

Graduate Studies Open House

Department of Civil & Environmental Engineering
July 24, 2007

Schedule

Time	Topic	Speaker
11:30-11:45	Overview of Grad Studies	Prof. Craig
11:45-12:00	Perspectives from Grad Students	Phil Schmidt, Mason Marchildon, Flávio Cunto & Nick Lawler
12:00-12:30	Departmental Research Brief	Profs. Craig, Saccomanno, Soudki, & Rothenberg
12:30-1:00	Pizza and Pop Talk with grad students and profs	

What is Graduate Studies?

- After graduation, you'll have options:
 - Starting a professional career in engineering or a related field
 - Living off the land

Or...

- You might choose to go on to graduate school...

What is Graduate Studies?

- Research and coursework beyond your BSc. Degree that leads to a
 - Masters (MAsc) or
 - Doctoral Degree (Ph.D.)

Why would you want to do that?

- ...You *actually* enjoy the intellectual challenge of university
- ...You want to earn more money over the course of your lifetime
 - \$8000-\$12000/yr x 40 years = ~\$400,000+!
- ...You want a better job than what you can get with just a BSc (maybe even be a professor?)
- ...You are not quite sure that the consulting world is right for you (i.e., you don't want to wear a suit)
- ...You want to advance the state of engineering practice and work on cutting edge science
- You've always wanted to be called "Doctor"

Why would you want to do that?

- It's a personal decision – not everybody is suited for grad school
- You have to be
 - Independent
 - Self-motivated
 - Intellectually curious
 - Have a brain this big:



MASc Program

- Admission requirement:
 - An honours bachelor degree (>75%) in your last two years of study
- Degree Requirements
 - 4 graduate courses (that's it?)
 - A RESEARCH THESIS (oh.)

MASc Program

- ALL Masters students are provided with a minimum salary of \$16,500/year
- Minimum funding \$5000/term
- Teaching Assistantship \$3407/term
- Tuition -\$2050/term
- Living on Ramen Noodles Priceless

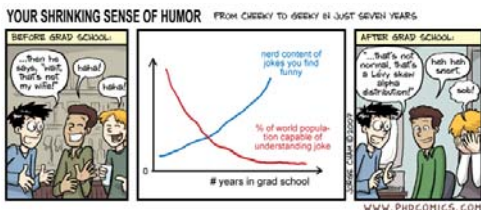
MASc Program

- Students with above an 80% in their last two years can get scholarships:
 - NSERC \$27,300/year
 - OGS \$25,000/year

Things to do if you are thinking about grad school

- URA -
 - Undergraduate Research Assistantship- 3 hrs/week
- Co-op
 - Contact a prof. you might like to work with
- “Fast-track” masters program
 - Not for the faint of heart
- Talk with your professors and TAs

Questions?



Graduate Student Presentations



THE GRAD STUDENT FORMS DENSELY PACKED COLONIES IN WHAT ARE KNOWN AS "STUDENT OFFICES" OR "LABS". THOUGH COMMUNICATION WITHIN THE SETTLEMENT IS RARE AND OFTEN CONSIDERED TABOO.

Why I Wanted to be a Graduate Student

- Initial interest in highway construction (4 years)
- Analytical/logical type of guy (Interest in research and problem solving)
- M.Sc and Ph.D. = Advanced skills for problem solving
- Consulting Firms and Public Agencies require advanced degrees (relatively stable jobs)
- Strong desire to become a Professor (after the M.Sc)

Why I Wanted to be a Graduate Student

- Rewards:
 - Money (Why not?)
 - 202 UW Profs making more than 100k (94k average)
 - Consulting: couple of UW M.Sc friends ~ 60-80k
 - Continuously learning and teaching (mentoring)
 - No routine, flexibility
 - Lots of traveling (conferences, meetings...)

Final Thought

“Being a Graduate Student is like building a solid foundation to support a rewarding life style”

Departmental Research

OK. So I might like grad school.
What would I do for my Masters thesis?
Who would I work with?



Departmental Research

- Environmental/Water Resources
- Transportation
- Structures, Mechanics, and Construction
- Geotechnical

Water/Environmental Area

- Water/Wastewater Treatment
- Surface Water Hydrology
- Contaminant Transport

Water/Wastewater Treatment

Professors:

Bill Anderson, Susan Andrews, Monica Emelko, Peter Huck (NSERC Chair), Wayne Parker, Sigrid Peldszus



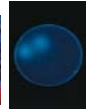
Research Focus:

- Improvements to water/wastewater treatment facilities
 - New or more efficient treatment technologies
 - Improved water supply systems
 - Alternative energy from biomass
- Investigation into aqueous chemical and biological processes
 - Disinfection byproducts
 - Emerging contaminants and pathogens

Water/Wastewater Treatment

Research Topics:

- Riverbank filtration / constructed wetlands
- Pathogen and contaminant removal
- Ultraviolet disinfection technologies
- Pharmaceuticals and endocrine disruptors
- Enhanced digestion of wastewater treatment sludges
- Modelling of wastewater treatment and sludge handling systems



Water/Wastewater Treatment

The Typical Treatment Grad Student:

- Will often have to don a white lab coat or steel-toed boots
- Interacts with treatment plant engineers and policy-makers
- Learns how to run sophisticated laboratory technology
- Runs on-site pilot studies of new treatment techniques
- Performs computer simulations of treatment plants and supply systems
- Designs and runs laboratory experiments on pathogens, drugs, and other contaminants
- Should get used to the smell of (1) chlorine or (2) "organic sludge"
- Gets a job working for (for example) federal, provincial, or municipal water authorities

