



OCTOBER 2019

DEPT. OF PHYSICAL AND
ENVIRONMENTAL SCIENCE

DPES

DIGEST

C O N T E N T S

03

MEET THE DEPARTMENT!

DPES PROFILES

Research Stream: Dr. Ruby Sullan and Lab
Teaching Stream: Dr. Kris Kim
DPES Alumni: Dr. Anthony Joseph Veloso

HOW TO GET INVOLVED

UNDERGRADUATE

Past Events:

Annual DPES Mix and Mingle
DPES Co-op Student Presentations

Club Updates:

Environmental Sciences and Physical
Student Association (EPSA)

The Chemistry Society(CSU)

11

WHAT'S GOING ON?

GRADUATE PROGRAM EVENTS

EnvSc Graduate Orientation

MEnvSc Past Events:

Internship and Research Presentations
Welcome Retreat

Upcoming Events:

MEnvSc Social Night

15



CHAIR'S COLUMN

Dear Faculty and Students,

Welcome to the new issue of our newsletter! We hope you enjoy our efforts to keep you informed of the exciting news of the faculty, staff, students, and alumni of the Department of Physical and Environmental Sciences at the University of Toronto, Scarborough. The department has reached an all-time high in terms of our program (1,550 students) and course (close to 5,800 Full Credit Equivalents) enrollments in chemistry, physics, and environmental sciences. We lead the Scarborough campus in the number of research grants/contracts and published peer-reviewed papers/book chapters per tenure-stream faculty, as well as in the number of graduate students supervised.

After the long overdue infusion of new resources and increase in the experiential learning opportunities, we are delighted to see positive growth trends in Physics and Astrophysics. The pedagogical leadership of our Chemistry programs consistently represents a reference point for our department, as we are uniquely poised with faculty expertise and cutting edge infrastructure. We are also particularly pleased to see the positive trajectory of our graduate and undergraduate programs in Environmental Sciences, which is collectively the result of our efforts to improve their quality, as articulated by the accreditation of our specialist and major programs from ECO Canada, the creation of an extremely rigorous combined BSc/MEng Degree Program, the revamping of the Environmental Geoscience specialist program to meet the requirements of APGO for obtaining PGeo certification, the addition of a minor program in Natural Sciences and Environmental Management, the rapid growth of our novel Environmental Studies program, and the highly successful Professional Master's program in Environmental Sciences.

However, there are several challenges ahead of us in order to sustain our growth, while maintaining the quality and rigor of our programs. The first one is the intellectual integration of our disciplines and the need to revamp our specialist programs. After our substantial investments on instrumentation over the past four years, we must determine what else we are missing in order to augment the experiential learning opportunities. Another challenge is the better connection of our programs with the recent trends of the market in Canada. Our research enterprise needs to capitalize upon the emerging funding opportunities surrounding the environment, climate change, and production of alternative forms of energy. Of course, none of our aspirations will be possible without our hard-working administrative and technical personnel. The department has embarked on a major reorganization exercise of our administration with several new staff additions that will allow us to optimize our functionality for years to come. I think that it is time to discuss frankly about our future outlook as an academic unit. A well-organized departmental retreat is more critical than ever before to plan our department for the next 5 years.

In the meantime, stay tuned....and enjoy our newsletter!

George Arhonditsis
Professor/ Department Chair and Graduate Chair

MEET OUR EDITORS



Shadi Dalili
Associate Professor,
Teaching Stream

About Me:

I teach 2nd year organic and 4th year pharmaceutical chemistry courses and labs. I am an alumnus of UofT, having graduated with my PhD from Andrei Yudin's group in 2005. Following a one year post-doctoral degree with Aaron Schimmer at Princess Margaret Hospital working on small molecule sensitizers to anoikis in prostate cancer cell lines, I was hired at DPES in 2006 (wow that's 13 years ago!?). I am also passionate about STEM outreach, especially with youth, and act as the faculty advisor for Lets Talk Science, a non-profit volunteer run STEM outreach organization here at UTSC. It's been an honour to have launched this newsletter two years ago and very proud to see how it has grown since. It would not be possible without the tireless efforts of Karyna and Vithusha, who have been with me since day one on this incredible project. Thank you to our Chair for his vision and support.



