

# NUScience

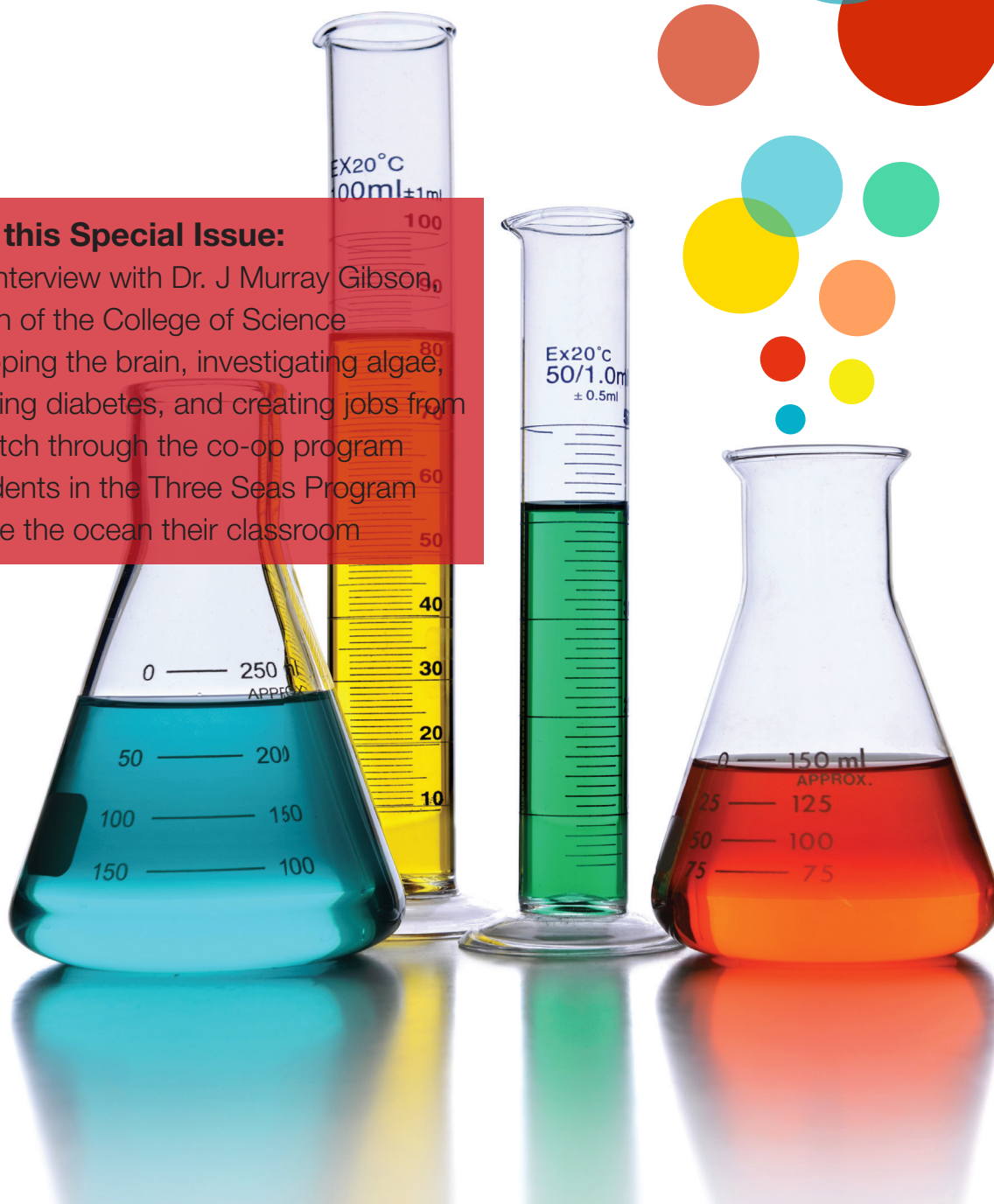
Northeastern University's First Science Magazine

## Focusing on the College of Science

Tomorrow's innovators, explorers, and problem-solvers are today's Huskies.

### Inside this Special Issue:

- An interview with Dr. J Murray Gibson, Dean of the College of Science
- Mapping the brain, investigating algae, fighting diabetes, and creating jobs from scratch through the co-op program
- Students in the Three Seas Program make the ocean their classroom



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## GET INVOLVED!

Are you looking for a creative way to showcase your work on campus? Do you want to boost your resume in a way that's creative, intellectual and fun? Become a part of NUScience! We publish two issues per semester on a variety of themes in science and technology and welcome our writers to explore any appropriate topic they find interesting.

We meet every **Thursday at 8:15pm** in room **408 EII Hall**. Come collaborate with us!

## Letter from the Editors

Dear Readers,

Here at NUScience, we typically focus on worldwide science news, from the latest developments in the fight against cancer to the newest discoveries at the outermost edges of the universe. In this special issue, we are proud to feature the stories of the peers we attend classes with and the dedicated faculty we learn from here in Northeastern's College of Science.

Our fellow Huskies never cease to amaze us. We have spoken with students who have worked on co-ops as far away as the African savannas, and as close as Harvard Medical School. Some of our peers have even paved a new path and their own created co-ops, with the help of our dedicated advising staff. The Northeastern students in these pages have completed, presented, and won awards for research projects on a wide range of topics, including circadian rhythms and African languages. They study on, and dive in, not one, but three seas. They, along with our distinguished and enthusiastic faculty, touch the boundaries of knowledge daily.

Indeed, none of the work we do would be possible without the staff whose curiosity and spirit of exploration drives us as a university. In this issue, we spoke to the Dean of the College of Science, Dr. J. Murray Gibson, about his experiences here at Northeastern and the potential our college has for the future. We also had the honor of sitting down with Sir Richard Roberts, Nobel Laureate, passionate microbiologist, and new faculty member in the College of Science, about his work with the Ocean Genome Legacy.

Whether you are reading this issue as a prospective, incoming, or current student, as a parent, friend, or solely someone with a curiosity for the sciences, we hope you enjoy this special issue of NUScience Magazine. We would like to thank our wonderful writers, editors, and designers who took the time to work on this issue. Without them, we would not have the magazine you hold in your hands! We hope that the stories they have helped tell inspire you to new pursuits, encourage you to explore, and lead you to new discoveries, whether out in the wide world or simply from your seat in a classroom. Simply sharing these stories has inspired us already, and made us proud that we call Northeastern our home.

Go Huskies!

Katie Hudson, Marine Biology, 2017; Claudia Geib, Journalism & Environmental Science, 2015







### Co-Editors-in-Chief

## Read More at NUSciencemag.com

Often, our eagerness to share news of science's latest discoveries doesn't fit between the pages of our magazine. Check out additional stories on our blog, which features exclusive content guaranteed to satisfy your science fix, whether it comes between the latest issues of NUSci or simply between classes.

# There's A Club For That

BY NAOMI STAPLETON, PSYCHOLOGY, 2016

 <p><b>Psy Club</b> Psych Specific <a href="#">JOIN NOW</a></p>	 <p><b>Linguistics Club</b> Major Specific <a href="#">JOIN NOW</a></p>	 <p><b>NU Bio Club</b> Major Specific <a href="#">JOIN NOW</a></p>
 <p><b>NU Marine Bio</b> Major Specific <a href="#">JOIN NOW</a></p>	 <p><b>Science Club for Girls</b> <a href="#">JOIN NOW</a></p>	 <p><b>NEURONS</b> BNS Specific <a href="#">JOIN NOW</a></p>

For Northeastern College of Science students, science is not just something they read about in dusty textbooks. Northeastern University students live and breathe the subject, and the multitude of science-related clubs on campus make this incredibly easy. From Behavioral Neuroscience to Marine Biology, almost every major can find a group of students with similar scientific interests and, just as importantly, free food.

Many groups are organized around a specific major. PsyClub meets to discuss and learn more about the varied fields within Psychology. The executive board works closely with the Psychology Department to host helpful and interesting events for Psychology and related majors. These include co-op panels, course previews, and a town hall meeting to discuss potential improvements for the department. "The club also hosts a year-long lecture series from speakers on topics ranging from marketing to PTSD to sex addiction," explained Emma Parrish, the club's public relations chair.

