UNIVERSITY OF TORONTO SCARBOROUGH

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DEPT. OF PHYSICAL AND ENVIRONMENTAL SCIENCES

DPES

DIGEST

EDITORS:

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Photo: Forest in Hamilton, ON Courtesy of Rosalyn Kish

“I (we) wish to acknowledge this land on which the University of Toronto operates. For thousands of years it has been the traditional land of the Huron-Wendat, the Seneca, and most recently, the Mississaugas of the Credit River. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.”

- University of Toronto, Land Acknowledgement

Photo: Chai Chen

CONTENTS

ASIAN HERITAGE MONTH

by ***Yao Yan Huang***

Earlier this month, Vivienne Poy, former U of T chancellor, alumna, and the first person of Asian ancestry to sit in the Senate, was one of the speakers at the Asian Heritage Month opening ceremonies. Other speakers included Stephen Siu, President of Yee Hong Community Wellness Foundation, Ahmed Hussen, Minister of Housing and Diversity and Inclusion, and Mayor John Tory. Presentations talked about diverse topics such as Asian pop culture influences on Canadians and human rights issues that impact Asian Canadians and First Nations.

Vivienne Poy was born in Hong Kong and fled to mainland China with her family when she was seven months old, after Japan attacked the British colony during the Second World War. She later moved to Montreal in 1959, studying at McGill and later at U of T where she earned her PhD in history. She founded Vivienne Poy Mode, which sold high-end knitwear, and is also the author of several books about Sino-Canadian relations, Chinese immigration and her own family experiences. She served as U of T chancellor from 2003 - 2006.

Poy was appointed by Prime Minister Jean Chrétien to the Senate in 1998. In 2001, she proposed a motion to recognize May as Asian Heritage Month that was supported unanimously and in May 2002, the Government of Canada signed an official declaration.

"The reason why I introduced it was because Asians – meaning all of Asia, all the way to west Asia – we were quite invisible in Canada because we were not part of Canadian heritage." Poy explains her reasons for the motion with U of T News. "I just wanted to give visibility to all Asians in Canada – Canadians of Asian heritage. That was the main reason – just for visibility. Just to let everybody know we're here."

With the reports of increased anti-Asian racism in Canada during the pandemic, Asian Heritage month is an important time to reflect on contributions made by the Asian Canadian community and a reminder for all Canadians to come together to combat anti-Asian racism and discrimination in all its forms.

Canada has a history of anti-Asian discrimination and racism. Chinese workers were a key part of the building of the Canadian Pacific Railway but were paid lower wages than their white counterparts and it is estimated between 600 to 2200 died during the construction due to dynamite accidents, landslides, and poor working conditions. Over 21, 000 Canadians of Japanese heritage were forcibly removed from Canada's West Coast and sent to internment camps during the Second World War, separating families and had their property confiscated and sold. The Komagata Maru, carrying mostly Sikhs from Punjab, India, and all British subjects were denied docking in Vancouver, BC, forcing the ship to return to India where 19 passengers died.

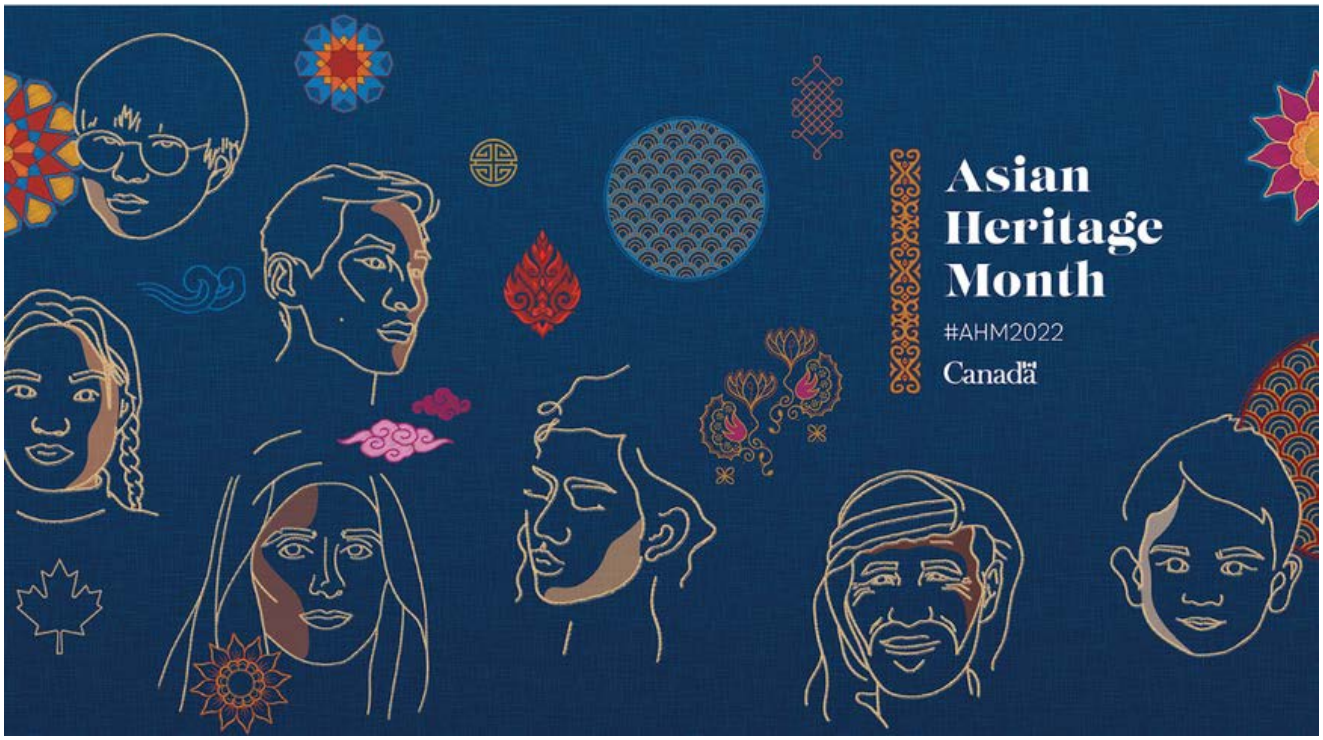
It is also important to bring up that the term Asian encompases a wide range of identities. South-east Asians, West Asians, those not of Chinese, Korean, and Japanese descent are often left out of the conversation. Colorism is often perpetuated by Asian communities and the wider Canadian society. Others may face Islamophobia and other forms of religious-based discrimination.