Karyna Hanif
Undergraduate Student

About Me:

I'm a 5th year student completing my B.Sc with a Major in Biochemistry (Co-op) and a double minor in Environmental Science and International Development Studies. I've completed work terms at Sunnybrook Hospital and Sanofi Pasteur. I've always been involved heavily with the department being the co-president of the Chemistry Society and the Director of Chemistry on EPSA so being a part of this newsletter has always been important for me. It's been a privilege to work on this newsletter since its launch and seeing the evolution in the last two years has been incredible. We hope you enjoy this edition of the newsletter!



RESEARCH PROFILE DR. RUBY SULLAN

*BSc Chemistry, University of the Philippines—Diliman
PhD Chemistry, University of Toronto*

About Me:

I braved the Canadian winter joining the Gilbert Walker group at UofT St. George for my PhD. Studying how barnacles can heavily foul a ship, I began my career on biofouling and nanomechanical properties of biofoulers. After joining the Single-molecule Biophysics group in Boulder, Colorado to spend more time understanding single molecules using force, news headlines such as "The Antibiotic Apocalypse", compelled me to look more closely at how bacteria stick to surfaces. In Belgium, I probed forces of interactions of bacterial pathogens at the single-molecule and single-cell levels. Satisfying my cravings for Belgian waffles and chocolates, I moved to Max Planck Institute in Potsdam, Germany, to learn some more tools crucial to understanding bacterial adhesion. I circled back to Toronto, where my research group now endeavours to dissect the mechanical forces that keep bacterial biofilms intact and stable.

Research Focus in the Mechano-Microbiology Lab:

Our group aims to understand why bacteria stick to surfaces and why nasty things can happen when bacteria organized into elaborate structures as in biofilms. Biofilms cover medical instruments in hospitals, putting patients at risk of infection. They eat away at plastic and rubber parts of aircraft fuelling systems and also coat human teeth (dental plaque) that cause decay. We use a microscope sensitive to really small forces, in the range of piconewton, to visualize structures to get you up-close and personal with bacteria, and measure bacteria-surface interaction at the single-molecule and single-cell level. Being able to tackle microbial biofilms, one molecule and one cell at a time, can reveal what makes bacteria stick to various surface and know how to interfere with it. The insights gains from this nanoscale mechanistic approach should provide design principles for 'anti-fouling' coatings that could be used for medical implants, as well as in industry, dentistry or elsewhere.

Recent Accomplishments:

Connaught New Researcher Award, 2018

Awards received by other lab members:

Alexander von Humboldt postdoc fellow

OGS recipient

MITACS Globalink recipient

NSERC-USRAs (5)

NSERC - UTEA

NanoNet Ontario Award

AN INTERVIEW WITH DR. RUBY SULLAN

Most rewarding parts of your job?

Being able to mentor PhD students and postdocs. I am still a newbie in the mentoring arena and still learning the ropes but this for me is the most rewarding part of an academic position. Also, being able to provide research opportunities to undergraduate students. I want undergrads to experience early on the rigour and discipline that comes with scientific research. This is invaluable, regardless of which path they will eventually choose.

Where do you hope your career takes you in 10 years?

The lab will be in a position where our mechanistic studies will provide the design principles that will allow us to develop new and effective materials with both anti-fouling and anti-biofilm properties. And if you ask me 10 more years down the road... hopefully our work will pave the way towards creation of new technologies critical to the global effort in fighting the growing threat of antimicrobial resistance.

A fun fact about you?

I love Ramen. I enjoy exploring the different ways Ramen is made. I should probably go to that place in Japan, hailed as the holy grail for Ramen enthusiasts.

Challenges in your current position?

This may be a cliché, but it's a big challenge to meet all the demands the academic job entails and at the same time do well in all of them. Before when you are a graduate student or a postdoc you are mostly focused on your own research and rarely get a chance to manage other student's work. Now, you have to suddenly know how to manage not just one but many different research projects at the same time, while making sure that your lab has enough funding to keep going.

What advice would you give yourself if you can go 10 years in the past?

Be brave and don't be afraid to venture beyond your comfort zone. Have a life plan. Life is short, eat your bacon.



