Appendix A

Department of Civil Engineering, York University
Policies and Procedures for PhD Comprehensive Examination

1. Objectives
The objectives of the PhD Comprehensive Examination is to ensure that the PhD students, before being allowed to proceed to their PhD research activities, possess adequate knowledge in the major area of their PhD research project and have the ability to communicate that knowledge to their peers. It is expected that through passing of the PhD Comprehensive Examination, the PhD students will be able to demonstrate their:

- Grasp of relevant basic concepts in mathematics, science and engineering;
- Ability to use these concepts to solve complex engineering problems; and,
- Ability to handle facts, concepts and new ideas at the PhD level.

2. Timing
Each PhD student is required to pass a PhD Comprehensive Examination within the first 12 months of the student’s PhD program. It is anticipated that the majority of students will be able to complete this requirement within the first 12 months of their PhD degree program. As such, exceptions to the 12-month time limit will only be considered under exceptional circumstances (e.g. part-time students, personal situations beyond the student’s control, etc.) and must be approved by the Graduate Program Director (GPD).

3. Format
The PhD Comprehensive Examination will have two components: (i) a written component that involves the student’s being asked to solve a set of technical questions that are taken from undergraduate- and graduate-level materials in the major area of the student’s PhD research project; and (ii) an oral examination component that follows the written component. The purpose of the oral examination component is to allow the student an opportunity to offer further clarification on the written component and to allow for further assessment of the student’s knowledge.

4. Examination Committee
A separate Examination Committee will be formed for each PhD student. It will comprise the student’s supervisor, two research experts whose areas of expertise align closely with the major area of the student’s PhD research project, and the GPD (or the GPD’s designate), who will chair the Examination Committee. Normally, a research expert will be a member of the Department; however, upon consultation with the GPD, the student’s supervisor may invite someone from another Department at York or from industry. The student’s supervisor and the two research experts will be the voting members of the Examination Committee. The GPD (or the GPD’s designate) will be a non-voting member of the Examination Committee. In the case of joint supervision of the student by two or more faculty members, all the co-supervisors will collectively have a single vote on the Examination Committee.

The student will be informed of the composition of their Examination Committee at least four weeks before the Examination. The student will have the right to request to the Department Chair that any voting member of the Examination Committee be replaced if the student feels that past instances of personal conflict may potentially compromise the voting member’s objectivity.
5. Arrangements
All arrangements for this examination are the responsibility of the student's supervisor(s). Copies of the PhD Comprehensive Examination Request Form (attached at the end of this document) must be given to the GPD and to each member of the Examination Committee at least two weeks before the day on which the student will be given the set of technical questions for the written component of the Examination. From the day on which the student receives the set of technical questions, the student will have up to five business days to hand in the student's written response (solutions) to the questions to the GPD. The GPD will make copies of the student's written response and distribute it among the members of the Examination Committee. Members of the Examination Committee will have up to five business days to complete their assessment of the student's written response after which the oral component of the Examination will be scheduled. The GPD must be informed of the date of oral component of the Examination at least two weeks in advance.

6. Assessment
The outcome of the Examination will be described using the following categories:

(a) Pass
(b) Referred: The Examination Committee will use this category when one or more deficiencies have been identified in the student's performance in the written and/or oral (or both) components of the Examination. A set of corrective measures will be prescribed by the Examination Committee. The student's supervisor(s) must ensure the implementation of these corrective measures and will inform the GPD, in writing, of their successful implementation.
(c) Fail: A written report on both the written and the oral components of the Examination is required from the Chair of the Examination Committee in case of the student's failing the PhD Comprehensive Examination. The Examination Committee may recommend either the student's retaking of the Examination within six months or the student's withdrawal from the PhD program.

[Note: In the case of a second PhD Comprehensive Examination – either as a result of the Examination Committee's recommendation as outlined in Section 6(c) above, or because of the result of an appeal process as described in Section 7 below, the outcome of the second PhD Comprehensive Examination will be final. That is, no third PhD Comprehensive Examination will be allowed.]

7. Appeal Procedure
The procedure for a PhD student to appeal the composition or the decision of the Examining Committee will be as follows:

(a) If a student wishes to appeal the outcome of the Comprehensive Examination on procedural and/or academic grounds, the appeal must be lodged formally with the GPD, setting forth in writing the reasons why the student believes the academic decision is unjust. This should be done as early as possible after the decision is announced and, normally no later than five business days thereafter.
(b) If the matter has not been resolved by the GPD, and the student continues to believe that the academic decision is unjust, a formal request may be lodged for a review of the formal appeal by an Appeals Committee established by the GPD. The Appeal Committee should exclude the initial examiners on the student's Examination Committee.
(c) After reviewing the appeal, including interviewing the student and the members of the examination committee, the Appeals Committee may find that:
   (i) The decision is academically and procedurally sound; or,
(ii) An error in procedure or academic judgment has been made. In this case the Appeals Committee will proceed to rectify the error. This may include passing the student or allowing the student to repeat all or part of the Comprehensive Examination.

(d) If the GPD and the Appeals Committee find that the decision of the Comprehensive Examination Committee was academically and procedurally sound, the GPD may recommend to the York University Faculty of Graduate Studies (FGS) that the student be required to withdraw from the PhD program. The student may subsequently appeal such recommendation for withdrawal by following the procedures and policies of the FGS.

