OCIENE Graduate Student Seminar Series
Program & Abstracts

Monday, April 15, 2024
Virtual via Teams & In-Person, Room XXX, University of Ottawa
01:00 PM – 03:40 PM

OTTAWA-CARLETON
INSTITUTE FOR ENVIRONMENTAL ENGINEERING
(OCIENE) Winter 2024 Seminar Series

OCIENE Seminar Series Schedule

Monday, April 15, 2024
Zoom & In-Person, Room xxx,
University of Ottawa
01:00 PM – 03:40 PM

01:00 – 01:10 p.m. **Welcome and opening remarks**

01:10 – 01:15 p.m. **Welcome from the Sponsor**

01:15 – 03:30 p.m. **Speakers:**

1:15 Student 1
1:30 Student 2
1:45 Student 3
2:00 Student 4
2:15 Student 5
2:30 - 2:40 ***Break***
2:40 Student 6
2:50 Student 7
3:00 Student 8
3:10 Student 9
3:20 Student 10

Note: MASc and PhD students will have 12 minutes for presentation followed by 3 minutes of questions and M.Eng students will have 8 minutes for presentation followed by 2 minutes of questions. Timelines will be strictly followed.

03:30 -3:40 p.m. **Closing remarks**

The pages that follow are the abstracts in the order of the time slots.

Student Name: Student 1
Student Number: xxxxxxxxxx
Degree: PhD
Supervisor(s) Name(s): Dr. Amir Hakami
Institution: Department of Civil Engineering – University of Ottawa

On the impacts of grid resolution on the estimates of marginal societal health benefits of emissions abatement

Air quality models (AQMs) are commonly used to quantify the health benefits of reducing air pollution. Grid resolution of an AQM is one of the parameters that affect estimates of marginal societal benefits of emissions abatement in metropolitan areas. The use of higher resolution is constrained by availability of sufficiently resolved inputs and computational costs. This work evaluates the impact of the horizontal grid resolution of CMAQ-ADJOINT on the population health benefit due to reductions in primary or precursor PM2.5 emissions. It examines two of the largest metropolitan areas in North America, modeled at progressively increased resolutions of 36 km, 12 km, 4 km, and 1 km during the summer of 2016. Our findings suggest that despite the increased sub-grid variability in benefit per ton (BPT) estimates with coarser resolutions, 12 km can be sufficient to estimate the total health burden in a metropolitan area. However, higher resolution modeling is required for any policy action locally.

Student Name: Student 2
Student Number: xxxxxxxxxx
Degree: Environmental Engineering PhD
Supervisor(s) Name(s): Dr. Paul Van Geel
Institution: Department of Civil Engineering – University of Ottawa

Development of a novel competitive adsorption model and its incorporation in a contaminant transport model to predict the behaviour of PFAS in a CAC barrier

Groundwater contamination by per – and polyfluoroalkyl substances (PFAS) is a global problem, and current treatment methods are expensive and/or inefficient. Attenuation of the PFAS plume by subsurface Colloidal Activated Carbon (CAC) sportive barrier is a potential interim alternative. However, when multiple PFAS are present, competitive adsorption can impact the longevity of the CAC barrier. Competitive adsorption is predicted using mathematical models such as the ideal adsorbed solution theory (IAST) and the competitive Langmuir model (CLM). This research evaluated existing competitive adsorption models and developed a new model, Modified CLM (MCLM), to predict the competitive adsorption equilibria of multiple PFAS on CAC. The findings indicate that none of the existing models accurately predict the competitive adsortion equilibria, but MCLM shows promise and suggests a relationship between PFAS competitive adsorption and their molecular weights. A 1D transport model was also developed for the prediction of breakthrough of PFAS from CAC-treated soils.

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Student Name: Student 3
Student Number: xxxxxxxxxx
Degree: Ph.D.
Supervisor(s) Name(s): Dr. Onita Basu
Institution: Carleton University, Environmental Engineering

Investigation of Environmental Applications of Graphene Oxide for Water Treatment Technology and Hydrogen Storage

Climate change, industrialization, and pollution have become some of the most urgent challenges of our time, necessitating the development of innovative and sustainable technologies for mitigating their negative impacts. Graphene oxide (GO) has emerged as a promising adsorbent for water treatment and hydrogen storage applications, owing to its unique layered structure, high surface area, and numerous functional groups. This study explores and evaluates the potential of GO as an effective alternative to conventional adsorbents for the removal of synthetic dyes. Further, this research investigates how GO can be used for hydrogen storage applications within the green energy sector. In particular this research examines the importance of different methods for characterizing GO to optimize its performance as an adsorbent for hydrogen storage. The findings provide valuable insights into Go's adsorption behaviour that can contribute to the development of more efficient and sustainable water treatment and hydrogen storage technologies.