MECHANO- MICROBIOLOGY LAB ALEXA ZAYADI

PhD Candidate

About Me:

I completed my undergraduate studies at the University of Toronto specializing in Material Sciences. Currently, I am a second-year Chemistry PhD student working in Prof. Ruby Sullan's Group, where we conduct interdisciplinary research at the intersections of physical and life sciences. I enjoy teaching science and engineering topics to students working previously as a Grade 12 Chemistry and Physics course instructor and at UofT's Engineering Outreach Office. As a graduate student, teaching assistantships for CHMA11 and PHYA11 practicals allow me to encourage student engagement with, and excitement about, chemistry and physics at an early stage of their undergraduate studies.

Recent Accomplishments

Ontario Graduate Scholarship recipient

Presented at conference in Münster, Germany (September)

Research Focus:

I study how bacteria interact and adhere to material surfaces using physicochemical, mechanical and biological considerations. By integrating knowledge and methods from different approaches, we gain a rich and comprehensive understanding of the systems we study. My research project is motivated by the increasing threat of bacterial resistance to antibiotics and the urgent need for new materials which inhibit bacterial colonization –which first requires an understanding of how bacterial adhesion works!

What are the challenges of your project?

With each completed experiment, new research questions will be raised requiring new experiments to answer them. There are so many potential experimental paths, it can be difficult and overwhelming to figure out what to prioritize.

An interesting fact about you?

At home, I have a pet cat and three hedgehogs! I am deeply indebted to their cuddles and support of my academic pursuits!

Where do you see yourself in 10 years?

I hope to work in a multidisciplinary environment, collaborating to create and execute solutions to problems related to bacterial surface colonization. Whether that be in industry, in academia or in another public sector – I guess only time will tell!

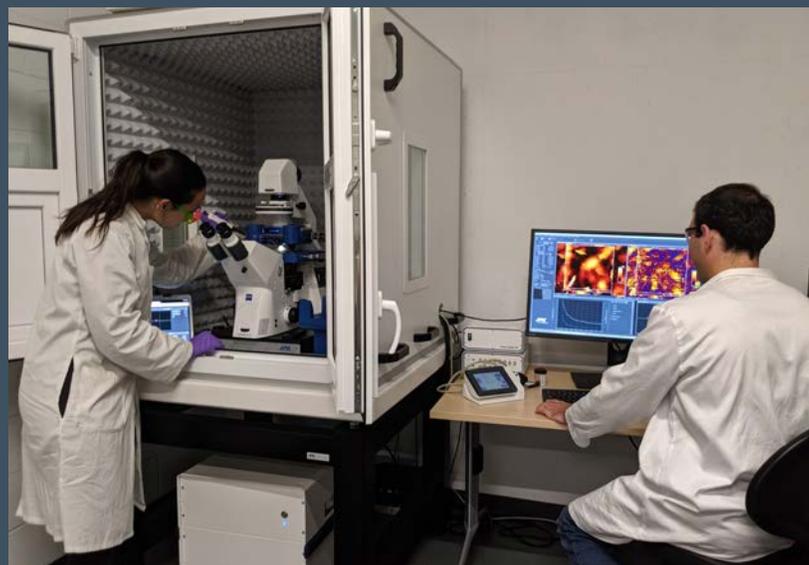
As a graduate, what is the work life balance?

I continue to struggle with this, between research, TA'ing, taking courses and extracurriculars, there is always more work to do. It's important to make time for self-care and social fun. For me, this means reading (for fun, not for school!) and getting together with friends to play board games, go for hikes and try tasty new foods.

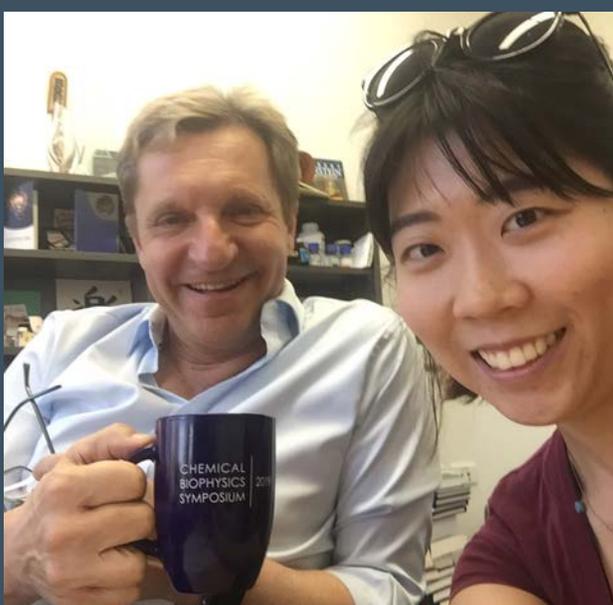
MECHANO- MICROBIOLOGY LAB GALLERY



Friday afternoons: (Down) The group during a competitive yet friendly bowling competition at The Ballroom and (Up) cooling off at the rink in Toronto Harbourfront.