"...because racism in Canada is systemic and I would say there's always racism wherever there are people – because most of us are more comfortable being with people who look like us."

Poy also talks about the importance of education. "We need to constantly be vigilant and actually teach the younger generation about how important it is – not only to make friends and get along, but to learn about other cultures. I think that may be – and I'm not an educator – but that may be what is missing in the schools. "

She recommends checking out the Reel Asian International Film Festival that showcases Asian performances and movies. Their archive of over 100 films from the festival's 25 year year history is now available for free on their website. The Anti-Racism & Cultural Diversity Office at U of T is also hosting programming. Events included a film screening of "Under the Willow Tree – Pioneer Chinese Women in Canada", a celebration of LGBTQ2S+ Asian Heritage through performances and conversation, and an educational workshop on confronting anti-Asian racism.

The theme for Asian Heritage Month 2022 is "Continuing a legacy of greatness".



Sources/Links

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About Asian Heritage Month: https://www.canada.ca/en/canadian-heritage/campaigns/asian-heritage-month/about.html

Virtual Opening Ceremony: https://www.eventbrite.ca/e/asian-heritage-month-virtual-opening-ceremony-2022-tickets-315685532927

Reel Asian: https://www.reelasian.com/

U of T Events: https://antiracism.utoronto.ca/2021-asian-heritage-month/

U of T Resources: https://kpe.utoronto.ca/asian-heritage-month-anti-asian-racism-resources

May is also Canadian Jewish Heritage Month and May 17 is the International Day Against Homophobia, Transphobia, and Biphobia.

AWARD HIGHLIGHT

Congratulations to Professor Artur Izmaylov as the **co-recipient** of the ***University of Toronto Scarborough Research Excellence Faculty Scholar Award*** for 2022! This award recognizes an innovative researcher whose accomplishments have made a major impact in their fields.

In just over ten years of independent career at the University of Toronto, Dr.Izmaylov has published over 50 papers (more than 75 total) from his independent work. He has been invited to over 80 lectures internationally in the most prestigious universities in North America, Europe, and Asia. His work has appeared in high impact journals (e.g., The Journal of Physical Chemistry Letters, Accounts of Chemical Research, Physical Review Letters, and Small) and has been recognized by highly sought after awards such as the Sloan Fellowship (Sloan Foundation, USA, 2015-2017), which is awarded yearly to only 126 young researchers worldwide in recognition of their distinguished performance and unique potential to make substantial contributions to their corresponding field. His seminal paper published in 2006 in the Journal of Physical Chemistry "*Influence of the exchange screening parameter on the performance of screened hybrid functionals*" has been cited 4342 times according to Google scholar.

Other Awards:

- Ontario Early Researcher Award (Ministry of Research and Innovation, Canada, 2017-2022)
- Tom Ziegler Award (Canadian Society for Chemistry, Canada, 2019)
- Journal of Physical Chemistry Lectureship Award (American Chemistry Society, USA, 2019)
- Google Quantum Research Award (Google Inc., USA, 2019-2020)

Research Overview

Dr.Izmaylov's research focuses on developing electronic structure and quantum dynamics methods on classical and quantum computers to obtain detailed understanding of processes involving simultaneous changes in electronic and nuclear states. Such processes constitute crucial steps in many areas of fundamental and technological importance: solar energy conversion, UV-light DNA damage and repair, operation of MRI contrast agents, catalysis at surfaces, and general surface chemistry. Ongoing projects include methods to solve the scaling problem in quantum computing and method development for energy and charge transfer in organic molecules.