**“We are all just a bunch of fun loving nerds who come together to expand our knowledge... outside of the formal boundaries of a classroom.”**

Like PsyClub, the Linguistics Club is another group catered for a particular major. The club president, Heather Fielding, said the group

“aims to foster a friendly environment to discuss language and linguistics. We want to create a group where one can learn about and indulge in language, and where one can be aware of the opportunities available in Boston and in the field.” She explains that the weekly meetings involve free food and activities like playing Bananagrams or watching language-related movies like *The King's Speech*. The group will often hear presentations from its members' own research or from guest lecturers.

The Marine Biology Club meets weekly in an effort to “foster and engage students with interests in marine biology, environmental science, ecology, evolution, and behavior by providing educational, recreational, and professional opportunities in correlation with the Marine Science Center,” according to current club president, Katie Hudson. The meetings are structured to include a presentation on a relevant topic and a group discussion. This year, the club also screened *Finding Nemo* (a club tradition), *Sharknado*, *Blackfish*, and some of the television series “Planet Earth.”

NEURONS is a group focused on bringing neuroscience to campus. They do this through meetings held every other week involving events like speakers, career panels, and socials. The group also devotes time to planning for Brain Awareness Week in the spring. The executive board is always trying to mix up their meetings; this year they covered a variety of topics, including taste-test demonstrations and the neuroscience of sex.

The Biology Club serves as a resource for students in the Biology major. Internal Vice-President, Vivian Ma, explained, “we are all just a bunch of fun-loving nerds who come together to expand our knowledge in the biological sciences outside of the formal boundaries of a classroom.

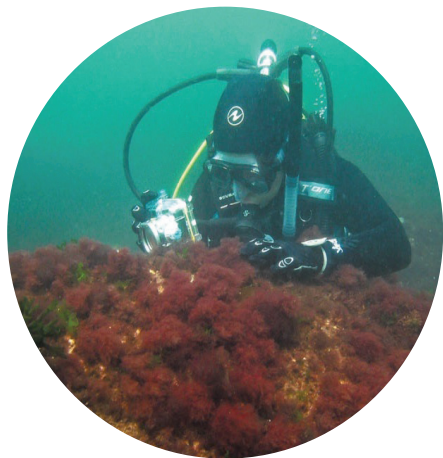
We try to host events that will not only be enlightening to our members academically, but also provide an environment in which students can let loose and have a good laugh.” These events often consist of a faculty speaker discussing their research and sharing personal anecdotes. This year they celebrated Darwin's birthday, as well as hosted an interactive presentation on regeneration using axolotls. The members also venture away from campus to visit local museums, aquariums and even herpetology shows.

The Northeastern Science Club for Girls chapter welcomes students of any major in helping them bring science, technology, engineering, and mathematics (STEM) programming to elementary-aged girls in the Boston area. They seek “to increase the self-confidence and science literacy of girls belonging to groups that are underrepresented in the sciences, through free programs that provide experiential learning, mentorship, and leadership opportunities,” according to current club president, Rebecca Hansen. The Northeastern mentors spend eight Saturday mornings per semester guiding students through a weekly curriculum involving hands-on activities like building film canister rockets and growing crystal gardens. The club also hosts several events outside of their Saturday sessions, including their annual event, “Show Me the Science.” Hansen explained that this event “is a reverse science fair, where we invite outside companies and other student groups to create hands-on experiments to present to our mentees.”

Like what you see? All of these clubs are eager for new members to get involved - look out for them at the Activities Fair in the fall! ■

*Making the world your oyster in the*

# *Three Seas Program*



Northeastern University offers an unparalleled opportunity to undergraduate students in the College of Science. The Three Seas Program is a year-long endeavor during which undergraduate marine biology, environmental science, and biology majors take rigorous marine biology and ecology related courses to gain research knowledge and experience. For 30 years, the program has provided students the unique experience of living in the environments that they are studying.

The "Three Seas" part of the program's name comes from the three different environments the students encounter and study. In the early years of the program, students went from Friday Harbor, Washington, to Discovery Bay, Jamaica, ending in Nahant, Massachusetts. Currently, they travel from Marine Science Center in Nahant; for the fall semester, to Bocas del Toro, Panama for tropical coral reef research in the first half of spring semester. After a couple months enjoying the sun and warm water, they move to Friday Harbor to study Pacific kelp forests and scuba dive in the chilly waters of the northwest. Through this plan, the students learn and experience the Atlantic, Caribbean, and Pacific Oceans.

For the first four months of Three Seas, students commute to Nahant, Massachusetts, where they are enrolled in five courses. They take classes such as Oceanography, Marine Invertebrate Zoology, Marine Ecology, Experimental Design, and Marine Botany. For those who are SCUBA certified, Diving Research Methods introduces students to underwater research techniques. The students get to practice what they learn in this course when diving off of the Marine Science Center's beach as part of lab work for their other classes. This semester also includes an extended field trip to Quoddy Head in Lubec, Maine, which is the eastern-most point in the United States. This trip provides research and learning opportunities in the differing habitats that make up the New England portion of the east coast.

Fast-forward past Christmas and New Year's,

BY MEG PINAIRE, MARINE BIOLOGY, 2017

and the students find themselves skipping Boston's snowy weather for Panama's sunny skies and sandy beaches. During the time in the Caribbean, there is an emphasis on experiments and field work. Given the environment, the students take courses revolving around coral reef biology and ecology. Also, the students get a break from the marine environment during their only non-marine course, Tropical Terrestrial Ecology. After two and a half months, the students leave the tropical paradise for Friday Harbor, WA. The coursework and research wraps up all they have learned over the year. There is a special focus on ecological questions and issues during this leg of the journey. Students are also encouraged to pursue individual research projects. Only three courses are taken over the two-month period, including the crowd favorite Marine Birds and Mammals.

Currently, there are 24 students enrolled for the 2014-2015 program. This group is one of the biggest that has ever participated, but Three Seas Program Coordinator and alumnus Liz Bentley does not see this number getting any smaller in the future. "The Three Seas Program is very well known, and as a result, has become more competitive over the years," says Bentley. While the program does accept non-Northeastern students, these slots are becoming extremely hard to come by because of the Northeastern undergraduate representation in recent years. In fact, Bentley has found that there are an "increased number of students who indicate that their decision to attend Northeastern was directly related to being able to participate in the Three Seas Program."

This program provides real, hands-on experience to students, developing skills such as DNA sequencing, underwater video transecting, and other skills that provide a strong foundation for individuals planning on going into research, or any other career within marine science. This practice and experience opens up more opportunities for careers, and gives participants a leg up in the competition for securing job positions. Furthermore, courses are taught by professors who have been involved in the program for, in some cases, up to

25 years. This opens up a venue for networking that every college student is looking for in order to move forward in their career search. Alumni of the program have been seen to become leaders in their fields, after being accepted into the best graduate programs.

Between the high level, demanding course work, frequent dives, lab work, and spending all of your time in close quarters with the same twenty or so people for almost a year, the Three Seas is a challenging endeavor. "The rigorous academics in Nahant, the fast paced classes in Panama and Friday Harbor, and the symbiotic living situations pushed us all - but I think we all agree that our Northeastern experience wouldn't have been complete without it and that it has been key in opening doors for us," Hollis Jones, a 2013-2014 Three Seas student, says. The program expands on social and academic skills simultaneously. The students appreciate the hard work though; Joelle Kilchenmann, another Three Seas student, claims, "It has arguably been the most valuable experience, not only socially, but in terms of my career and my life thus far."

The Three Seas Program has a website and blog where you can read more students' testimonials, watch videos made by the students, and keep up with what they are doing throughout the year. In addition, three NUScience writers will be participating in the Three Seas Program in the coming 2014-2015 year! Check out the NUScience blog at [NUScienceMag.com](http://NUScienceMag.com) in the fall to follow them on their adventures throughout this exciting and unique experience! ■



Photos courtesy of Three Seas Program photo gallery

# RED TIDE AT MORNING BIOLOGISTS TAKE WARNING

## *Algal Bloom Research at Woods Hole*

BY MATTHEW TYLER, MARINE BIOLOGY AND ENVIRONMENTAL SCIENCE, 2017

**W**oods Hole Oceanographic Institute (WHOI), located on Cape Cod, roughly 75 miles south of Boston, is home to a number of research labs. Every year, the labs hire about a dozen co-op students, whose studies can range from sandy beaches to the sea floor to salt marshes and everything in between. Aside from Northeastern's own Marine Science Center, WHOI is one of the only nearby places where co-op students can engage in marine science research in both field and laboratory environments. Shannon Jones, a Marine Biology student in the class of 2016, works in the Anderson lab at Woods Hole, where she aids in research related to the potentially harmful "red tides" caused by algal blooms. NUScience sat down with Shannon to talk to her about her time at the lab and her feelings about doing a co-op at WHOI.