(e) Should the student not agree with the decisions rendered in Sections 7 (a) to (d), the student may formally appeal outside the departmental framework based on established University Grievance and Appeal Procedures and the Senate Statement on Grievance, Discipline and Related Matters.
PhD Comprehensive Examination Request Form

Please consult the Department of Civil Engineering’s Policies and Procedures for the PhD Comprehensive Examination before completing this form.

Student’s Name:_____________________________________________  Student Number:___________

Supervisor’s Name:_________________________________________________________
[In case of joint supervision, please provide names of all the co-supervisors.]

Research Project Title:_______________________________________________________

Major Area of Research:______________________________________________________

Proposed Date for the Written Component:__________________________

Proposed Date, Time and Location for the Oral Component:______________________

Examination Committee Members in addition to the Supervisor(s):

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<th>Expert Reviewer #1</th>
<th>Expert Reviewer #2</th>
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Examination Committee Chair (GPD or GPD’s Designate)

Name:________________  Email:________________

Signature of the Student:________________

Signature of the Supervisor(s):_______________________________________________

Approval of the Graduate Program Director (GPD):___________________________

Date:________________________
Appendix B

Department of Civil Engineering, York University
Policies and Procedures for Research Proposal Presentation and Defense

1. Objectives
The objective of the Research Proposal Presentation and Defense is to ensure that the student has conducted extensive literature review and background investigation in sufficient depth on the student’s PhD research project to be able to propose an original research program and have the necessary experimental and/or analytical tools to complete the research program.

2. Timing
Each PhD student is required to present a Proposal for the student’s PhD research in the form of a formal written document as well as in an open seminar format and to defend it before an Examination Committee within the first 24 months of the student’s PhD program. It is anticipated that the majority of students will be able to complete this requirement within the first 24 months of their PhD degree program. As such, exceptions to the 24-month time limit will only be considered under exceptional circumstances (e.g. part-time students, personal situations beyond the student’s control, etc.) and must be approved by the GPD.

The student is required to prepare a formal written Research Proposal, using the generally-accepted format for an NSERC Discovery Grant proposal. The student should discuss the merits of the student’s PhD research in the Research Proposal and expect it to be evaluated in the following areas:

- Originality and innovation;
- Expected contributions and their significance;
- Scope and clarity of the objectives;
- Appropriateness and clarity of the methodology; and,
- Feasibility of timely completion of the proposed research.

The Research Proposal document should use 25 mm (1”) margins, single line spacing and 12 point font and must be presented in 3500 or fewer words (excluding figures and tables). It must contain the following details:

- The student’s recent progress in research activities related to the proposal;
- A clear statement of both the short- and the long-term objectives;
- A comprehensive review of relevant literature;
- Proposed approach and methodology;
- Anticipated significance of the work; and
- Proposed timeline of research activities.

Copies of the Research Proposal must be made available to the members of the Examination Committee at least two weeks prior to the oral examination of the Research Proposal. At the beginning of the examination, the student will give a 20-minute presentation highlighting salient features of the Research Proposal. The questions asked by the examiners will be based primarily on the proposal but may also include related areas of Civil Engineering and other scientific disciplines that are relevant to the proposal.
4. Examination Committee
A separate Examination Committee will be formed for each PhD student. It will comprise the student's supervisor, two research experts whose areas of expertise align closely with the major area of the student’s PhD research project, and the GPD (or the GPD’s designate), who will chair the Examination Committee. Normally, a research expert will be a member of the Department; however, upon consultation with the GPD, the student’s supervisor may invite someone from another Department at York or from industry. The student’s supervisor and the two research experts will be the voting members of the Examination Committee. The GPD (or the GPD’s designate) will be a non-voting member of the Examination Committee. In the case of joint supervision of the student by two or more faculty members, all the co-supervisors will collectively have a single vote on the Examination Committee.

The student will be informed of the composition of their Examination Committee at least four weeks before the Examination. The student will have the right to request to the Department Chair that any voting member of the Examination Committee be replaced if the student feels that past instances of personal conflict may potentially compromise the voting member’s objectivity.

5. Arrangements
All arrangements for this examination are the responsibility of the student’s supervisor(s). Copies of the Research Proposal Examination Request Form (attached at the end of this document) and the Research Proposal document must be given to the GPD and to each member of the Examination Committee at least two weeks before the scheduled day of the examination. The GPD must be notified of the scheduled date of the Examination at least two weeks prior to the examination.

6. Assessment
The outcome of the Examination will be described using the following categories:

(a) **Pass**
(b) **Referred**: The Examination Committee will use this category when one or more deficiencies have been identified in the student’s performance in the written and/or oral (or both) components of the Examination. A set of corrective measures will be prescribed by the Examination Committee. The student’s supervisor(s) must ensure the implementation of these corrective measures and will inform the GPD, in writing, of their successful implementation.
(c) **Fail**: A written report on both the written and the oral components of the Examination is required from the Chair of the Examination Committee in case of the student’s failing the Research Proposal Presentation and Defense. The Examination Committee may recommend either the student’s presenting and defending an improved version of the Research Proposal within three months or the student’s withdrawal from the PhD program.

[Note: In the case of a second presentation and defense of the Research Proposal – either as a result of the Examination Committee’s recommendation as outlined in Section 6(c) above, or because of the result of an appeal process as described in Section 7 below, the outcome of the second presentation and defense of the Research Proposal will be final. That is, no third presentation and defense of the Research Proposal will be allowed.]
7. Appeal Procedure
The procedure for a PhD student to appeal the composition or the decision of the Examining Committee will be as follows:

(a) If a student wishes to appeal the outcome of the Research Proposal Presentation and Defense on procedural and/or academic grounds, the appeal must be lodged formally with the GPD, setting forth in writing the reasons why the student believes the academic decision is unjust. This should be done as early as possible after the decision is announced and, normally no later than five business days thereafter.