Additional Links

- Profile: https://www.utsc.utoronto.ca/physsci/artur-izmaylov
- Website: https://www.utsc.utoronto.ca/~aizmaylov/Teaching.html
- Youtube Channel with highlights on recent publications on quantum computing for quantum chemistry and a series of introductory lectures: https://www.youtube.com/channel/UCasCpaWUuHzPug9pdcI6QQ

Congratulations to Dr.Izmaylov! We are proud to have you in the DPES Community.

RESEARCH HIGHLIGHT

Dr. Frank Wania obtained his PhD in Chemical Engineering at the University of Toronto in 1994. Before joining DPES in 1999, he worked for the Norwegian Institute for Air Research, World Wildlife Fund, and the American Chemical Manufacturers Association. He currently leads an environmental chemistry research group and also teaches chemistry courses such as CHMB55 Environmental Chemistry and CHMD59H3F - Modelling the Fate of Organic Chemicals in the Environment. He enjoys the challenge of deciding what research directions to take and seeing students grow and mature.

ASSOCIATE PROFESSOR,
DEPARTMENT OF PHYSICAL AND
ENVIRONMENTAL SCIENCES

Research Overview

Dr. Wania seeks to understand and quantify organic contaminants in the environment with a combination of field work, instrumental trace analysis in the laboratory and computer simulation models. His work looks at the holistic journey from their release into the environment to their uptake in organisms, including humans. A particular interest is amplification processes that can counteract the normal tendency of contaminant dilution and attenuation, sometimes in non-intuitive ways. Examples are biomagnification and the cold-trapping of contaminants in polar and high mountain regions.

E-Waste Making Headlines

In a study published in Environmental Science Letters, Dr. Wania and researchers found that countries in Europe, North America and parts of Asia often "off-load" the toxic emissions associated with disposing of electronic waste (e-waste) to the developing world. Polybrominated diphenyl ethers (PBDEs) are a group of chemicals commonly used as flame retardants in cell phones, computers, textiles and furniture. PBDE emissions were found highest in areas of China, India, Bangladesh and Western Africa, places where these products are being recycled (Tong et al., 2022).

The Wania group has previously done work on atmospheric transport and spatial concentration variability of PBDEs (Shen et al, 2006), exposure pathways (Li, Arnot, & Wania, 2019), and modeled body burden-age relationships (Quinn & Wania, 2012).

"We should be held responsible for dealing with the waste generated by our society," says Frank Wania speaking to UTSC News (Campbell, 2022). **"It's unethical to send our waste to developing countries or less wealthy parts of the world. If we rely on these chemicals for our products, then we should be responsible for disposing of them."**

Recycling e-waste can have major health impacts on workers as these recycling facilities are often in small backyard workshops with minimal safety standards. Exposure to PBDEs have shown a link to neurodevelopment deficits (Sun et al., 2017), thyroid disruption (Kuriyama et al., 2007), reproductive changes (He et al., 2008) and cancer (Dunnick et al., 2018). In addition to PBDEs, gaseous elemental mercury (GEM) exposure can also be a concern in recycling mercury-containing products, as Dr. Wania reports in an earlier 2021 study.

"This is an environmental justice issue because the environmental burden of making and disposing of a product is not fully experienced by those who benefit from using the product," says Wania. The study found that emissions were dominated by the end of life disposal process in developing countries with relatively small emissions during the product use phase.

He says the irony is that if these products were disposed of in developed countries, overall emissions of these chemicals would be lower because of stricter health and safety regulations.

"Exporting this waste not only means we shift the emissions to poorer parts of the world, but we also increase overall emissions because the regulatory environment isn't as strong."

Other Links:

- Read Dr Frank Wania's faculty profile in our previous DPES Digest Issue of Jun 2021: https://www.utsc.utoronto.ca/physsci/dpes-digest-newsletter
- Profile: https://www.utsc.utoronto.ca/labs/wania/about-us/

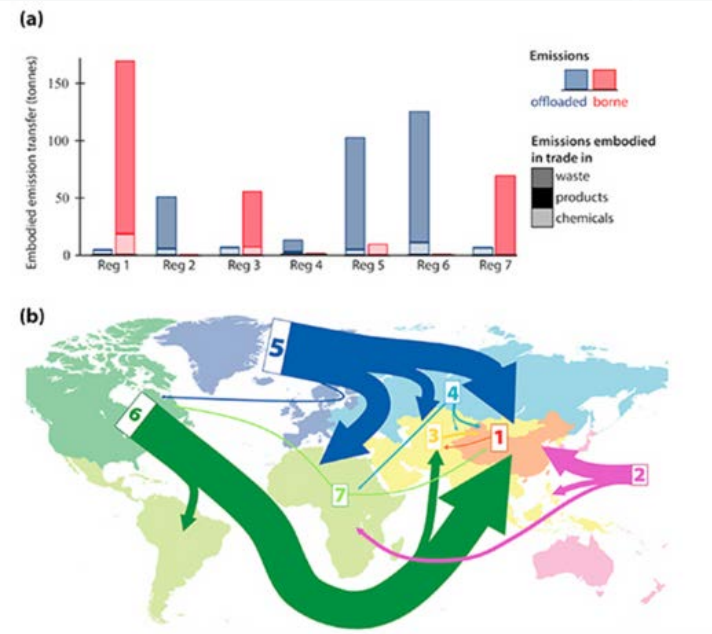

Figure 1. Comparison of the emission transfers (tonnes), aggregated from 2000–2020 in the seven geographic regions in the CiP-CAFE model and (b) illustration of the flows of the trade embodied emissions between those regions.