### **Tell me a bit about the background of your work in the Anderson lab.**

The lab is one of the larger labs at WHOI, and it's run by Dr. Don Anderson. He studies harmful algal blooms, what we call "red tides." That's when a population of plankton, specifically dinoflagellates, grows too large and starts using up all of the nutrients and oxygen in an area, killing off other organisms, sometimes even fish. The dinoflagellates often produce toxins and lay down cysts that act as bacterial spores, allowing the next generation of algae to lay dormant through the winter. The organism we study most commonly, *Alexandrium fundyense*, produces a toxin called saxitoxin. It has negative effects on humans, especially when concentrated in filter feeders or fish.

### **What's an average day of work like at the lab?**

Most days, I take care of our massive stock of cultures. We have many strains of *A. fundyense* to keep around for experiments, as well as some

*Gambierdiscus pacificus* strains, cyanobacteria, and a slew of other harmful microorganisms. I count cells to measure the health of our samples, prepare field experiments, run indoor experiments, and help my supervisors with papers and proposals.

My favorite days are field days! We go out to the marsh and take a ton of samples and see how the bloom is progressing, and we help the national seashore folks decide when to close the shellfish beds to harvesting.

### **What does taking care of the stock entail, and what sorts of experiments do you run?**

We grow all our cultures in little flasks. Each one is a tiny amount of enriched seawater, and the culture is all the same genotype because they only reproduce asexually under the conditions we grow them under. This is intentional. We want them to be pure in order to isolate the genotypes and the specific variant of toxin each genotype produces.

Most of the experiments running right now relate to cyst deposition. We control for temperature in an attempt to understand what ends the bloom, how the cysts live until the next spring, and what activates the cysts and starts the next bloom. There are also a number of experiments involving the effects of saxitoxin on development and growth.

### **What's the most interesting thing going on that relates to your research?**

I think one of the coolest things I've learned about harmful algal blooms is the history. Dr. Anderson basically started the field of harmful algal blooms; he's been there for the entirety of it, so he knows how everything's evolved. It's really amazing working under the man who pioneered the field. Another major thing is the fact that the algal blooms are delayed this year, most likely due to the cold winter. It's interesting, because there are so many ways this could affect how

the bloom goes: it could be a bigger but shorter bloom, or it could be smaller, and this will also affect cyst deposition and how blooms happen for the next few years. We won't know for sure until we see it happen!

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“It's really amazing working under the man who pioneered the field.”

### **What's it like living in Woods Hole?**

I live in an apartment with three of the other five co-op students, who are involved in things like paleoclimatology research or the deployment of robots for long-term algal bloom monitoring in the Gulf. There isn't a ton to do at night or on the weekends, because Woods Hole is a small town, but we can go to the library, or the beach, and there's always opportunities to go to lectures and learn more at the lab. There's also bowling and trivia nights!

It's been a great experience so far, and I'm glad I've still got a month to go! I've really enjoyed my time co-oping at WHOI, and I definitely recommend that other people interested in Marine Biology apply for this position! Even if you're not in love with algae, you'll really learn to appreciate how cool the field is. ■

Photo courtesy of [tokyobling.wordpress.com](http://tokyobling.wordpress.com)



# Turning up the HEAT on climate awareness

BY SHANNON JONES, MARINE BIOLOGY, 2016

As carbon dioxide production increases worldwide, so does evidence that carbon dioxide is harmful to our planet. Students at Northeastern have developed a novel approach to combat this problem, starting with motivating a change in policy. DivestNU is a subcommittee of the Husky Environmental Action Team (HEAT), a student group at Northeastern. These students are interested in divestment, a nation-wide campaign that has one major goal: working with businesses, universities and corporations to move away from investing in the fossil fuel industry. The idea is to cut funding for fossil fuels by stopping new investments, and then moving money elsewhere to gradually remove financial backing.

With recent studies warning of the dangerous effects of climate change, such as rising seas, increased storm intensity, droughts, wildfires, and losses of biodiversity, some students argue that the most responsible thing to do as a group is to move away from fossil fuels and work to combat increasing carbon dioxide in the atmosphere. This is thought to be especially true of academic institutions, which some students think have a moral responsibility to protect our planet's future as recognized

advocates for higher education and global stewardship. As Austin Williams, a member of the executive board of HEAT, says, "Were Northeastern and other academic institutions to divest, we would witness a very public social stigmatization of the fossil fuel industry, stripping away at their political clout and shifting political discourse. Divestment won't solve the climate crisis, but it is how we may best leverage our position as educators and students to do our part."

“Divestment won't solve the climate crisis, but it is how we may best leverage our position as students and teachers to do our part.”

In the 2014 student body elections ballot questionnaire, there was an additional question: should Northeastern University undertake divestment from the fossil fuel industry, stopping

all new investments in the fossil fuel industry and guaranteeing that the University will no longer support this industry within five years? For the first time in nine years, the minimum of 20 percent of the student body voted within the allotted time span. Out of 3,625 student votes, 75 percent of students agreed that divestment should be a priority of Northeastern. This does not yet have a direct impact on the University, but it does express the desires of the students to the administration.

If you're interested in divestment, consider stopping by a DivestNU meeting this fall. You can also help by raising awareness and discussing divestment with your friends, professors, or student groups. In addition, Williams suggests, "come out to our actions and events on campus. This is a great way for students who can't provide a long-term commitment to show their support, and it helps far more than most realize." ■

Image courtesy of divestnu.org

## SERVICE LEARNING AT NORTHEASTERN

BY KRISTEN DRUMMEY, BEHAVIORAL NEUROSCIENCE, 2017

When I received my schedule the summer before freshman year, I was curious about one course in particular: Inquiries in Cellular and Molecular Biology. Not sure what to expect, I found that the class covered quite a lot. Apart from a traditional classroom learning component and a research project that culminated in a poster presentation, the class had a service-learning requirement.

Service-learning at Northeastern is a form of experiential learning that allows students to get out into the community and give back, utilizing knowledge and techniques that they are learning in a corresponding class. The Inquiries class I took placed students with different organizations in the community, including local schools and

clubs, with the goal of sharing a love of science and a basic understanding of biology. I worked with the Science Club for Girls, an organization that promotes science, technology, engineering, and math education in young girls through mentoring and accessibility to science programs. Throughout the semester, a few of my classmates and I met with high school girls in the club and helped them with their college admission essays, application materials, and deadlines. It was truly inspiring to work with young women who were so motivated to go on to college in science-related fields, and I'm grateful that taking a service-learning course gave me the opportunity to do so.

Although I learned many important skills

in my Inquiries class, such as how to read a scientific paper and present a research poster, I think that the service-learning component of the class was the most rewarding. College is busy—there are always events, assignments, and other commitments vying for attention and it's easy to get caught up in all of it. However, one of the most rewarding experiences of my college career so far has been taking a short break from all of the craziness on campus and working with those girls. Northeastern is very much a part of a bright and vibrant Boston, and a service-learning course is a fabulous opportunity to contribute and give back to the community.■



# Circadian Disruption and Enzyme Obstruction:

## A Student's Perspective on Undergraduate Research

BY MATTHEW DEL MASTRO, BIOLOGY, 2017

Xavier Jean is a biology student whose passion for research has driven him to become involved in a variety of exciting scientific opportunities at Northeastern and beyond. NUScience had the opportunity to sit down with Xavier before he graduated to discuss research, co-op, and his



Image courtesy of Xavier Jean

### What type of research have you been involved in at Northeastern?

For the past three years, I have been involved in undergraduate research with Professor Chris Richardson. We investigate circadian rhythms, biological changes that occur on approximately 24 hour cycles, in mice and hamsters. Disruption to circadian rhythms impacts many systems of the body, and we look at how circadian disruption affects the metabolism and immune function of these animals. I began in October of my freshman year and continued throughout my time at Northeastern. Overall, it has been a very intensive experience.

