army
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Tongji University/Shanghai Electric International Economic and Trading
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