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EES1116Y INTERNSHIP

Every year at this time the Department of Physical & Environmental Sciences' Master of Environmental Science (MEnvSc) team is very pleased to share with our broader DPES community that our MEnvSc students have embarked on their internship work terms. All 75 internship students in this year's cohort have begun their journey towards an exciting career in the Environmental Sector!

Although this incredible task is achieved year after year, thanks to the tireless work of our students, staff and faculty, the accomplishment is even more pronounced given the challenges faced during these difficult times.

For Summer 2022, our students have secured work terms in roles from over 30 different employer partners at all levels of government, private industry and the not-for-profit sector including the following employers:

- Environment and Climate Change Canada (ECCC) and Fisheries and Oceans Canada
- Ministry of the Environment, Conservation and Parks (MECP) and Toronto and Region Conservation Authority (TRCA)
- Toronto Transit Commission (TTC), EXP Consulting and Canadian Nuclear Laboratories
- Royal Ontario Museum and United Nations Association in Canada
- And more!

We invite the entire DPES community to virtually join the MEnvSc Internship Poster Day on **September 12th 2022** between 9am-5pm to discover more about the 2021-22 cohort's experiences.

Please save-the-date and more details to follow. Have questions? More information can be found here: **https://www.utsc.utoronto.ca/physsci/ees1116y-internship** and by contacting the MEnvSc Internship Team at **hiremasters.utsc@utoronto.ca**

For the latest MEnvSc news, events and student profiles please be sure to follow us on Instagram @utsc_dpes and our MEnvSc LinkedIn Showcase page: Master of Environmental Science (MEnvSc), University of Toronto Scarborough.

MEnvSci Research Feature

Rosalyn Kish

Rosalyn is passionate about reducing atmospheric carbon through effective ecosystem management and renewable energy. Throughout her Bachelor and Master degrees in Environmental Science, Rosalyn discovered her research interests in the impacts that biological pathogens can have on the movement of carbon through terrestrial systems.

After defending her MEnvSc thesis, Rosalyn became a Field Data Specialist at Heliolytics. In this position she captures imagery of solar panels from a small plane for fault analysis to enhance green energy production. Rosalyn aspires to limit the greenhouse effect by combining her passions in renewable energy and natural ecosystem research to reduce agricultural emissions associated with solar power plants through effective management.

Rachel Mariani

Rachel recently graduated from the MEnvSc program here at UTSC where she had the opportunity to write and publish her first research paper on the topic of global environmental change under the supervision of Dr. Adam Martin. Upon completing her degree, she was hired on as a research assistant in the same lab that she worked with for her Master's. There, she gets to work with peers like Rosalyn Kish, and conduct research projects in unique regions in Ontario, such as Haliburton Forest, and Niagara-on-the-Lake for both student's graduate research, and other projects with Dr. Martin and his collaborators.

Rachel is excited to be continuing her research work here at UTSC this summer, and she is looking forward to future collaborations in the upcoming year!

Left to right:
Emily Young, Rosalyn Kish, Rachel Mariani, and Mahendra Doraisami.

BEECH BARK DISEASE IN UNMANAGED TEMPERATE FORESTS

READ THE FULL PAPER:
HTTPS://WWW.LINKEDIN.COM/FEED/UPDATE/URN:LI:ACTIVITY:6931241964977721344/

This study assessed forest and tree characteristics that coincide with the progression of Beech Bark Disease (BBD) in a temperate, 13.5 ha forest plot in Ontario. The study also assists with the integration of BBD severity risk into forest carbon budget models, while providing insight into how large-scale forest inventories can inform screening for pathogen resistance in trees.

Beech Bark Disease is an insect-fungal complex that requires an invasive scale insect (Cryptococcus fagisuga) to first compromise beech bark integrity and then a parasitic fungus (Neonectria ditissima or N. faginata) to colonize the damaged tissue.

The infection begins with the invasive scale insect, which burrows into the bark of beech trees (Fagus grandifolia) and exposes its internal tissues to pre-forest-dwelling, parasitic Neonectria fungi. Girdling, cankering, and ultimately death occurs in later stages of the disease, when beech trees are infected with both the scale insect and parasitic fungi. Spatial models suggest the introduction of the invasive scale insect into the forest plot in late 2000's and has since become widespread throughout the plot.

The research team measured the diameter, height, and level of disease progression in all beech trees >10 cm in diameter (651 trees total). Combining this recent data with pre-existing forest-level data, they found that tree diameter at breast height (DBH) and relative growth rate (RGR) were both significant predictors of BBD severity.

Close-up of birch bark disease. The white wax on the bark is evidence of the beech scale, and the red fungus is Neonectria.