### How did you initially get involved in undergraduate research?

I interviewed a professor as an assignment for my Introduction to Biology class. Afterwards, I emailed the professor and asked if he needed help in his lab. I began working in the lab a month after I arrived at Northeastern.

### What co-op experiences have you been involved in during your time at Northeastern?

I did a co-op at a company called Celgene, during which I focused on oncology research and drug discovery. We tried to determine which compounds were the most effective

at impacting specific targets in the cell. We looked at compounds that could inhibit certain enzymes called kinases, and we examined how this inhibition affected the growth of cells. We also had to make sure that the compound was specific to the particular kinase. The compounds that we investigated were covalently binding inhibitors. These compounds form permanent covalent bonds and continually inhibit proteins. This type of inhibitor may make an effective drug, and this research has applications to finding new methods to cure a diverse variety of cancers.

My responsibilities included maintaining cell cultures, performing biochemical assays such as ELISAs, developing assays for reporter proteins, and performing western blot analyses to analyze results. I also worked with proliferation assays, biochemical assays that test how well cells are growing on different compounds.

### Did you always know you wanted to go into this field?

I didn't. My co-op experience made me realize that I was really interested in oncology. The field is so complex, there is so much research being done, and there is a great potential for future innovation. The co-op made me realize that I wanted to attend medical school and got me highly interested in oncology.

### How did working on co-op compare with doing research at the university?

In industry, it is less budget-intensive. In the lab I worked in at Northeastern, we had a smaller budget and we had to minimize our costs. In industry, we had to get the results no matter how many tests it took. In academia, the main goal is to publish a paper. In industrial research, the main goal is to get a product. It was good to get both experiences; they are two very different environments.

### Did your co-op experience influence your development as a researcher?

Absolutely. My time in industry introduced me to data analysis and statistics that I had never used before in my lab here. When I came back I had new knowledge and new ways of thinking. My co-op was focused more on the molecular level, while my research at Northeastern was more behavior-based. Applying my new knowledge of the molecular level helped me better grasp the concepts at the behavioral level.

### Beyond your research, what have been some of your favorite experiences at Northeastern?

I participated in the alternative spring break volunteering program for three years. The first year I went to Arkansas. For the next two years, I was a team leader on trips to the Grand Canyon and Ecuador. You get to help out different people and experience different cultures. This has definitely been the most fun part of my undergraduate career.

### What are your plans for after graduation?

I will be working at the company where I did my co-op for a year, after which I will be applying to medical school.

### What advice would you give to an incoming freshman interested in research?

Don't be afraid to put yourself out there and contact people. Sometimes people won't be available to work with you, but you have to keep trying and working. If you want to do research, make sure you talk to the professors doing the research that you are interested in. ■

# Map my Mind

BY KATIE HUDSON, MARINE BIOLOGY, 2017

In the opening scene of the 2013 blockbuster film *Iron Man 3*, scientist Aldrich Killian shows Pepper Potts a hologram containing a live feed of his brain activity, so accurate that they are able to watch packs of nerves fire. While this technology currently exists only in the Marvel Cinematic Universe, one Northeastern student is working on developing it for today's world.

Prnay Chopra is a third-year behavioral neuroscience major at Northeastern University currently on co-op at Harvard Medical School, right around the corner from Northeastern's campus. In the Reid Lab within the Department of Neurobiology, Chopra is working with other researchers to further develop an understanding of the connections within the brain. The research team is not focused on the anatomy of the brain and its differing sections, an area which has been covered extensively by neuroscientists. Instead, their focus is on mapping the connections within each section of the brain. These can vary between individuals for multiple reasons, including genetics, the environment, and how much an individual learns. Currently, the team is analyzing the visual cortex region of the brain in rats and the olfactory (smell) region of the brain in the fruit fly *Drosophila*.

“I know that because of my co-op, my career will be positively impacted in the future, and I am really grateful to Northeastern for the opportunity!”

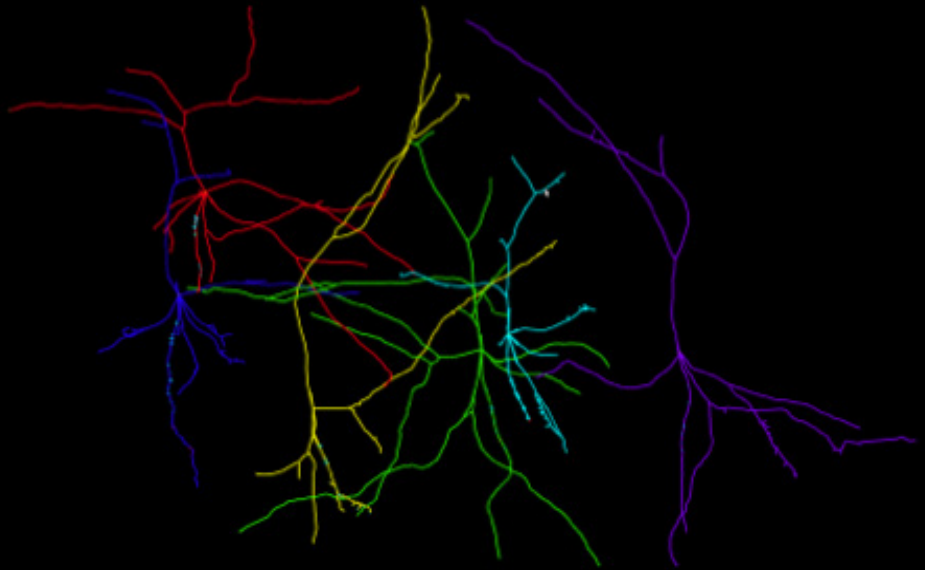
Using transmission electron microscopy (TEM) and a visual annotation program called CATMAID (Collaborative Annotation Toolkit for Massive Amounts of Image Data), Chopra is able to trace a neuron within those in the data set. He traces the dendrites, axon, and all connections that the individual neuron makes with those surrounding it. This creates a 3D map of the individual cell and those around it. The team Chopra works with is then able to scroll up and down in the third dimension to determine how the neurons are arranged within different layers of the brain. The ultimate goal of the project is to create a 3D “network map” of the regions of the brain being studied. The researchers hope

that they will eventually be able to use the map in conjunction with functional data, “so we can see how and when different connections are used in response to certain activities or stimuli.”

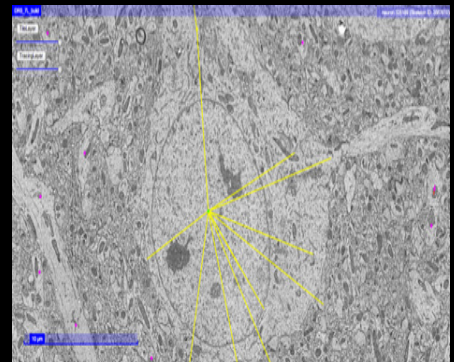
In addition to participating in this research project, Chopra has also attended neurobiology seminars, faculty talks, dissertation presentations, and guest lectures hosted by the Department of Neurology. Many of the guest lecturers are some of the country's top neurobiologists. Chopra says that his supervisor “encourages [the researchers] to attend as many of these as we can.” In addition to these presentations, every Friday the various labs within the department present their current research to each other in a meeting that, like many held by Northeastern student organizations, is accompanied by free pizza. The Reid lab is also part of a scientific journal club with another lab in the department. In these weekly meetings, the members of the lab discuss relevant academic papers with Harvard Medical's distinguished faculty members and either praise or critique them.

By attending these lectures and meetings in addition to working on the project in the Reid lab, Chopra has been exposed to many fields within neuroscience that he was not aware of before starting his co-op. As a result, Chopra is looking

forward to returning to classes and bringing his new knowledge to the classroom. As for his future beyond the classroom, Chopra says, “I know that because of my co-op, my career will be positively impacted in the future, and I am really grateful to Northeastern for the opportunity!” ■



3D view of the first neurons that Prnay and the other co-ops traced. The blue dots on some of the processes indicate incoming synapses onto the axon. Image courtesy of Prnay Chopra.



A view of what the EM data looks like, with the cell body of a neuron in the center and dendrites extending outwards. Image courtesy of Prnay Chopra.