Getting up close and personal with bacteria: PhD student Alexa Zayadi and Postdoc Christian Kreis hard at work in our new Atomic Force Microscopy Lab, eager to find out what dictates bacteria's choice to stick to which surface.



Keuna meeting up with Prof. Matt Trau (University of Queensland and former CBP keynote speaker) while at a MITACS Globalink stint in Australia.



Ruby and Nesha listening intently on mechanism behind mussel adhesion — Multiscale Mechanochemistry and Mechanobiology conference at McGill (July 2019).



FACULTY PROFILE

DR. KRIS KIM

BSc, University of Toronto

PhD in Chemistry, University of Toronto

Research / Teaching Summary:

After my undergrad, I went to the St. George campus to pursue my PhD in Chemistry. During this transition, I was interested in shifting my focus a bit and learning more about interfacial and surface chemistry. I worked in Professor Gilbert Walker's lab where I worked a lot with atomic force microscopy to study various nano materials. As a grad student, I TA'd as a lab demonstrator for first-year organic chemistry. I started to wonder about a couple things:

1. What other teaching opportunities are out there?

This led me to try teaching in different environments, such as labs versus classrooms for tutorials

2. Is there more I can do to get involved with this particular course to incorporate some of the students' feedback?

This led me to pursue a Chemistry Teaching Fellowship Program (CTFP), where I got to draw on the students' feedback about the course I had TA'd and got to collaborate with teaching faculty members to address them by designing new lab experiments.

Dr. Kim has published a peer reviewed article in Journal of Chemical Education with Dr. Andy Dicks on the impact and framework of the CTFP. Dr. Kim has also worked as a Lead Writing TA, TA Trainer at TATP, and headed a team of Learning Strategists at Student Life in St George. He won the TATP Teaching Excellence Award in 2015.



About Me:

I came to Canada (2007) specifically to pursue an undergraduate education at UTSC. I was born in South Korea, and went to the US for a few years before immigrating to Canada. I actually didn't think I would become a chemist. My initial intention was to pursue a degree in biology (specifically in cell and molecular bio). While doing that, I realized that I actually really enjoyed the few chemistry courses I had to take. Specifically, I really enjoyed the way of thinking and solving problems in chemistry. I also appreciated how I was given the chance to express my understanding in different ways, such as through experiments, lab reports, and presentations. I was also really drawn to the various opportunities to work with professors. I used to help develop CHMB16 experiments with Professor Effie Sauer (it's funny how things come full circle as, coincidentally, this is the course I'm teaching now).

AN INTERVIEW WITH DR. KRIS KIM

Most rewarding parts of your job?

Seeing students succeed...but actually, giving them a safe space to fail productively. Seeing students make the attempt to overcome some challenge, “fail”, get back up and learn from that experience to succeed is so rewarding. UTSC students have an incredible level of resilience. Students have so much on their plates these days...There are lots of things that I fail at, and continue to be afraid to fail at, and so it helps me with my own sense of resilience to hear such amazing stories from students. I really enjoy engaging with students of all ages and was fortunate to have been invited to join EPSA and CSU students to hold chemistry demos at a public library for young children.

A fun fact about you?

I used to be huge band geek, and I mean that in the proudest way. I was a competitive clarinet player back in high school and was in every band you can imagine. I was part of a music community over on the 3rd floor of the AA building when I was an undergrad, as well. Oh, and I love watching horror movies.

What advice would you give yourself if you can go 10 years in the past?

Intentionally go outside my comfort zone more and talk to more people. Listen to their stories. Whether it's professors and learning more about what their day-to-day is like, or what it took to get to where they are.



Challenges in your current position?