Spatial analyses revealed that approximately 4.2% of variation in BBD severity is associated with unmeasured spatial features. Finally, approximately 6.0 Mg C ha-1, or ~6.5% of the average 92.5 Mg of aboveground biomass C ha-1 will transition from the live to the dead biomass pool due to BBD in this unmanaged forested region.

Beech trees are a long-lived hardwood species that sequester a significant amount of carbon in their biomass during their lifespan of 300-400 years. Their results indicate a loss of 6.0 Mg carbon ha-1 on average in the site due to BBD with longer term impacts, in the next 10-50 years, on forest structure, function, and composition. Forest carbon budget models will need to account for BBD mortality and decline functions, especially those that rely on forest inventory and DBH data.

Program Highlight: Environmental Chemistry Major

The Major program in Environmental Chemistry introduces students to the main areas within chemistry, with an emphasis on analytical, environmental, inorganic, and organic chemistry, and also ensures students gain foundational knowledge of the environmental sciences. Students will develop both theoretical knowledge and practical lab skills throughout their course work. This program is intended for students who are interested in developing basic environmental skills, but who also seek the flexibility of combining this program with other Major and Minor programs. Students interested in developing depth in Environmental Chemistry should consider the Specialist or Specialist (Co-operative) program in Environmental Chemistry.

Wetlands and unmanaged forest in Haliburton, Ontario

CTL TEACHING GRANT AWARDEES AND PROJECTS

The Centre for Teaching and Learning (CTL), in partnership with Information and Instructional Technology Services (IITS), offers Teaching Enhancement Grants two rounds per year. Categories include teaching equipment, software, enhancement, assessment, matching fund requests, professional development, and teaching and learning seed grants. DPES excelled for one more year with our CTL grant applications for the following projects.

NIRUSHA THAVARAJAH, MARCO ZIMMER-DE IULIIS, KRIS KIM: "MODULE DEVELOPMENT FOR STUDENT SUCCESS WITH READING AND COMPREHENSION: HOW TO READ AND ANALYZE SCIENTIFIC JOURNAL ARTICLES" (TEACHING ENHANCEMENT)

The first-year teaching team at DPES has recently created and implemented a new peer-reviewed writing assignment for our introductory courses, which has led to the development of numerous assignment modules on Quercus and has been implemented across all our first-year courses, including CHMA10, CHMA11, and CHMA12, reaching over 2000 students in the 2021-2022 academic year.

Based on student feedback, one of the challenging steps of this writing assignment is reading and comprehending the scientific literature. To address this learning need, our first year teaching team has been awarded $2500 (matched by the department) through this teaching enhancement grant to develop a module that would provide step-by-step instructions for students to navigate through a scientific article. The module will be composed of scaffolded instructions with complementing interactive videos (e.g., Kaltura) that guide students through how to extract the necessary information from a scientific article. The development of the module will be done in collaboration with a graduate teaching assistant, as this will offer them a unique professional development opportunity to engage in curriculum development that can impact 1600+ students each year and allow our curriculum to evolve with the incorporation of student voices.

TANZINA MOHSIN: "INDIGENIZATION OF EESC25, URBAN CLIMATOLOGY" (TEACHING ENHANCEMENT)

LANA MIKHAYLICHENKO AND EFFIE SAUER : "HIGH RESOLUTION BENCHTOP NMR SPECTROMETER" (TEACHING EQUIPMENT)

Bruker Fourier 80 Benchtop NMR Source:
https://www.bruker.com/en/products-and-solutions/mr/nmr/fourier80.html

SHADI DALILI: "CHEMISTRY AT WORK" (TEACHING ENHANCEMENT)

A community-partnered experiential learning project will be implemented in the Introductory Organic Chemistry (CHMB41H) course to increase retention of students in the chemistry programs by broadening students' knowledge about the discipline of chemistry and its countless applications across a broad range of professions and industries. Students will work with a community partner to discover examples of how chemistry and course content taught is applied in the real world of work in the community partners' organization and/or industry. Students will report on the role, application, and impact of chemistry on the community partners' product and/or service as well as daily work, through the development of recorded short casts. In addition, students will reflect upon, and analyze the experience through a final written reflection and peer-evaluation by rating their group members' involvement and contribution to the project. The top five podcasts in each partner category will be selected for presentation to the community partners. The community partners can provide feedback for the podcasts, which can be used as part of their community outreach, engagement, hiring and/or promotional material.

The $5000 CTL grant will support the hiring of two coordinators who will be responsible for the management and organization of student groups, monitoring group activity and meetings through Quercus, communication between students and community partners, and developing rubrics and criteria for evaluation of the podcasts and reflections. A portion of the funds will be used to provide honorariums and/or gifts for our community partners, as a token of appreciation for their time and involvement.