# Decoding the Complexity of Language

BY CLAUDIA GEIB, JOURNALISM AND ENVIRONMENTAL SCIENCE, 2015

Rachel Tenenbaum is a perfect example of the difference a single class can make for college students. As a freshman, Tenenbaum registered for Linguistics 101 on a whim. Now a rising sophomore, Tenenbaum has added a minor in Linguistics to her Psychology major, and has immersed herself in researching the depth and complexity of human communication.

"I find [linguistics] fascinating because language is something that I think we take for granted," said Tenenbaum, a native of Long Island, New York, and a member of the class of 2018. "Many of us fail to realize how complex it is, and how many different factors go into it in order to produce what we understand to be language. There is so much we have yet to learn about language, and there is so much we can learn from languages around the world."

After completing Linguistics 101, Tenenbaum agreed to help her professor, Patrick Jones, with one of his ongoing research projects. She quickly became absorbed in the study of the Bantu language of Kinande, spoken in the Democratic Republic of the Congo. Jones and Tenenbaum are constructing a database of analyzed Kinande utterances from a Kinande-English dictionary to break down the configuration of this complex tongue. The researchers are examining the organization of sounds, language structure, and tonal system.

Like other Bantu languages, Kinande utilizes a complex tonal system, presenting a particular challenge to linguists. Within this system each

morpheme—the smallest unit in a word that contains meaning or grammatical function—of a word can appear in different contexts depending on the tone pattern of that word. This context often changes when tones move from their original, assumed position to the vowel, or even word, before them. This process, and others that can cause tones to shift, create unusual "cross-word" phenomena within the language. The goal in constructing the Kinande database is to be able to consistently identify each morpheme and pair it with its unique meaning.

The biggest thing she has learned from her research, Tenenbaum reflected, is the vast complexity and variety of language. "Kinande is very distant from English, so it's been a difficult process to understand its characteristics that English doesn't share; mainly, its tonal system," Tenenbaum explained. "I also really value my work with Patrick, because I've learned so much about how research is conducted and each step that is necessary to follow. I feel especially lucky because I started research so early, so I will be able to use this experience later."

Tenenbaum recalled being nervous when she began working with Jones; she had never participated in a research project before, or worked closely with someone who had expertise in one subject. "[Professor Jones'] patience and intelligence made it easy for me to learn, and the process has been helpful to me as a student and as a person," Tenenbaum said. "Not only has he taught me specific things about the

language, but I've learned valuable information about presenting research, analyzing data, and being thorough and organized. His guidance has been indispensable in my work, and I've learned a lot from working with him."

The database is still under construction while Jones and Tenenbaum continue to add entries from the Kinande dictionary. Their goal is to write a computer program that will automate the database. They also hope to open the database to the public, so that other researchers interested in their work can access it and utilize the knowledge they have gained for their own research.

Meanwhile, Tenenbaum is entering her sophomore year with a jump-start on research experience. This young language enthusiast, however, remains open to many career possibilities. She hopes to enter a field that incorporates her Linguistics minor as well as her second minor in Women's, Gender and Sexuality Studies. No matter where her career path leads, Tenenbaum knows that her fascination with language will remain with her. When asked what language she hopes to explore next, Tenenbaum enthusiastically replied, "Russian! I did a project on it for my Linguistic Analysis class, and my boyfriend and his family are native speakers. It's such a beautiful and fascinating language, and although I've heard it's difficult to learn, I'd love to give it a try." ■

## RISE : 2014

BY JENIFER OBRIGEWITCH, BIOLOGY, 2017

Every spring, Northeastern hosts its annual Research, Innovation, and Scholarship Expo (RISE), to showcase the projects of both its undergraduate and graduate students as well as Northeastern's distinguished faculty. The expo is open to students in any college, major, or year. To attend, students must first submit an abstract. If the abstract is accepted, the students then construct and submit a poster outlining their work. At the expo, they present their posters to their peers, Northeastern's faculty and staff, and a panel of judges. The panel is made up of accomplished men and women from a wide variety of fields all of whom "represent industry, investment, political, and media personnel, creating a dynamic networking environment which promotes visibility and enables new opportunities."

Winners are chosen by the judges in a variety of categories at both the graduate and undergraduate level.

Within the College of Science, four students were recognized. Douglas Townsend,

a chemistry major, earned the undergraduate physical and life sciences award for his work on the "Application of Spectral Cytopathology as a Diagnostic Tool for Barrett's Esophagus." Philip Strandwitz, a PhD candidate in the Biology department, won the best video pitch award for his project on "GABA Modulating Bacteria in the Human Gut Microbiome." For her project titled, "Optimization of pharmaceutical properties of a lead compound targeting human African trypanosomiasis by nano formulations," Jennifer Woodring, a Chemistry PhD candidate, won the graduate physical and life sciences award. Mollie Ruben, a Psychology PhD candidate, won the graduate social sciences, business, and law award for her project titled "Perceived Control of Pain Contributes to Reduced Pain Ratings and Accurately Recalling Pain."

Many other students from the university's other six colleges were recognized as well, both at the graduate and undergraduate level. The innovation award was given to Chris Marciano, Ryan Matthew, and Mark Munroe for presenting

"The Millennial Village." The entrepreneurship award was presented to Amir Farjadian, Qingchao Kong, Carlo Sartori, Matt Gowie, Elica Farjadian, and Constantinos Mavroidis for their "Interactive Cyclists Accident Prevention System (iCAPS). Chris Germano, Duncan MacLeod, and Justin Yang earned the undergraduate computer and information sciences award for their work, "Minutes to Midnight: Promoting Creation, Culpability, and Critical Thinking." The undergraduate engineering and technology award was won by David Potter and Sara Al-Otaibi for their "Resilient Structures." The undergraduate health sciences award was presented to Emily Nasson, Marin Little, and Lucy Burrage for their "pilot project in preparation for the randomized control trial: 'Moving on After Breast Cancer.'" The undergraduate interdisciplinary award was given to Matt Gowie, Maple Kuo, Craig Berry, John Reardon, and Nicole Nussbaum for their project entitled "WeTeam." ■

# Sir Richard Roberts:

## Nobel Laureate, Knight, and Northeastern Professor



BY EMILY ASHBOLT, BIOMEDICAL PHYSICS, 2017

Photo courtesy of Brooks Canaday, Northeastern University Marketing and Communications

“One of the problems with teaching students now,” said Sir Richard Roberts, “is that you fill them up with facts and knowledge and then have them just regurgitate this information, and that is not an effective way to have them learn processes.” Leaning back in his chair in his Ipswich, Massachusetts office, overlooking the lush grounds of New England Biolabs (NEB) and the enzyme reagent lab where he has spent the past seven years and is Chief Scientific Officer, Roberts looks far from how someone might picture a knighted Nobel Laureate. “I am a big believer in discovery-based learning.”

Discovery-based learning is certainly a field that Roberts is familiar with. Growing up in southwest England, Roberts learned much about science from making fireworks behind his parents’ house. “My parents were fairly uneducated,” he shared. “I don’t think they knew what I was doing. By the time I got to study chemistry in school, I’d seen all of it.”

Sir Richard Roberts was named as a Northeastern Distinguished University Professor at the beginning of 2014, and is hoping to inspire the next generation of molecular biologists.

Roberts comes to Northeastern with connections to another of the university’s recent additions: the Ocean Genome Legacy (OGL), a non-profit marine research institute and genome bank dedicated to exploring and preserving aquatic biological diversity. OGL used to be located at the New England Biolabs. However, land-locked Ipswich made far less sense for an oceanic project than its new location will: at Northeastern’s Marine Science Center, perched on the ocean’s edge in Nahant, Massachusetts. Roberts hopes the move to Northeastern will be stabilizing for OGL, giving the program attention it couldn’t have at the Biolabs. “I’d love to see a stable endowment come out of it. It also provides the opportunity

for a lot of marine resources.” Northeastern’s Marine Biology department is already one of the most opportunity-providing tracks, with many unique ways for undergrads to get heavily involved in working and researching, such as the Three Seas program. Commented Roberts, “There are lots of people really interested in this type of work, and the potential to make lots of connections around the world.”