Prioritizing - This has been a problem I've had for a while though. It's been so exciting to have the space to innovate and collaborate, but time is a limited resource. I'm so fortunate to be surrounded by such incredibly motivated and talented undergrad and grad students. They have so many amazing ideas, whether it's new initiatives to support peers to designing new experiments, it really makes me excited to come to campus every day. Figuring out how much time I want to dedicate to certain tasks is a puzzle that I need to solve quite frequently.

Empathy - I'm always trying to remember what it was like when I was a student. Time does funny things to your brain, I'm mindful that what I genuinely felt as an undergrad may be blurred by now. I think it's important that I constantly try to remember and also talk to students regularly about their lives so I can try and stay calibrated to who our students are and what they may be struggling with so that I can better support them.

DPES ALUMNI STORIES: DR ANTHONY JOSEPH VELOSO

HBSc Biological Chemistry, University Toronto (2004)

PhD Analytical Chemistry, University of Toronto (2014)



What are you doing now?

I've been working at Mondelez, an international snack food conglomerate. I previously served as the Lab Manager for the plant that manufactures all of the Halls lozenges for North America. I've just recently moved into a new role as a Regulatory Affairs Scientist.

In this new role I serve as a subject matter expert for Canadian and US Food and Drug Regulations, which define standards for food manufacturing and labelling. Generally, I support a number of different brand portfolios, including Oreo and Cadbury Dairy Milk, by providing a regulatory assessment and consultation during the development of new product formulas, ingredients, advertisements and label artwork.

What UTSC experiences helped in getting you to where you are now?

My extensive background in chemistry and experience working in labs is definitely what got me in the door of this company, since my first job here focused on analytical testing of drug active ingredients. Obtaining a PhD has had the most profound effect on how fast I've been able to advance through the company.

Whenever new roles and opportunities have come up my PhD was always seen as a defining asset that separated me from other top-level candidates. To date I have moved up through 4 different roles in 5 years.

Challenges in your current position?

Because my role relies so heavily on being a subject matter expert in US and Canadian food regulations, I needed to put in a lot of work educate myself in a very short amount of time. Many of my colleagues have been working in regulatory affairs for over 10 years so I'm still always learning new things, which I find enjoyable but could be challenging depending on your business deadlines.

Work life balance in your current role?

It's great. Our team does regular calibrations to assess workload and pulls in resources where necessary to support. We also plan our business deadlines months in advance, so if you're good at managing your time it's generally low stress. I find myself with plenty of time to spend with my friends, family and hobbies.

Most rewarding parts of your position?

1. My regulatory affairs team has been great to work with and we all get along well.
2. Development and growth opportunities that extend beyond my current field. Many different paths my career could take from here.
3. Flexibility as all of my work is digital. I can work remotely as needed or in the office.

Where do you see yourself in 10 years?

Currently I have no plans to leave regulatory affairs as I enjoy the people, the work and I also feel as though it represents a good culmination of my university education and work experience. Over the next few years I hope to gain more experience in our NHP/Drug/OTC product space as it would open up a lot more doors in the future.

Any advice for current students?

The working world is so different from the challenges of University life that being able to get work experience in your field of interest while you're studying is so important. If you have the opportunity to take a co-op or volunteering position, I would highly recommend it. My other piece of advice would be to try to at least have a vague idea of the position or field you want to end up with. Reach out to people in those fields, build your network and benefit from their experience to help you confirm it's the right path for you.

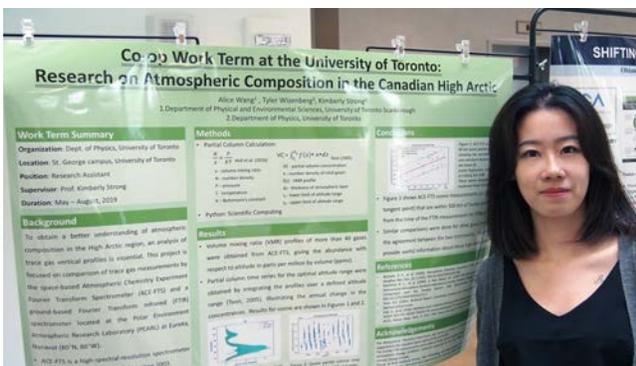
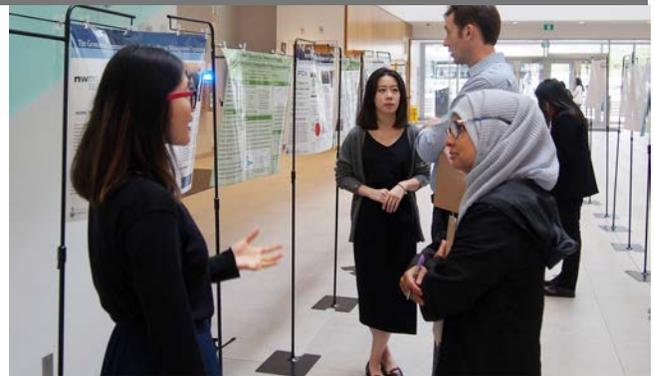
DPES EVENTS