MATHEW WELLS, HEIDI DAXBERGER, ADAM MARTIN, PHIL HERON:"FIELD SAFETY EQUIPMENT FOR ENVIRONMENTAL SCIENCE FIELD TRIPS" (TEACHING EQUIPMENT)

Our main goal with this equipment grant is to increase access and improve the recruitment of students into geosciences by removing barriers to access field trips in 16 courses in Environmental Sciences at UTSC, which are key for experiential learning. In an effort to work towards increasing Diversity, Equity and Inclusivity in environmental science programs, the successful applicants realized that access to proper safety gear represents a subtle but significant economic barrier for students who didn't grow up with outdoors experiences in their families. Specifically, many students lack the proper gear for overnight trips that will keep them dry, safe and free of insect bites as part of their first field trip experience. The right gear will make for a more inclusive program and the PIs have secured over $11,000 from CTL to purchase enough gear so that 15-20 students could be equipped and hence participate in intro field trips safely. This will allow students to get excited about the possibilities of Environmental and Geoscience courses. The numerous courses and 100s of students that will benefit from this grant are:

EESA01 INTRODUCTION TO ENVIRONMENTAL SCIENCE
EESB02 PRINCIPLES OF GEOMORPHOLOGY
EESB05: PRINCIPLES OF SOIL SCIENCE
EESB21 EXPLORATION GEOPHYSICS
EESC04 BIODIVERSITY AND BIOGEOGRAPHY
EESC16 - FIELD CAMP I
EESC33 -ENVIRONMENTAL SCIENCE FIELD COURSE
EESC36 - PETROLOGY
EESD07 - FIELD CAMP II
EESD19 PROFESSIONAL DEVELOPMENT SEMINARS IN GEOSCIENCE
EESD20 - GEOLOGICAL EVOLUTION AND ENVIRONMENTAL HISTORY OF NORTH AMERICA
EESD33 - FIELD TECHNIQUES
EES1108- ENVIRONMENTAL SCIENCE FIELD CAMP
EES1111 FRESHWATER ECOLOGY AND BIOMONITORING
EES1120 - ENVIRONMENTAL FLUID DYNAMICS
EES1128- BIOPHYSICAL INTERACTIONS IN MANAGED ENVIRONMENTS

Students on a field camp course in Nevada, California, Arizona and Utah 2018.
Source: https://utsc.utoronto.ca/news-events/pictures/field-course-takes-students-epic-adventure-across-southwestern-us

CONGRATULATIONS TO ALL OUR CTL GRANT WINNERS!

FROM THE TRACES CENTRE:UV-VIS SPECTROPHOTOMETRY: KINETICS MODE

In this TRACES segment, we will be highlighting the use of the Kinetics mode in the Agilent 8453/8454 UV-Vis spectroscopy system, as well as some experimental applications that can be performed using this feature. UV-Vis spectroscopy takes advantage of photon absorption by chemical species that are capable of undergoing electronic transitions when exposed to electromagnetic radiation in the ultraviolet (UV) and visible regions of the spectrum. Inside of a UV-Vis spectrophotometer, a light source emits broadband radiation that spans the UV-visible region. The light from the source is then separated into its individual component wavelengths by a monochromator and directed through the sample and finally onto a detector (Figure 1).

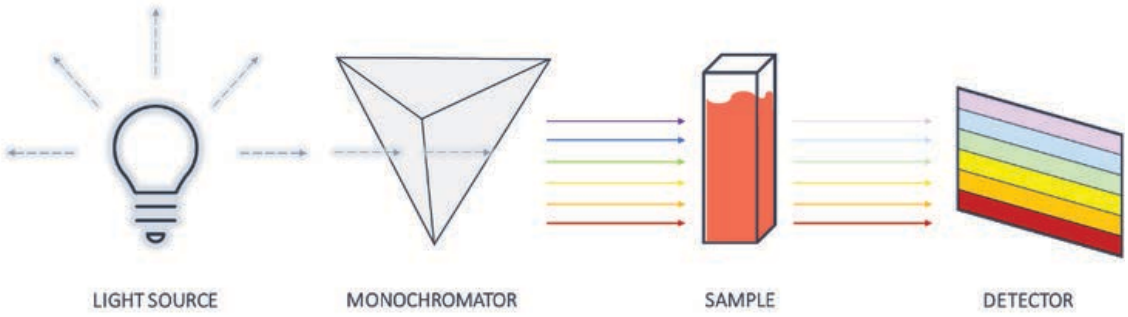


Figure 1: Components of a spectrophotometer.

As the wavelengths pass through the sample, some may be absorbed if the sample contains any absorbing species. The specific bond types and functional groups of the chemical species influence the wavelengths of absorption. The detector monitors which wavelengths were absorbed and by how much. Using Beer's law, the absorption by the sample can be related to the concentration of the absorbing species. The information from the detector is typically displayed in the form of a plot of absorption intensity as a function of wavelength (Figure 2A) and is referred to as a "spectrum". In Kinetics mode, the user is able to additionally monitor the intensity of absorption at a particular wavelength(s) as a function of time (Figure 2B).