However, OGL is not just for marine biology majors. Roberts received a Nobel Prize for Physiology or Medicine in 1993 for the discovery of split genes, the capability of gene structures to hold DNA material in several, well-separated segments. As a molecular biologist himself, he recognizes OGL for having significance for anyone interested in genes and molecular theory.

“One of the nice things about biology is that we don’t know very much,” Roberts said. The implication of this fact is that there are many ways to make discoveries, even at the undergraduate level. “There are lots of opportunities in science, and people can really choose what they want to do.”

Robert’s dream is to bring new genome sequencing, and, even more importantly, the determination of gene functions, into regular biological studies. “There are already some universities for which this is an integrated part of their curriculum,” said Roberts. “If we don’t make serious effort, we are not going to learn about it.” Many genes have yet to be decoded, and among those that have been, the larger significance of many is unknown. “This is a huge problem,” Roberts recognized.

However, there is an upside, he added: “It is also an area where undergraduates can really have an impact.” Northeastern strives for innovation, and tucking regular discoveries into standard scheduling definitely appeals. For Roberts, at least, knowing how to do research,

something that one must learn hands on, and associated field work is far more important than the “regurgitation” of standard studies.

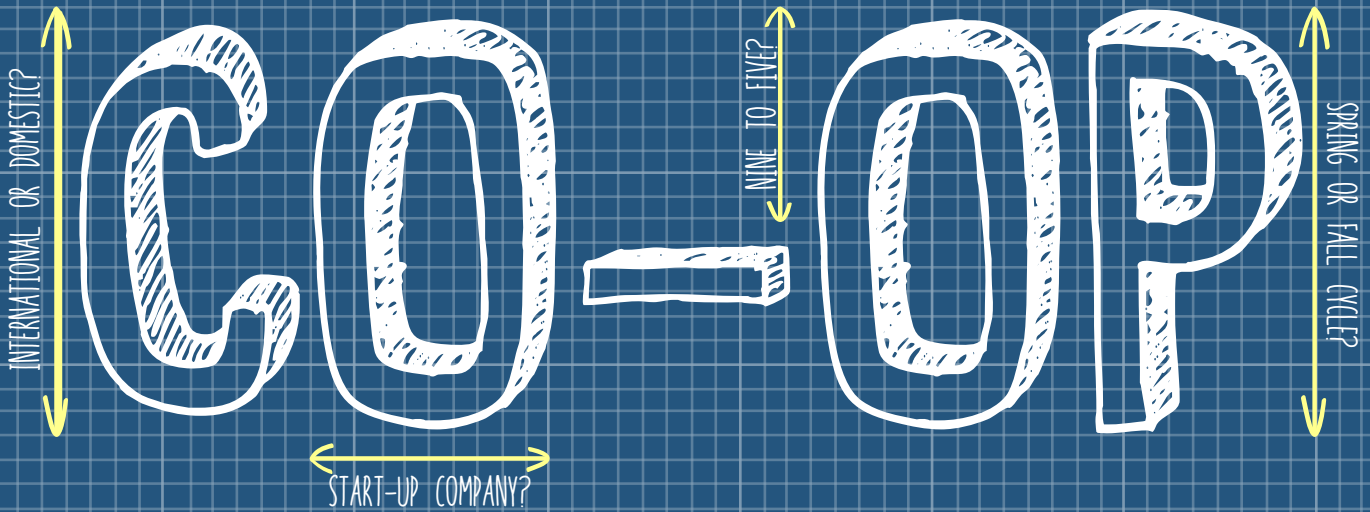
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“One of the nice things about biology is that we don’t know very much... there are many ways to make discoveries, even at the undergraduate level.”

Roberts detailed that his average day has him waking up at 6 a.m. and working on his research all day at NEB, as well as both before and after work at home: “I still do research; most of my time is still spent doing research.” He recognizes the immense importance in this kind of education for not just undergraduates, but anyone studying science. As he dives into his work at Northeastern, Roberts feels that his personal area of expertise, genes, will serve as an important tool for students: “One, it’s really good for undergrads to be involved in learning about how to work with genes. Two, this is an area in which [students] have the potential to make quite significant contributions to science, if the type of research is tailored properly.”

For Sir Richard Roberts, research is less of a method and more of a way of life. It’s the sort of work that keeps an individual chasing after what they are passionate about. “Seeing things for the first time—things that never have been seen before—it doesn’t matter whether they are little things or big things, it’s exciting.” ■

# MAKING YOUR OWN



BY RALPH EMILIO PETERSON, BEHAVIORAL NEUROSCIENCE, 2016

Northeastern students dwell within the hub of research and commerce. Through the co-op program, Northeastern provides talented students with opportunities to develop their skills and solve cutting-edge problems. Despite Northeastern's many co-op offerings, some students prefer to seek opportunities outside the university's network. Those students are encouraged to make their own co-op. To some, this may seem like a daunting and even impossible task, but Northeastern has ample resources to help students every step of the way.

Jacob Walker, student service representative for biology and behavioral neuroscience, is a Husky alumnus as well as a former make-your-own-co-op-er. When asked what it was that made him want to create his own co-op, Walker replied, "I was a psychology student and was interested in working in a residential facility. There were co-ops available at the time that met this criterion, but they weren't with the population in which I was interested." Walker was interested in working with teenagers and young adults in a residential facility in Western Massachusetts. "These were two relatively specific things, so I took it upon myself to identify employers that met these two criterion," he said. Walker started by networking with his family and friends, and found that his friend's father served on the board for the New England Center for Youth and Families, where Walker eventually chose to do his co-op.

Walker's colleague and fellow student service representative, Cheryl Arruda, stressed the importance of starting to network for co-op as early as possible. "Students need to be their

own advocate," she said. "Start telling family, friends, classmates, teammates, co-workers, and neighbors about your co-op/career goals now. Often times you can find a connection within your own network that works within your desired field."

Walker's co-op advisor during his time at Northeastern, Michelle Israel, played an integral role in helping him on the path to his co-op. With Israel's help, Walker was able to explain to future employers about the co-op program and why he decided to develop his own co-op. Israel is currently the co-op advisor for behavioral neuroscience students and has helped many students develop their own co-ops during her tenure at Northeastern.

Another example of a successfully self-developed co-op is Ashley Kellar, a recently graduated pre-veterinary student, who through her first co-op started her own veterinary program with Safari4U, a conservation program in South Africa. Safari4U is designed for interns, volunteers, and young professionals looking to enter the fields of veterinary science, animal welfare, and animal management. The program provides a theoretical hands-on approach to learning as it applies to African wildlife, agricultural livestock, and domestic animals. During her first co-op Kellar worked in South Africa on several conservation projects with Safari4U.

Since she was an animal lover and wanted more hands-on experience, Kellar decided to work with Safari4U to create a veterinary program. To do this, she approached Safari4U's

director and worked with him to design and advertise the veterinary division of Safari4U, which ran for the first time in 2012 and was wildly successful. Currently, Kellar is in South Africa continuing her work in conservation and further developing the veterinary program.

When a student makes his or her own co-op, he or she is often the first Northeastern student to work for that employer. This opens up opportunities for future Northeastern students to follow in their footsteps and make the opportunity a permanent part of Northeastern's already immense co-op network. ■



# Affective Science on Campus

BY JORDYN HANOVER, BEHAVIORAL NEUROSCIENCE, 2017

Image courtesy of affective-science.org

The Interdisciplinary Affective Science Laboratory (IASL) is one of the many opportunities available on campus for Northeastern University students. In this laboratory, teams of researchers study the different ways that affect can influence daily function. We use the term “affect” to describe the emotional state of being, and thus our studies stem from this concept of an affective state. There are always a multitude of studies being run from the laboratory space, which include testing human participants and collecting and analyzing data.

I was fortunate to work with two PhD’s in the laboratory doing two very different things throughout the course of this past year. During my first semester, I learned how to use the Analysis of Functional NeuroImages software (AFNI) to analyze brain scans from participants in a previously run study. This was particularly relevant to my major. As a neuroscientist, one of the most important things I wanted to learn was about the anatomy of the brain and how to read different scans, such as MRI machine scans. In this instance, the brain scans that I analyzed and processed using AFNI were from a recent collaborative study between our lab and another laboratory in Israel.