UNDERGRADUATE



Annual DPES Mix and Mingle hosted by EPSA and CSU

DPES Students presenting on their co-op experiences



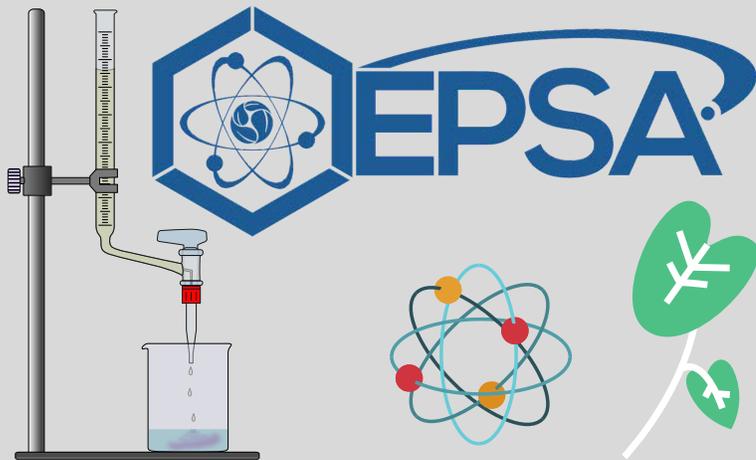


UNIVERSITY OF
TORONTO
SCARBOROUGH

DPES DIGEST IS LOOKING FOR YOU!

Interested in assisting with the DPES newsletter?
Have any great ideas you want to come to light?
Send us your resume by November 31st, 2019

Email: karyna.hanif@mail.utoronto.ca



A big thank you to all students and faculty who have attended our events this semester including Frosh Week, Lab Coat Sales, the Fall Faculty Mix & Mingle, the Earth Science Games, PGO Seminar and Masters of Environmental Science Seminar!

Volunteers Needed for Science Outreach!

We have received many questions over the last few weeks regarding volunteering with EPSCA and being more involved with the department.

Coming up on November 29th 2019 will be our Fall 2019 Science Rendezvous! UTSC volunteers will be needed for supervising high school students in a chemistry lab demonstration, as well as to help facilitate smooth transitions between activities.

Please follow our Instagram and Facebook pages to find out more and to sign up!

Pictures from Past Events:



Upcoming Events

November 13: U of T Pharmacy Seminar

November 29: Science Rendezvous

January 2020: Geogames

Contact Us:

 EPSCA - Environmental and Physical Sciences Students' Association

 @myepsa

Email: epsa@utsc.utoronto.ca





Recent Events:

Science outreach events help kids at young ages to develop their critical thinking skills about the world and to realize how science is used in everyday life. Through asking questions and being curious about how things happen, it aids kids with their development. Thank you to Dr. Lana Mikhaylichenko, Dr. Kris Kim, UTSC students and CSU volunteers that made these events successful!



Students gathered at the Toronto Public Library for a chance to do fun science experiments. They got to make slime, rainbow milk, dissecting a diaper to find its polymers, and much more! (Sept 21)



@CSUforU

csu@utsc.utoronto.ca

Who are we?

We're a club at UTSC aiming to strengthening student success in the various fields of science, particularly Chemistry. Our approach towards student success includes increasing student passion towards science through workshops, seminars, field trips, lab visits and volunteer opportunities.



National Chemistry Week! Outreach Event (October 26th) and volunteers



Annual Liquid Nitrogen Ice Cream Event . Thanks Hanlin and Maryam for assisting!

Upcoming Events:

Nov 23: Annual Chemistry Graduate Studies Information Session at McMaster's University. Learn about chemistry programs across the country. Transportation covered.