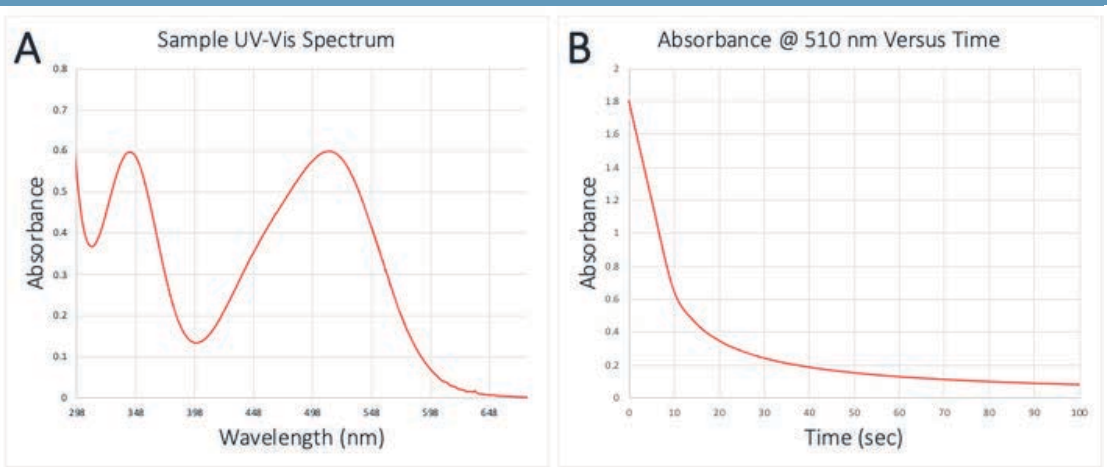


Figure 2: Spectrophotometer data output as absorbance vs wavelength (A) and absorbance at a specific wavelength vs time (B).

FROM THE TRACES CENTRE

The Kinetics feature is designed to facilitate reaction kinetics experiments which require time-based measurements. Various parameters such as integration time and measurement cycle time can be controlled so that absorption measurements are automated at precise time intervals over the course of a reaction. This allows the progress of a reaction to be monitored for a specified period of time. Built in computation tools for rate calculations allows the user to evaluate the kinetic data. Alternatively, data may be exported and evaluated in other data processing software. Temperature, another important parameter of interest in reaction studies, can also be controlled and integrated into the Kinetics mode method when needed. This is enabled by the Agilent 89090A Peltier Temperature Controller accessory which is shown in Figure 3A. This Peltier attachment controls a single cuvette holder and provides thermostated temperatures between 5 °C below ambient to 70 °C. The cuvette holder (Figure 3B) is capable of in-cuvette magnetic stirring for a standard 1 cm pathlength, 3.5 mL quartz or method compatible plastic cuvette. A jacketed multicell (multi-cuvette) system connected to a water bath could be used as an alternative to the Peltier, however this provides less temperature control and no in-cuvette stirring.

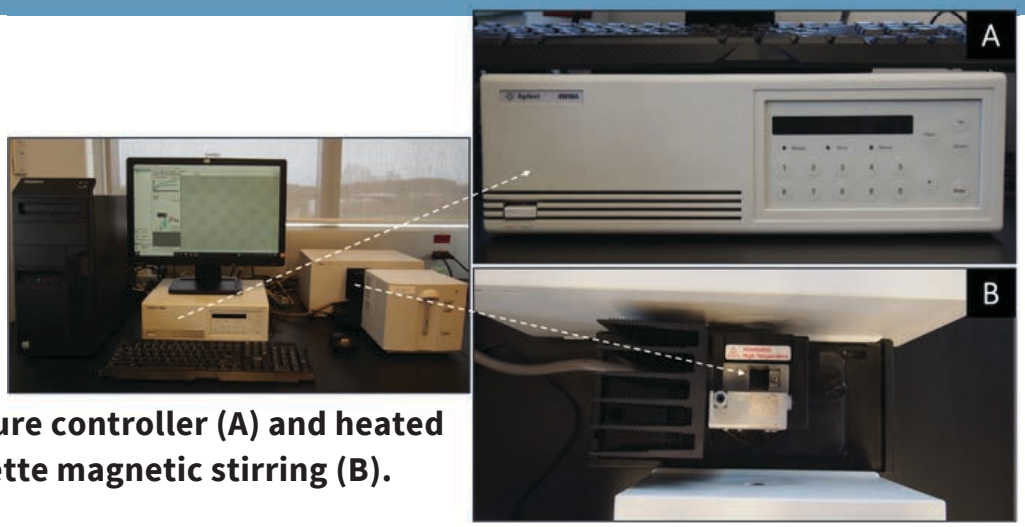


Figure 3: The Peltier temperature controller (A) and heated cuvette holder with in-cuvette magnetic stirring (B).

The Kinetics mode feature is a useful tool for the investigation of reaction rate fundamentals. Experimentally measured changes in reactant or product concentration over time can be used to derive reaction orders and rate constants for rate law determinations. Through the use of the Arrhenius equation, activation energies can be determined by evaluating the same reaction at several different temperatures. The effects of catalysts and inhibitors can be examined as well. All of this information can be used to help elucidate possible reaction mechanisms. Examples of other experimental applications include an enzyme assay-based method for the quantitation of sucrose/D-glucose in various foods and beverages, and the measurement of enzyme activity. With careful planning, the Kinetics mode feature can be applied to a variety of experiments requiring time-based measurements. At a minimum, the system must contain a species of intertest that absorbs in the UV-visible region (or that can be made to absorb through some other means), and the rate of the reaction of intertest cannot exceed the measurement rate capability of the instrument.