In this study, people watched emotion-inducing film clips from inside an MRI machine. During the screening of the clips, participants’ brain activity was recorded, both in strength and location. Our analysis began to identify whether several patterns and areas in the brain were activated by the induction of certain emotions. For example, participants watched three film clips that were intended to induce three different emotions – fear, sadness, and happiness. Another one of our research goals was to see if the patterns of activation changed based on which emotion was induced. This research was very interesting because it involved something that occurs in everyday life – watching a movie or a TV show – and began to determine the way the brain reacts to feeling certain emotions because of, or empathizing with, the various characters on screen.

During my second semester of work at the IASL, I learned how to run participants in a different study. This involved learning the

institutional review board protocols required for interacting with human subjects, which is a useful certification to have as a neuroscientist. Another aspect about my major that interested me was human interaction, and the work that is done in order to obtain data about the brain to analyze. Being able to take charge of a study and walk a participant through actively gathering data is a very important aspect of the type of research I am interested in, so this was a perfect opportunity.

In this experiment, participants who came into the lab would have their eye movements tracked while viewing various facial expressions on a computer screen. These facial expressions were taken from photographs of supporting-role actors in an effort to make the expressions more natural, as opposed to the over exaggerated expressions typically used. As the faces were presented, about half were also shown with various contexts. After each face, or face and context, was presented, the participant wrote an emotion word describing what he or she had just seen or read.

facial expressions is an extremely important and useful tool.

There are dozens of other studies being run in the laboratory, which draws its undergraduate Research Assistants from majors like Psychology and Behavioral Neuroscience. For example, there is a study being done about food and vegetarianism, and if certain people are more inclined to buy specific brands of a food item based on several variables. Another study, which I actually participated in, involves attaching mirrors at several pulse points and viewing a series of images and tracking each participants pulse rate based on a picture being shown for only a few seconds. During this experiment participants also view images of random people holding block objects, and they have to determine if the person is a threat or not based on the object in their hand – a gun or a cell phone. Again, the image here is only shown for a second. This mirrors how people have to respond in a fight or flight situation, by either remaining calm and not reacting, or pressing a button to “fire” back.

These examples of both studies I’ve helped run and studies I’ve observed as a participant, show the wide variety of research being done within just one laboratory on campus, as well as some of the different applications that our research has on every day life. ■

“ We use the term “affect” to describe the emotional state of being, and thus our studies stem from this concept of an affective state.”

Eventually, we hope to determine if, and how, the way a person looks at a face changes when they have a contextual background for the expression. For example, just from performing the experiment on several participants, I was able to notice certain similarities in the way people changed their interpretations of faces based on whether or not there was context. From passing friends on the street to security training protocols, understanding how we process

# Fractyl's Fight Against Type II Diabetes

BY JOSEPH ZIMO, MECHANICAL ENGINEERING, 2015

The work being done in one quiet and unassuming office on the Charles River in Waltham, MA, is beginning to make big news across the world. My third co-op was there, at a venture-funded start-up by the name of Fractyl Laboratories, which is working with Type II Diabetes.

Type II Diabetes, or T2DM, affects 350 million people worldwide – and that number is growing at an alarming rate. T2DM is typically developed in adulthood and disrupts the body's ability to manage blood sugar levels appropriately. Type II diabetes is hard to control, even with multiple medications, and symptoms tend to worsen progressively. The estimated cost of diagnosed diabetes in the United States was \$245 billion in 2013. Government programs such as Medicare and Medicaid bear nearly two thirds of this cost. This disease is a heavy burden on all involved. A long list of health conditions can develop as a result of type II diabetes – including heart attack, stroke, blindness, and amputations. Fighting the disease has historically been a losing battle, on both an individual and societal basis. There are no treatments that treat the root cause of the disease, as the root cause is still not understood. Patients are expected

to modify their diet and exercise habits, take multiple medications, and eventually monitor their blood sugar multiple times daily, using insulin injections. Managing T2DM effectively takes a full-time commitment for the rest of the patient's life, and inappropriate medication dosage or timing can be life-threatening.

Fractyl's revolutionary, non-invasive procedure, Duodenal Mucosal Resurfacing, targets the intestinal hormonal changes that occur in diabetic patients. Though much of the research hasn't been released to the public as of yet, treatment results for Fractyl's procedures are continuing to show positive data, and it has been fascinating and engaging to be a part of the company for six months.

My co-op experience at Fractyl has primarily been focused on both console and catheter research and development. Because of the start-up atmosphere I have found it much easier to get involved with other meaningful projects that were not included in the job description. In addition to typical mechanical engineering duties like design, CAD, testing, and brainstorming, I have found meaningful and important duties for the company in generating and analyzing videos of the early human

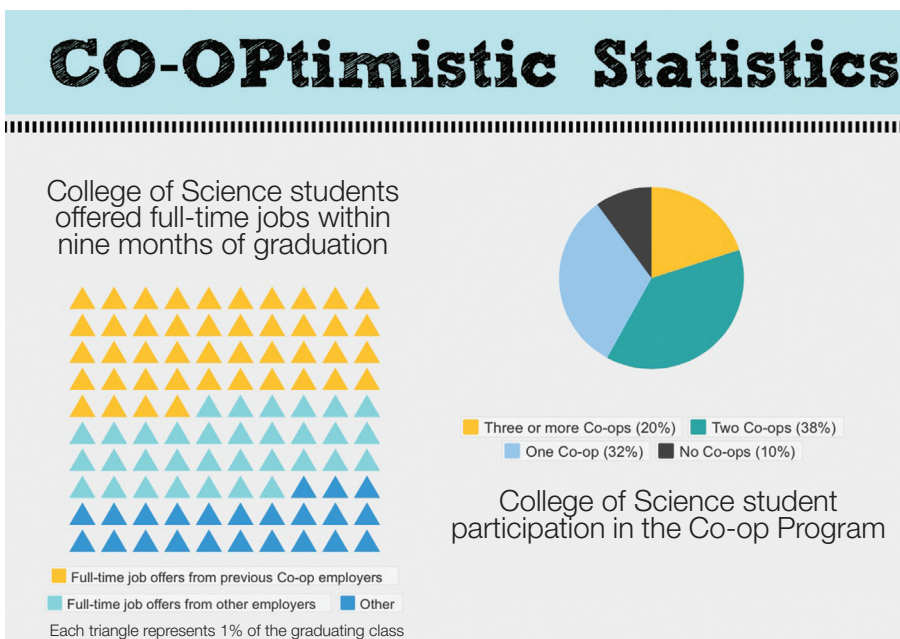
procedures, as well as coordinating an order of a 3D printer to increase the company's rapid-prototyping capabilities.

Working at a small company was a huge change from my first two co-ops, which were in much larger companies. I have found that the work being done feels so much more meaningful and important when working at a start-up. The atmosphere and comparatively small engineering staff lends itself to a much more focused and community-driven environment, which is bringing the company success and making a big difference in the fight against type II diabetes.

“ I have found that the work being done feels so much more meaningful and important when working at a start-up.”

Ordinarily, taking a position at a start-up company is seen as a risky career move, with great potential for benefit or disaster. One of the best advantages of taking a risk with my co-op has been experiencing what working at a start-up is like first-hand before even completing my undergraduate education. Following my five-year program graduation, I have the ability to make a much more educated decision on where I want to take my professional career. Because of the co-op program, I have relevant experience working in the biomechanical field at both large companies and small start-ups. The value of this experience cannot be emphasized enough.

Fractyl's amazing developments have been incredible to work on. Having the opportunity to see and impact such a revolutionary device and procedure has made going to work every day an exciting and meaningful venture. To learn more about the company and what they do, please visit their newly updated website at [www.Fractyl.com](http://www.Fractyl.com), or look out for open co-op positions beginning in spring of 2015! ■



All data comes from the Survey of Recent Graduates



Photo courtesy of Northeastern College of Science

## Interview with Dean Murray Gibson

BY NATASHA MATHUR, BEHAVIORAL NEUROSCIENCE, 2017

**D**ean Murray Gibson has been the Dean of the College of Science at Northeastern for four years. As head of the College of Science, Murray is kept busy but was able to take some time to share with NUScience what he values most about Northeastern.

### **What is your background in science, and in what part of the field are you most interested?**

I have a background in physics. I grew up in Scotland, received my bachelor's degree from the University of Aberdeen, and earned my PhD in physics at the University of Cambridge. After my PhD, I worked for IBM Research as a post-doc until 1980 and then I joined Bell Laboratories in New Jersey for 11 years.