(b) If the matter has not been resolved by the GPD, and the student continues to believe that the academic decision is unjust, a formal request may be lodged for a review of the formal appeal by an Appeals Committee established by the GPD. The Appeal Committee should exclude the initial examiners on the student’s Examination Committee.

(c) After reviewing the appeal, including interviewing the student and the members of the examination committee, the Appeals Committee may find that:

(i) The decision is academically and procedurally sound; or,

(ii) An error in procedure or academic judgment has been made. In this case the Appeals Committee will proceed to rectify the error. This may include passing the student or allowing the student to repeat all or part of the Research Proposal Presentation and Defense.

(d) If the GPD and the Appeals Committee find that the decision of the Examination Committee was academically and procedurally sound, the GPD may recommend to the York University Faculty of Graduate Studies (FGS) that the student be required to withdraw from the PhD program. The student may subsequently appeal such recommendation for withdrawal by following the procedures and policies of the FGS.

(e) Should the student not agree with the decisions rendered in Sections 7 (a) to (d), the student may formally appeal outside the departmental framework based on established University Grievance and Appeal Procedures and the Senate Statement on Grievance, Discipline and Related Matters.
Department of Civil Engineering, York University

Research Proposal Presentation and Defense Request Form

Please consult the Department of Civil Engineering’s Policies and Procedures for Research Proposal Presentation and Defense before completing this form.

Student’s Name:__________________________________________  Student Number:__________

Supervisor’s Name:_________________________________________________________

[In case of joint supervision, please provide names of all the co-supervisors.]

Research Project Title:_______________________________________________________

Major Area of Research:_____________________________________________________

Date and Time for the Presentation and Defense:_______________________________

Venue:_____________________________________________________________________

Examination Committee Members in addition to the Supervisor(s):

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<tr>
<th>Expert Reviewer #1</th>
<th>Expert Reviewer #2</th>
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Examination Committee Chair (GPD or GPD’s Designate)

Name:__________________________________________  Email:_____________________________________

Signature of the Student:________________________

Signature of the Supervisor(s):__________________________________________

Approval of the Graduate Program Director (GPD):___________________________

Date:________________________
### Appendix C

**Short Descriptions for Graduate-level Courses in Civil Engineering**

Short calendar descriptions are presented in this Appendix for the following graduate-level courses in Civil Engineering.

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<tr>
<td>GS/CML 6002</td>
<td>MASc Thesis</td>
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<td>15/16</td>
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**LEGEND:**

- **Course Coding:**
  - **Environmental:** E
  - **Geotechnical:** G
  - **Geoenvironmental:** GE
  - **Structural:** S
  - **Transportation:** T
  - **Water Resources:** WR
  - **Departmental:** D
  - **Faculty:** AE
  - **Faculty:** CL
  - **Faculty:** GE
  - **Faculty:** MK
  - **Faculty:** JS
  - **Faculty:** RsB
  - **Faculty:** RpB
  - **Faculty:** Ryley Beddoe
  - **Faculty:** Sabbir Saiyed
  - **Faculty:** Ahmed Elyadi
  - **Faculty:** Cao Laifa (Adjunct)
  - **Faculty:** Dan Palermo
  - **Faculty:** Magdalena Krol
  - **Faculty:** Rashid Bashir
  - **Faculty:** New Hire - Environmental
  - **Faculty:** New Hire - Geotechnical
  - **Faculty:** New Hire - Geoenvironmental
  - **Faculty:** New Hire - Structural
  - **Faculty:** New Hire - Transport
  - **Faculty:** New Hire - Water Resources

- **Course Type:**
  - **Environmental:** 611X for Fall courses; 612X for Winter courses.
  - **Geotechnical:** 621X for Fall courses; 622X for Winter courses.
  - **Geoenvironmental:** 631X for Fall courses; 632X for Winter courses.
  - **Structural:** 641X for Fall courses; 642X for Winter courses.
  - **Transportation:** 651X for Fall courses; 652X for Winter courses.
  - **Water Resource:** 661X for Fall courses; 662X for Winter courses.