FROM THE TRACES CENTRE

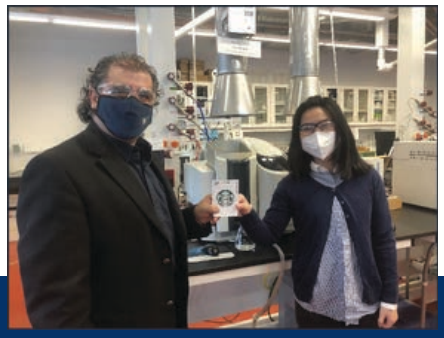
If you are interested in scheduling a training session for the use of Kinetics mode UV-Vis spectrophotometry, or would like more information, please do not hesitate to contact your friendly neighbourhood TRACES staff, Tony Adamo or Pat Benvenuto. To book the UV-Vis spectrophotometer with the Peltier accessory, select UV-Vis2 on the TRACES booking platform. If temperature control is not required, UV-Vis4 may also be used.

CONGRATULATIONS TO OUR MARCH TRACES CONTEST WINNERS - ISLA WRIGHTSON & LISA LABINE

On a celebratory note, congratulations to Isla Wrightson and Lisa Labine, the winners of the March 2022 DPES Digest TRACES contest. Coincidentally, Isla (Picture 1) has also won the best tuque in DPES, and possibly the world, competition!

CONGRATULATIONS TO OUR CHALLENGE WINNERS - RUCHIKA GAUTAM & EILEEN JIANG

We would additionally like to congratulate Ruchika Gautam (Picture 2) and Eileen Jiang (Picture 3). These CHMD16 students participated in a competition among CHMC16, CHMD16 and EES1102 students for the best lead calibration curve by flame atomic absorption spectroscopy this past semester. They achieved an epic r2 value of 0.99998, a feat so rarely encountered that you probably have a better chance of spotting a dodo bird taking flight!



FROM THE TRACES CENTRE

CONTEST OF THE MONTH

ANSWER THE FOLLOWING TRIVIA QUESTIONS AND THE FIRST 3 PEOPLE TO ANSWER CORRECTLY WILL WIN A TUQUE

EMAIL ANSWERS TO TONY ADAMO
tony.adamo@utoronto.ca

- *Who invented the spectrophotometer and when?*
- *What type of dispersive device is used within the monochromator of the Agilent 8453 UV-Vis spectroscopy system?*
- *How many spectrophotometers are in TRACES?*

Last Month's Answers

1. Although Rosalind Franklin obtained some of the first x-ray crystallography images of DNA, James Watson and Francis Crick (and Maurice Wilkins) are credited with "discovering" the first x-ray crystal structure of DNA and proposing the famous two-strand (or double-helix) model.
2. The full name of the single crystal diffractometer in TRACES is the Bruker SMART X2S single crystal diffractometer.
3. The name of the "expected chemical formula" Fe(C5H5)2 is ferrocene (bis(cyclopentadienyl)iron(II)).

DPES PROGRAMS SUMMARY

TOTAL PROGRAMS: 17

COOP PROGRAMS: 9

COMBINED DEGREE PROGRAMS: 3

CHEMISTRY

Chemistry Specialist
Chemistry Major
Biochemistry Major
Biological Chemistry Specialist
Environmental Chemistry Specialist
Environmental Chemistry Major

PHYSICS AND ASTROPHYSICS

Physics and Astrophysics Specialist
Physics and Astrophysics Major
Physical and Mathematical Sciences Specialist
Physical Sciences Major

ENVIRONMENTAL SCIENCE

Environmental Biology Specialist
Environmental Geoscience Specialist
Environmental Physics Specialist
Environmental Science Major
Environmental Science Minor
Natural Sciences and Environmental Management Minor

ENVIRONMENTAL STUDIES

Environmental Studies Major

CO-OP

Chemistry Specialist - Coop
Chemistry Major - Coop
Biochemistry Major - Coop
Biological Chemistry Specialist – Coop
Environmental Chemistry Specialist – Coop
Environmental Biology Specialist-Coop
Environmental Geoscience Specialist-Coop
Environmental Physics Specialist- Coop
Environmental Science Major-Coop

COMBINED DEGREE PROGRAMS

HONOURS BACHELOR OF SCIENCE / MASTER OF ENGINEERING

HONOURS BACHELOR OF SCIENCE / MASTER OF ENVIRONMENTAL SCIENCE

HONOURS BACHELOR OF SCIENCE OR HONOURS BACHELOR OF ARTS / MASTER OF TEACHING

UNIVERSITY OF TORONTO SCARBOROUGH

DPES DIGEST IS LOOKING FOR YOU!

Interested in assisting with the DPES newsletter?
Have any great ideas you want to see come to light?
Send us your resume!

Email: **anna.galang@mail.utoronto.ca** or **sh.dalili@utoronto.ca**

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