My area of interest is nanoscience. For my research, I use tools such as electron microscopes that look at the structure of materials on the atomic scale. I'm a materials physicist studying how atoms are organized in materials and how the materials' properties are related. Bell Labs made me appreciate the concept of interdisciplinary research; pulled together, we forgot who was a physicist and who was an engineer – two people with different backgrounds can have revolutionary ideas one person could not have had.

In 1991, I became a professor at the University of Illinois and worked there for seven years building a research group that trained 13 PhD students. In 1998, I moved to Argonne National Laboratory and in 2001, I became the Director of the Advanced Photon Source. I was seeking a new opportunity when I was contacted about the founding dean position at Northeastern's College of Science. The more I learned about the position, the more I liked it.

### **What do you think the benefit of research being available to students is, in respect to showing them different paths they can take with their careers?**

I'm a very strong believer in coupling research and education. I often tell people that if you love science, you want to do it, and doing science is research. Science is a tool for discovering knowledge, so the people who are most excited about science and most creative are doing research. Here in the College of Science, we

choose faculty who enjoy both teaching and research. These leading scientists are the people you want to be involved in the education process, because they provide students with information and experiences that go well beyond what they can learn in a book.

### **Is there any specific research project on campus that you're interested in and makes you think "wow?"**

One example is our big initiative in urban coastal sustainability, where we're assembling a group of interdisciplinary scientists—ecologists collaborating with engineers and policy experts—aiming to develop sustainable cities by the sea.

To me, as Dean, it's exciting to vicariously be a part of this innovation. I view my job as a facilitator, and I can promote science beyond the limited realm of my own research. We have a lot of faculty and students doing exciting things and I really enjoy going to presentations and learning about the impact of our work.

### **How do you think co-op helps Northeastern students in their future endeavors, whether it be furthering their education or getting a job?**

Co-op is a key aspect of Northeastern. Of course, co-op is a route to a great resume and a career, but it's more than that. What people don't realize is that the world outside universities has challenges and tools that academics have never dreamed of. We all know that commercial innovations can be spawned from university research, but at Bell Labs, I learned that even fundamental research can be stimulated by the tools and approaches that come from the technological world.

Co-op helps you find your passion while you are still being educated. It intellectually illuminates what you are learning in the classroom and renders you very well qualified for what you want to do. It's the best way to learn science.

### **How does the College of Science ensure students receive individual attention?**

We have professional academic advisors who advise students on course options right from the get-go. We have faculty advisors within the major, who can give you advice and guidance on your career track as you seek your passion. We

have co-op advisors who help you find a good job match based on your major. We also have a team of staff and student mentors who support students who are having trouble academically. As a private university we focus on success, and our retention rate is above 95 percent.

### **How do you think Northeastern provides what students are looking for in colleges nowadays: an entire package, including the atmosphere and faculty?**

We have the ingredients of a great education, with faculty who are not only researchers, but also committed teachers. We have a very nice campus in the city; it's self-contained and attractive to students because we get the best of both worlds. We want all students to be successful and work with them individually. We also have experiential education, which we deliver in a very unique way. In my opinion, it's the best way to learn.

### **Where do you see Northeastern in 10 years?**

I think our research profile is going to rise; it's critical for undergraduates to have cutting-edge research opportunities. The quality of the students has continuously gone up, and I don't think that's going to slow down. We are constantly evolving as we add to our faculty, which allows us to deliver the education our students are looking for. We are also carrying out research that matters to society, such as drug discovery, sustainability, and cancer research.

We are working to couple co-op more closely to the classroom and remain at the forefront of experiential education. In addition, all of these "ingredients" will help grow our endowment, which will allow us to help even more students with financial aid.

### **Is there any advice you would give to incoming College of Science students?**

Take risks! We have a safe environment and we want people to come out of their comfort zones and try things to find out where their passion really lies -- that's what college is about. Become comfortable trying different things -- you may not find out something about yourself if you don't try something new! ■

# National Honor Society in Neuroscience Comes to Northeastern University

BY JESSICA MCINTIRE, BEHAVIORAL NEUROSCIENCE, 2015



The Nu Rho Psi National Honors Society is one of the newest student groups on campus contributing to the College of Science community. The Northeastern chapter is the second chapter in Massachusetts, and officially became a Northeastern student group during the spring 2014 semester. This national society focuses on professional and academic excellence in neuroscience. It recognizes students who have achieved excellence in

scholarship, provides a network for students, faculty, and professionals in the field, and emphasizes service to the community and awareness of neuroscience-related issues.

The chapter here at Northeastern is still young, but has growing plans for the next academic year. Top on the list are events meant to promote building relationships with the other students and faculty on campus studying the discipline. These include socials with the up-and-coming Boston University Nu Rho Psi chapter, a boat cruise, and a retreat to Northeastern's Marine Science Center in Nahant. Philanthropic efforts will also be on the rise, as the group is building relationships with philanthropies such as Autism Speaks, the neuroscience technology company interaXon, and local middle schools and high schools. Current members of the group are very

excited for the society to extend its reach in the school and the community. "I can't wait to see the camaraderie within the group grow and expand!" said Nicole Comfort, president of the club for the 2014-2015 academic year.

Application to the society is open to anyone meeting the requirements: a major or minor in neuroscience, completion of at least three semesters, completion of at least 12 semester hours of neuroscience-related courses, and a cumulative GPA and neuroscience GPA of at least 3.5.

Although less than a year old, the Nu Rho Psi Massachusetts Beta Chapter has come a long way in providing more opportunities for neuroscience scholars to be more involved on campus and in the community, and it has a bright and productive year in store. ■

Image courtesy of brainexchange.com

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## Looking at Interdisciplinary Learning Through PRISM

BY GWEN SCHANKER, JOURNALISM, 2018

Since interdisciplinary learning first started to grow in the 1960s, scholars have recognized the benefits of approaching a scientific topic from multiple perspectives. Knowledge of physics is required to answer questions in chemistry, and biologists often carry out mathematical calculations before drawing conclusions.

At Northeastern, interdisciplinary learning is represented in multiple ways, including the university's PRISM program. The program, supported by the National Science Foundation (NSF), allows first- and second-year students to pursue careers in science and math through interdisciplinary seminars and activities. The exposure to different perspectives is enriching for students and faculty alike, and demonstrates why cross-disciplinary discussion is so important.

"Research in science is becoming much more interdisciplinary," said Richard Porter, principal investigator for the program, adding, "It's important for students to experience the research perspective from different disciplines."

The program has four main components. The first is the Fall Preview, for which all first-year students enrolled in the College of

Science or Program for Undeclared Students are invited to apply. A series of seminars are offered throughout the fall semester, and a research course is available in the spring semester, which also includes workshops in the technical computing language MATLAB. Finally, a 4-week Summer Discovery Experience is held throughout the month of May, during which students learn to apply their MATLAB skills practically.

In the intensive Summer Discovery Experience, the budding researchers work with a different faculty member each week on a specific topic; for example, in the program's second week in 2014, they examined cardiac rhythms with physics professor Alain Karma. This discussion incorporated not only concepts from physics but from biology and math as well. Porter emphasized that this type of integration is one of the most important parts of the PRISM program.

"If you look at the really challenging problems, they can't be solved from the particular perspective or knowledge of a single discipline," he said. "It's good to be hearing authentic voices from different disciplines."

The idea of "authentic voices" does not only

refer to the faculty members, who represent a variety of disciplines from psychology to engineering. It also includes the participating students, who approach the discussion and coursework from the perspective of their major, resulting in an inspiring cross-disciplinary conversation.

Heather Davis, a freshman chemistry major who took part in the Fall Preview and spring course before joining the intensive summer experience, has particularly enjoyed the MATLAB sessions, to the extent that she is considering changing her major to chemical engineering.

"I never thought I would enjoy [MATLAB], and then I did," Davis said. "It made me think about math in a different way."

Since 2014 is the last year of the NSF grant for the PRISM program, this is the final year that the program will be offered at Northeastern for the foreseeable future. However, the ability to look at scientific questions from an interdisciplinary perspective will remain with the PRISM participants throughout their university education and beyond. ■



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