Distillery District Tour with Professor Lana (Date TBA)

GRADUATE PROGRAM HIGHLIGHTS

ENVIRONMENTAL SCIENCE GRADUATE ORIENTATION

The Environmental Science Graduate orientation was held September 5 at Miller Lash House and this year we welcomed 94 MEnvSc students and 10 PhD students to our department. The day began with a breakfast and Student Services fair and followed by a rotational meet and greet where students moved to different tables to get to know one another and met with a faculty member, a postdoc or a senior graduate student seated at each table. During lunch, we were treated to music from a jazz trio including UTSC's own Gray Graffam and Dave Fenton, accompanied by award-winning saxophonist, May Akanuma.

A sincere thank you goes out to all the faculty, postdocs, senior graduate students, administrative and technical staff who contributed their breadth of knowledge to helping our students settle into their time here at UTSC.

Finally, a special thanks goes out to the DPES Grad team who took care of the organization of the event and ensured a hugely successful introduction to our incoming graduate cohort.

Welcome to all the incoming students and best wishes for a very successful year!



MEnvSc INTERNSHIP POSTER DAY AND RESEARCH PRESENTATIONS



On September 9, 2019, DPES hosted 69 outgoing MEnvSc students in the EVAtrium and Catalyst Centre for the Annual Masters of Environmental Science Internship Poster Day.

This year our employer partners included, among others:

Ministry of Transportation
Canadian Wildlife Services
Natural Resources Canada
Hydro One
Impact Assessment Agency of Canada (IAAC)
Golder
Toronto Hydro

This event provided an excellent opportunity for the outgoing MEnvSc students to return to campus and share their experiences in-person with faculty, staff, employers and with each other. The incoming MEnvSc cohort also greatly benefited from the event as they were able to network with their peers, understand the internship process and the diversity of potential internships positions available and get firsthand tips on the program. Overall, the poster day was a huge success! Special thanks to Mark Horsburg and the MEnvSc Internship Coordinators for the fantastic organization of this event.

In early September, seven research MEnvSc students presented their Research Paper. Their titles were:

Mercury and Methyl mercury Levels and Stream Flows in the Dryden Region of Northwestern Ontario Prior to Logging

Baseline surface runoff and water quality assessment of a small-scale urban plot before Low-Impact Design construction

Projected climate change impacts on grape growth and wine production in Prince Edward County

When can we declare a success? A Bayesian framework to assess the recovery rate of impaired freshwater ecosystems

“Is the Integrity of fish communities threatened by reoligotrophication? A structural equation modelling analysis in the Bay of Quinte, Ontario, Canada

Summer habitat-selection modelling of endangered bats in Greater Toronto Area urban forests.

Patterns of plant invasion in agricultural riparian buffers.

M E n v S c
P A S T E V E N T S



MEnvSc Internship Poster Day and Research Presentation



MEnvSc Welcoming Retreat



As in previous years, the MEnvSc incoming cohort, together with some faculty and staff, headed up North to



Beausoleil Island (Georgian Bay Islands National Park). The trip included two overnight stays at Camp Kitchikewana (S'mores included!), interpretative hikes and team building exercises. The group returned to Toronto excited and thankful for the opportunity to meet and mingle with their peers. For some, it was their first Canadian outdoor experience!



We are inviting all MEnvSc alumni to join our exclusive MEnvSc Alumni LinkedIn Group. Contact hiremasters@utsc.utoronto.ca to join.

M E n v S c

UPCOMING EVENTS

This event is open to:

Current/Outgoing MEnvSc students
 MEnvSc Alumni from all years of the
 program
 UTSC faculty and staff

**We cordially invite you to the 12th Annual
 Master of Environmental Science Social Night
 at Scallywags Restaurant!**

You're invited to celebrate the accomplishments of our outgoing MEnvSc cohort and welcome our current cohort of over 90+ students! Please join us to share your experiences, stay involved, hear what's new, and reconnect with UTSC faculty and your classmates!

Snacks will be provided. Cash bar available.

Rsvp to hiremasters@utsc.utoronto.ca



We are inviting all MEnvSc alumni to join our exclusive MEnvSc Alumni LinkedIn Group
 Contact hiremasters@utsc.utoronto.ca to join.