- **Department:**
  - **Environmental:** GS/CIVL
  - **Geotechnical:** GS/CIVL
  - **Geoenvironmental:** GS/CIVL
  - **Structural:** GS/CIVL
  - **Transportation:** GS/CIVL
  - **Water Resources:** GS/CIVL
  - **Department:** GS/CIVL
  - **Department:** GS/CIVL
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Area</th>
<th>Time Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS/CIVL 6110</td>
<td>Physical Principles of Environmental Engineering</td>
<td>3</td>
<td>Environmental</td>
<td>2015-16 Fall</td>
</tr>
<tr>
<td></td>
<td>This course introduces the student to aspects of fundamentals and applications of mass, momentum, and heat transport in environmental engineering and will be introduced to concepts of advection, diffusion, dispersion, settling, surface transfer, kinetics and equilibrium processes in air, water and soil. This course is composed of 3 stand-alone modules. There are no prerequisites for this course.</td>
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</tr>
<tr>
<td>GS/CIVL 6120</td>
<td>Environmental Bioengineering Processes</td>
<td>3</td>
<td>Environmental</td>
<td>2015-16 Winter</td>
</tr>
<tr>
<td></td>
<td>This course introduces the student to aspects of molecular biology of environmental engineering processes and will be introduced to modern techniques and practices in biotechnology and bioengineering and develops the basic skills required to design an environmental biotechnology. This course is composed of 3 stand-alone modules. There are no prerequisites for this course.</td>
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</tr>
<tr>
<td>GS/CIVL 6111</td>
<td>Advanced Laboratory Analytical Methods</td>
<td>3</td>
<td>Environmental</td>
<td>2016-17 Fall</td>
</tr>
<tr>
<td></td>
<td>This course is aimed specifically at Engineers who need a broad base introduction to analytical instrumentation tools for the measurement of different chemical, structure, and biological properties and processes. This course is composed of 3 stand-alone modules. There are no prerequisites for this course.</td>
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<tr>
<td>GS/CIVL 6121</td>
<td>Air Pollution Engineering</td>
<td>3</td>
<td>Environmental</td>
<td>2016-17 Winter</td>
</tr>
<tr>
<td></td>
<td>This course is aimed at preparing the students to the diverse nature of the air pollution problem, and atmospheric dispersion of air pollutants and is composed of 3 stand-alone modules. There are no prerequisites for this course.</td>
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<tr>
<td>GS/CIVL 6100</td>
<td>Special Topics in Environmental Engineering</td>
<td>3</td>
<td>Environmental</td>
<td>2016-17 Fall/Winter</td>
</tr>
<tr>
<td></td>
<td>This course is a placeholder for Directed Reading courses in Environmental Engineering. A new course in Environmental Engineering may be offered as a Directed Reading course, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.</td>
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<tr>
<td>GS/CIVL 6210</td>
<td>Advanced Soil Mechanics</td>
<td>3</td>
<td>Geotechnical</td>
<td>2015-16 Fall</td>
</tr>
<tr>
<td></td>
<td>Soil properties and behaviour examined using Critical State Soil Mechanics (CSSM). Topics include: soil as a geomaterial; soil properties and their measurement; soil constitutive modelling; isotropic and anisotropic elastic models; plasticity theory; elastic-plastic model; Cam-clay model; critical states; shear strength of soils; stress-dilatancy; elastic-viscoplastic model; applications of elastic-plastic soil models. Students are expected to have completed an undergraduate course in Soil Mechanics or an equivalent course.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
<td>Area: Geotechnical</td>
<td>Time: 2015-16</td>
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<tr>
<td>GS/CIVL 6211</td>
<td>Geosynthetics</td>
<td>3</td>
<td>Once per year</td>
<td>Fall</td>
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<td></td>
<td>This course provides students a fundamental understanding of geosynthetic design for a geotechnical engineer. The 3-module course focuses on the manufacturing and industrial applications of a wide variety of geosynthetics, design calculations and considerations and evaluation of a geosynthetic design failure. There are no prerequisites for this course.</td>
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<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Area: Geotechnical</th>
<th>Time: 2015-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS/CIVL 6212</td>
<td>Unsaturated Soil Mechanics</td>
<td>3</td>
<td>Once per year</td>
<td>Fall</td>
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<tr>
<td></td>
<td>This 3-module course provides students a fundamental understanding of the basic principles of unsaturated soil mechanics presented as an extension of classical saturated soil mechanics. Students are expected to have completed soil mechanics/geotechnical engineering course at the undergraduate level.</td>
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<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Area: Geotechnical</th>
<th>Time: 2015-16</th>
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</thead>
<tbody>
<tr>
<td>GS/CIVL 6220</td>
<td>Advanced Foundation Design</td>
<td>3</td>
<td>Once per year</td>
<td>Winter</td>
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<td></td>
<td>This course presents the planning, analysis, and design of shallow and deep foundations at an advanced level. This course is designed to fully prepare a student to carry out sub-surface investigations, analysis and design of shallow and deep foundations.</td>
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<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Area: Geotechnical</th>
<th>Time: 2015-16</th>
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</thead>
<tbody>
<tr>
<td>GS/CIVL 6221</td>
<td>Geotechnical Modelling</td>
<td>3</td>
<td>Once per year</td>
<td>Winter</td>
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<td></td>
<td>Principles and applications of theoretical, numerical and physical modelling in geotechnical engineering. Topics include: Introduction to modelling; idealization of soil behaviour; constitutive modelling; numerical modelling; physical modelling; centrifuge modelling; theoretical modelling. Applications include: embankments; soft ground tunnelling; dams; retaining walls; foundations; soil reinforcement; soil-structure interaction.</td>