Surface Water Hydrology

Professors:

Bill Annable, Don Burn, Bob McKillop, Ric Soulis, Bryan Tolson



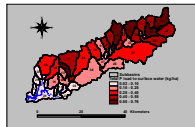
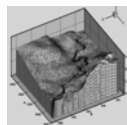
Research Focus:

- Improved hydrological forecasting and modelling
 - Extreme events, climate change, wetlands, and nutrient transport
 - Addressing problems of uncertainty and scale
- River restoration and rehabilitation
- Optimization with environmental models

Surface Water Hydrology

Research Topics:

- Coupling atmospheric, surface, and groundwater models
- Upscaling of hydrological processes
- River restoration and rehabilitation
- Including uncertainty in environmental models
- Characterizing extreme hydrologic events
- Surface water-groundwater interaction



Surface Water Hydrology

The Typical Hydro Grad Student:

- Wades through bogs and fens in waist-high galoshes
- Applies statistical methods to complicated hydrologic data sets
- Is obliged to learn FORTRAN
- Runs thousands of simulations on the Waterloo Parallel computer system, SharcNet
- Gains an excellent intuition into hydrological processes like interflow, runoff, and sublimation
- Sifts through millions of data points looking for *just one pattern* on which to base their thesis.
- May get to fly out to Yellowknife and enjoy the local bear population
- Gets a job working at (for example) Environment Canada or BC Hydro

Contaminant Transport

Professors:

James Craig, Jon Sykes, and Neil Thomson



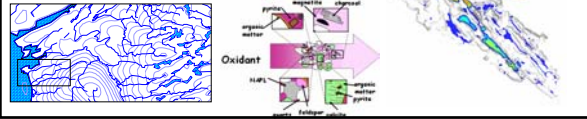
Research Focus:

- Computer simulation and analysis of polluted environmental systems
 - Fate and transport of contaminants, groundwater flow
 - Development of modelling tools for practitioners
- Data analysis, assimilation, and acquisition
 - GIS, site evaluation, large-scale data synthesis
- Novel remediation methods

Contaminant Transport

Research Topics:

- Impact of climate change on groundwater
- Subsurface measurement techniques
- Nuclear waste disposal
- Source water protection
- Contaminated site clean-up
- Watershed management



Contaminant Transport

The Typical CT Grad Student:

- Develops new software/models (programming)
- Learns state-of-the art modelling and analysis techniques (GIS, DBMS, Finite Element, etc.)
- Has spent at least 3 days looking for a single bug in the code
- Applies models to complicated systems with extensive data (and data uncertainty)
- Loves to solve puzzles
- Designs and operates field and column experiments
- Becomes an expert in on-site measurement devices
- Gets a job as (for example) a modelling consultant

Transportation Systems Research Area University of Waterloo

July 26, 2007

Transport Faculty



Dr. Lee Fu:

- Public Transport
- Logistics
- ITS



Dr. Jeff Casello:

- Transport Planning
- Travel Forecasting
- Public Transit



Dr. Bruce Hellinga:

- Traffic Modelling
- Traffic Operations
- Intelligent Transport Systems



Dr. Frank Saccomanno:

- Risk Assessment
- Accident Prediction
- Safety Simulation



Dr. Susan Tighe:

- Pavements
- Asset Management
- Life Cycle Analysis

Sample Research

- Safety
 - At-grade highway - rail crossings
 - Microscopic traffic safety models
- Pavement/Infrastructure
 - Life-cycle costing
 - Infrastructure management
 - Rehabilitation



Sample Research (cont'd)

- Traffic Control
 - Traffic signal control
 - Transit operations
 - Winter road maintenance

- Transportation Planning
 - Ridership forecasting for new transit services
 - Paratransit scheduling and analysis



Funding Agencies

- Public Sector:
 - Federal (e.g. Transport Canada, CFI, US)
 - Provincial (e.g. MTO)
 - Municipal (e.g. City of Toronto, Region of Waterloo)
- Private Sector:
 - Transportation consulting firms
 - Construction firms/suppliers
- Professional Associations
 - Transportation Association of Canada
 - ITS Canada

More Information



www.civil.uwaterloo.ca/transportation

Geotechnical Area

- Trenchless technologies
- Computational geomechanics
- Nondestructive evaluation of infrastructure

Geotechnical Area

Professors:

Mark Knight, Leo Rothenberg, Giovanni Cascante



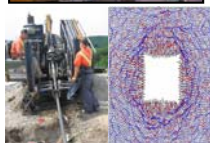
Research focus:

Design methods for trenchless technologies applications
 Prediction of soil behaviour using computer simulations
 Assessment of civil infrastructure using waves

Geotechnical Area

Research topics

- Impact of trenchless and open-cut pipeline installation on pavement deterioration
- Rehabilitation of and asset management of buried infrastructure
- Numerical simulations of granular materials
- Stability of offshore structures, rock salt, potash, and solution mining
- Nondestructive evaluation of concrete pipes, wooden poles, asphalt and concrete (laboratory and numerical tests)
- Measurement of dynamic properties of materials (resonant column)



Geotechnical Area

The Typical Geotechnical Grad Student:

- Interacts with geotechnical consultants
- Learns how to run sophisticated laboratory equipment and numerical simulations
- Develops computer codes
- Performs field tests even in the winter!
- Works for the petroleum, mining, and construction industries and government agencies