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<tr>
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<th>Area: Geotechnical</th>
<th>Time: 2015-16</th>
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<tbody>
<tr>
<td>GS/CIVL 6222</td>
<td>Geohazards</td>
<td>3</td>
<td>Once per year</td>
<td>Winter</td>
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<td></td>
<td>This course is designed to develop a student’s understanding of how geohazards impact geotechnical engineers. The course will be delivered in 3 stand-alone modules, designed to first develop the student’s knowledge on the triggers, mechanisms and risks associated with geohazards such as earthquakes, volcanic eruptions, floods, tsunami’s before focusing on landslide susceptibility and risk specifically in Modules 2 &amp; 3.</td>
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<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Area: Geotechnical</th>
<th>Time: 2016-17</th>
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</thead>
<tbody>
<tr>
<td>GS/CIVL 6213</td>
<td>Geotechnical Laboratory and Field Testing</td>
<td>3</td>
<td>Once per year</td>
<td>Fall</td>
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<tr>
<td></td>
<td>This 3-module course investigates soil behaviour through hands-on geotechnical in situ and laboratory techniques. The course will develop the student’s knowledge of core geotechnical laboratory tests used in industry, working towards state of the art field investigation techniques. Classwork will also include design, execution and evaluation of the testing methodology and results. There are no prerequisites for this course.</td>
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<tr>
<td>GS/CIVL 6223</td>
<td>Ground Improvement Techniques</td>
<td>3</td>
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<tr>
<td>Area: Geotechnical</td>
<td>2016-17 Winter</td>
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<tr>
<td>Once per year</td>
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<tr>
<td>Principles and applications of ground improvement techniques. Topics include: Densification, compaction, prefabricated drains (PVDs), vacuum preloading, electrokinetics, chemical stabilization, soil freezing, grouting, soil reinforcement using geosynthetics, anchors, nails and micropiles, stone columns, deep cement mixing (DCM) columns.</td>
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<tbody>
<tr>
<td>GS/CIVL 6200</td>
<td>Special Topics in Geotechnical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Area: Geotechnical</td>
<td>2016-17 Fall/Winter</td>
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<td>On Demand</td>
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<tr>
<td>This course is a placeholder for Directed Reading courses in Geotechnical Engineering. A new course in Geotechnical Engineering may be offered as a Directed Reading course, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.</td>
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<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>GS/CIVL 6310</td>
<td>Advanced Hydrogeology</td>
<td>3</td>
</tr>
<tr>
<td>Area: Geoenvironmental</td>
<td>2015-16 Fall</td>
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<tr>
<td>Once per year</td>
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<tr>
<td>This course advances the student's knowledge of undergraduate hydrogeology through theory, field visits, and computer simulations and is composed of 3 stand-alone modules. The course will focus on saturated and unsaturated flow in porous media, followed by mechanics of pumping of confined and unconfined aquifers. There are no prerequisites for this course.</td>
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<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>GS/CIVL 6320</td>
<td>Flow and Transport in the Vadose Zone</td>
<td>3</td>
</tr>
<tr>
<td>Area: Geoenvironmental</td>
<td>2015-16 Winter</td>
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<tr>
<td>Once per year</td>
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<tr>
<td>This 3-module course provides students a fundamental understanding of the flow and transport in the vadose zone. Theoretical as well as applied aspects of various processes and mechanisms of flow and transport are presented within the context of contaminant migration and remediation.</td>
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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>GS/CIVL 6321</td>
<td>Contaminant Hydrogeology</td>
<td>3</td>
</tr>
<tr>
<td>Area: Geoenvironmental</td>
<td>2015-16 Winter</td>
<td></td>
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<tr>
<td>Once per year</td>
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<tr>
<td>This course introduces students to contaminant hydrogeology through theory, field visits, and computer simulations and is composed of 3 stand-alone modules that focus on contaminant fate and transport, multiphase flow and fractured networks, and end with an investigation into new and emerging environmental pollutants. There are no prerequisites for this course.</td>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>GS/CIVL 6311</td>
<td>Flow and Transport in the Vadose Zone</td>
<td>3</td>
</tr>
<tr>
<td>Area: Geoenvironmental</td>
<td>2016-17 Fall</td>
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<tr>
<td>Once per year</td>
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<tr>
<td>This course outlines the design and operation of site remediation activities and is composed of 3 stand-alone modules. It expands the students' knowledge about subsurface contaminant fate and transport and delves into site remediation technologies. The course will include a site visit to an active remediation site and introduce students to new and emerging technologies. There are no prerequisites for this course.</td>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>GS/CIVL 6300</td>
<td>Special Topics in Geoenvironmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Area: Geoenvironmental</td>
<td>2016-17 Fall/Winter</td>
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<tr>
<td>On Demand</td>
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</tr>
<tr>
<td>This course is a placeholder for Directed Reading courses in Geoenvironmental Engineering. A new</td>
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</table>
A course in Geoenvironmental Engineering may be offered as a Directed Reading course, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

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<tbody>
<tr>
<td>GS/CIVL 6410</td>
<td>Advanced Reinforced Concrete Design</td>
<td>3</td>
</tr>
<tr>
<td>Area: Structural</td>
<td>2015-16 Fall</td>
<td>Once per year</td>
</tr>
<tr>
<td>This 3 module course provides students with an understanding of advanced topics in reinforced concrete analysis and design. The content focuses on detailed sectional analysis, slender columns and strut and tie models, and the Modified Compression Field Theory for shear design. Students are expected to have completed reinforced concrete design at the undergraduate level.</td>
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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>GS/CIVL 6411</td>
<td>Structural Dynamics and Earthquake Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Area: Structural</td>
<td>2015-16 Fall</td>
<td>Once per year</td>
</tr>
<tr>
<td>This 3-module course provides students with an introduction to modern seismology, ground-faulting and characteristics of earthquakes, derivation of the dynamic equations of motion of multi-degree of freedom systems, time-history analysis to ground excitations, damping, nonlinear hysteresis, nonlinear spectra, modal properties, analysis in the frequency domain, torsional response of structures, performance limit states and principles of base isolation.</td>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>GS/CIVL 6420</td>
<td>Advanced Prestressed Concrete</td>
<td>3</td>
</tr>
<tr>
<td>Area: Structural</td>
<td>2015-16 Winter</td>
<td>Once per year</td>
</tr>
<tr>
<td>This course provides students with an understanding of the mechanics and fundamental concepts of prestressed reinforced concrete. The content will include analysis and design principles according to Canadian design standards. The course will culminate with an applied design project of a prestressed concrete structure. Students are expected to have completed reinforced concrete design at the undergraduate level.</td>
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<th>Course Title</th>
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<tbody>
<tr>
<td>GS/CIVL 6421</td>
<td>Seismic Design of Reinforced Concrete Structures</td>
<td>3</td>
</tr>
<tr>
<td>Area: Structural</td>
<td>2015-16 Winter</td>
<td>Once per year</td>
</tr>
<tr>
<td>This 3-module course provides students with an introduction to seismic design of reinforced concrete structures. Topics range from a review of seismic hazard to the requirements of the National Building Code to state of the art in seismic design philosophy. Students are expected to have completed reinforced concrete design at the undergraduate level. Structural Dynamics &amp; Earthquake Engineering (GS/CIVL 6411) is a prerequisite.</td>
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<tbody>
<tr>
<td>GS/CIVL 6413</td>
<td>Advanced Structural Steel Design</td>
<td>3</td>
</tr>
<tr>
<td>Area: Structural</td>
<td>2016-17 Fall</td>
<td>Once per year</td>
</tr>
<tr>
<td>This 3-module course provides students with an understanding of advanced topics in the design of steel structures. Topics will include principles of local and global buckling and stability; plastic design of steel structures; plate girders; and composite members. Emphasis will be placed on overall structural analysis and design. Students are expected to have completed structural steel design at the undergraduate level.</td>
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<td>Course Title</td>
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<tr>
<td>GS/CIVL 6414</td>
<td>Bridge Engineering</td>
<td>3</td>
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<td>This 3-module course provides students with tools in bridge engineering from an understanding of bridge loads, to simplified and advanced methods of analysis, to planning and selection of bridge systems, to design of reinforced concrete, structural steel, and prestressed reinforced bridges and their management, maintenance and monitoring, including corrosion repair. Students are expected to have completed reinforced concrete and structural steel design courses at the undergraduate level.</td>
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<tr>
<td>GS/CIVL 6422</td>
<td>Advanced Topics in Structural Engineering</td>
<td>3</td>
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<td></td>
<td>This 3-module course comprises cutting-edge, new concepts and technological developments in structural engineering. Topics include: computer-based modelling of structures; seismic assessment of existing structures; and, novel construction materials in structural engineering. These topics are presented as three stand-alone modules.</td>
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<tr>
<td>GS/CIVL 6400</td>
<td>Special Topics in Structural Engineering</td>
<td>3</td>
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<td></td>
<td>This course is a placeholder for Directed Reading courses in Structural Engineering. A new course in Structural Engineering may be offered as a Directed Reading course, depending on the needs of a graduate student's research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.</td>
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<tr>
<td>GS/CIVL 6510</td>
<td>Advanced Transportation Engineering</td>
<td>3</td>
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<tr>
<td></td>
<td>This course deals with fundamentals of transportation engineering, essential elements of geometric design of highways, traffic safety, and principles of transportation planning and traffic demand forecasting. It is presented as three stand-alone modules. There are no prerequisites for this course.</td>
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<tr>
<td>GS/CIVL 6520</td>
<td>Pavement Materials, Analysis and Design</td>
<td>3</td>
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<td></td>
<td>This 3-module course provides students with an introduction to sustainable design of pavements for highways, airports and other industrial applications. Pavement materials and principles of analysis and design of pavements are covered in detail. It is presented as three stand-alone modules. There are no prerequisites for this course.</td>
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<tr>
<td>GS/CIVL 6511</td>
<td>Intelligent Transportation Systems</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>This course introduces the students to essential features of intelligent transportation systems (ITS) and provides them with the opportunity to explore and investigate the applications of ITS in delivering safe and efficient transportation systems and in preserving of transportation assets. It is presented as three stand-alone modules. There are no prerequisites for this course.</td>
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<td>This course is designed to provide students with a strong theoretical and methodological foundation in road safety analysis. It focuses on the analysis of road accident data, the evaluation of safety countermeasures, the roadway safety management process, and the roadway design consistency. It is presented as three stand-alone modules. There are no prerequisites for this course.</td>
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<td>This course is a placeholder for Directed Reading courses in Transportation Engineering. A new course in Transportation Engineering may be offered as a Directed Reading course, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.</td>
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<td>This course is a placeholder for Directed Reading courses in Water Resources Engineering. A new course in Water Resources Engineering may be offered as a Directed Reading course, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.</td>
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<td>The Graduate Seminar Series comprises at least twelve individual seminar events organized by the Department of Civil Engineering approximately once a month throughout the academic year and an annual conference-style all-day Graduate Symposium in which MASc and PhD students give presentations based on their respective research projects. Each MASc student is expected to give at least one presentation at the Graduate Symposium. Each PhD student is expected to give at least two presentations at the Graduate Symposium. All graduate students (MASc and PhD) are required to attend at least 10 graduate seminars during the course of their respective degree programs.</td>
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<td>Thesis requirement for Doctor of Philosophy (PhD) degree in Civil Engineering. All PhD students must maintain a continuous registration in this course for the entire duration of their degree program. There are no prerequisites for this course.</td>
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**Area:** Transportation  
**2015-16 Fall**  
**Continuous**

Thesis requirement for Master of Applied Science (MASc) degree in Civil Engineering. All MASc students must maintain continuous registration in this course for the entire duration of their program. There are no prerequisites for this course.
### Appendix D

**Full Course Proposals for Graduate-level Courses in Civil Engineering**

Full course proposals are presented in this Appendix for the following graduate-level courses in Civil Engineering.

<table>
<thead>
<tr>
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| Environmental: 611X for Fall courses; 612X for Winter courses. | GS/CIVL | Physical Principles of Environmental Engineering | E | AE | Ahmed Eldyasti |
| Geotechnical: 621X for Fall courses; 622X for Winter courses. | GS/CIVL | Environmental Bioengineering Processes | E | AE | Dan Palermo |
| Structural: 641X for Fall courses; 642X for Winter courses. | GS/CIVL | Advanced Soil Mechanics | G | JS | Rashid Bashir |
| Transport: 651X for Fall courses; 652X for Winter courses. | GS/CIVL | Advanced Transportation Engineering | T | SS | Magdalena Krol |
| Water Resource: 661X for Fall Courses; 662X for Winter courses. | GS/CIVL | Special Topics in Water Resources Engineering | WR | NH-WR | New Hire - Geotechnical |

| Environmental: 611X for Fall courses; 612X for Winter courses. | GS/CIVL | Physical Principles of Environmental Engineering | E | AE | Ahmad Eldyasti |
| Geotechnical: 621X for Fall courses; 622X for Winter courses. | GS/CIVL | Environmental Bioengineering Processes | E | AE | Dan Palermo |
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| Water Resource: 661X for Fall Courses; 662X for Winter courses. | GS/CIVL | Special Topics in Water Resources Engineering | WR | NH-WR | New Hire - Geotechnical |

**Course Coding:**

- **E** Environmental
- **G** Geotechnical
- **GE** Geoenvironmental
- **S** Structural
- **Transportation**
- **WR** Water Resources
- **D** Departmental
- **F** Fall Term
- **W** Winter Term
- **CU** Credit Units
- **PI** Principal Instructor
- **SI-1** First Backup Instructor
- **SI-2** Second Backup Instructor

**Faculty:**

- **AE** Ahmed Eldyasti
- **CL** Cao Lasia (Adjunct)
- **DP** Dan Palermo
- **MK** Magdalena Krol
- **JS** Jit Sharma
- **RaB** Rashid Bashir
- **RyB** Ryley Beddoe
- **SS** Sаббир Saiyed (Adjunct)
- **NH-E** New Hire - Environmental
- **NH-T** New Hire - Transport
- **NH-WR** New Hire - Water Resources
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6110

3. **Credit Value**: 3 Credits (1 Credit per module)

4. **Long Course Title**: Physical Principles of Environmental Engineering

5. **Short Course Title**: Physical Principles of Environmental Engineering

6. **Effective Session**: Fall 2015

7. **Calendar (Short) Course Description**: 
   This course is aimed at preparing the students to the diverse nature of the physical principles of environmental engineering. This course is composed of 3 stand-alone modules. There are no prerequisites for this course.

8. **Expanded Course Description**: 
   This course introduces the student to aspects of fundamentals and applications of mass, momentum, and heat transport in environmental engineering and will be introduced to concepts of advection, diffusion, dispersion, settling, surface transfer, kinetics and equilibrium processes in air, water and soil. This course will be composed of 3 stand-alone modules. The first module will introduce the students to address the student to the concepts of molecular and turbulent diffusion, advection, generalized mass balance equations, dispersion, dispersion in porous media, and dispersion modeling. The second module will discuss the application of physical principles in natural environment, while the third module will cover the application of physical principles in treatment of environmental problems. Details of the modules can be found below

**Module 1: Introduction to Physical Principles of Environmental Engineering**
   This module will introduce students to perform simple conceptual of molecular and turbulent diffusion, advection, generalized mass balance equations, dispersion, dispersion in porous media, dispersion modeling, fundamentals of mass and heat transfer, mass transfer in physical situations, fundamentals of momentum transport, velocity distributions in laminar and turbulent flows, equation of continuity, equation of motion. At the completion of this component, students will have the background to apply the physical principles to different environmental system.

**Module 2: Applications in Natural Environment**
   Module 2 will help the students to understand the principal aspects of natural problems where different physical principles can be applied, water quality modeling in rivers and lakes, DO sag curve (Streeter-Phelps equation), transport processes in water bodies, interphase mass transfer, groundwater quality,
atmospheric dispersion, chimney plume characteristics, pollution of soil and groundwater by leaching of agricultural and industrial wastes. At the end of this module, students can understand the application of physical principal in natural environment.

Module 3: Applications in Treatment of Environmental Problems
The last module focuses on the application of water, wastewater and air treatment: sedimentation, flocculation, thickening, filtration, absorption, adsorption, ion-exchange, membrane separation, air stripping, gas-solid separation. At the end of this module, students will be able to pursue and explore further research areas in the field.

9. Evaluation:

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<td><strong>TOTAL</strong></td>
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10. Integrated Courses: N/A

11. Rationale:
Physical Principles is an important topic to cover the general objectives of the civil engineering department of sustainable development. This course including the three modules will help the students to obtain a solids foundation of the physical principles and the contribution of it in the climate change and different engineering technologies.

12. Faculty Resources:
The faculty members qualified to teach this course are: Dr. Ahmed Eldyasti and one or more of future hires in Environmental Engineering area within the Department of Civil Engineering. All Modules will be offered once a year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:
Module 1, 2 & 3:

Transport Modeling for Environmental Engineers and Scientists, Mark M. Clark, John Wiley and Sons, 1996.


15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course will be acquired before the first offering of this course in Fall 2015.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6120

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Environmental Bioengineering Processes

5. **Short Course Title:** Environmental Bioengineering Processes

6. **Effective Session:** Winter 2016

7. **Calendar (Short) Course Description:**
   This course is aimed at preparing the students to the diverse nature of the environmental bioengineering and biotechnology processes. This course is composed of 3 stand-alone modules. There are no prerequisites for this course.

8. **Expanded Course Description:**
   This course introduces the student to aspects of molecular biology of environmental engineering processes and will be introduced to modern techniques and practices in biotechnology and bioengineering and develops the basic skills required to design an environmental biotechnology. This course will be composed of 3 stand-alone modules. The first module will introduce the students to genes and genome, DNA, and microbial background. This module will also help the student to apply knowledge of microbiology to the design of bioengineering systems. The second module will discuss the biological wastewater treatment process including aerobic and anaerobic treatment process for wastewater, while the third module will focus on the advanced bioelectrochemical technology to generate bioenergy from wastewater and biosolids. The understanding of this advanced module will help the student to pursue and explore further research areas in the field. Details of the modules can be found below

**Module 1:** **Introduction to biotechnology and bioengineering systems**
   This module will introduce students to perform simple genes and genome, DNA, and microbial background in bioenvironmental process with a focus on the basic definition, feature, classifications, morphology, cell size, cell structure, cytoplasmic membrane of microorganisms. This module will introduce the student to the concept of gram positive bacteria and gram negative bacteria and the metabolism of different types of micro-organisms. At the completion of this component, students will have the background to apply this fundamental background to different biotechnology system.

**Module 2:** **Biological treatment process**
Module 2 will help the students to understand the principal aspects of biological treatment processes for wastewater and biosolids by defining the important design parameters of such biosystem. This module will develop a thorough understanding of biochemical reactions occurring in wastewater treatment processes including utilization of various non-inhibitory biokinetic models both in suspended-growth and attached-growth bioreactors. At the end of this module, students can design different types of biotechnology.

Module 3: **Advanced biological treatment process**

The last module focuses on the design and calculation focus on the advanced bioelectrochemical technology to generate bioenergy from wastewater and biosolids including: microbial fell cells (MFC), biocatalyzed electrolysis cells (BECs); and microbial electrolysis cells (MECs), etc. At the end of this module, students will be able to pursue and explore further research areas in the field.

9. **Evaluation:**

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<tr>
<th>Module 1:</th>
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<td>Team Presentation</td>
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<td><strong>TOTAL</strong></td>
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10. **Integrated Courses:** N/A

11. **Rationale:**

Biotechnology and bioengineering is an important topic to cover the general objectives of the civil engineering department of sustainable development. This course including the three modules will help the students to obtain a solids foundation of the Biotechnology and bioengineering and the contribution of it in the climate change and different engineering technologies to control this pollutions and even generate bioenergy.

12. **Faculty Resources:**
The faculty members qualified to teach this course are: Dr. Ahmed Eldyasti and one or more of the future hires in Environmental Engineering within the Department of Civil Engineering. All Modules will be offered once a year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

Module 1, 2 & 3:


15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available free of charge.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6111

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Advanced Laboratory Analytical Methods in Civil and Environmental Engineering

5. **Short Course Title:** Advanced Laboratory Analytical Methods

6. **Effective Session:** Winter 2016

7. **Calendar (Short) Course Description:**
   This course is aimed specifically at Engineers who need a broad base introduction to analytical instrumentation tools for the measurement of different chemical, structure, and biological properties and processes. This course is composed of 3 stand-alone modules. There are no prerequisites for this course.

8. **Expanded Course Description:**
   The course covers fundamentals of modern analytical instrumentation, providing general background theory and principles of operation. The course will be composed of 3 stand-alone modules. The first module will introduce the students to the chemical or physical principles exploited during analytical separations measurement, a description of how the instrument carries the measurement and some of the techniques used to increase accuracy, precision and sensitivity. The second module will discuss different methods for spectroscopy including: atomic, optical absorption, vibrational, and mass spectroscopy methods, while the third module will focus on different techniques for microscopy. Details of the modules can be found below:

**Module 1: Analytical Separations**
This module will introduce students to the basic of analytical separations using the gas and liquid chromatography. This course will focus on application of analytical methods for specific applications in chemical and environmental Engineering. At the completion of this component, students will have the fundamental and laboratory background to apply gas and liquid chromatography to chemical and environmental case studies.

**Module 2: Spectroscopy**
This module will teach students the theory of spectroscopy including atomic structure, the electromagnetic spectrum, light and matter, Interactions of light with matter, and the general instrumentation used to measure the interaction of light with matter. At the end of this module, students will understand how to use atomic, optical absorption, vibrational, and mass spectroscopy methods for
Module 3: Microscopy

This module will teach students the theory of Microscopy including: optical, scanning electron microscopy (SEM), environmental scanning electron microscope (ESEM), transmission electron microscopy (TEM), Reflection electron microscope (REM), and confocal microscopy (ConM). At the end of this module, students will understand how to use microscope and apply this techniques to related research area for different civil and environmental applications.

9. Evaluation:

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<th>Module 1:</th>
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<th>Module 3:</th>
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<td>Team project and presentation</td>
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<td>Term paper</td>
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<td><strong>TOTAL</strong></td>
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10. Integrated Courses: N/A

11. Rationale:

Fundamentals of modern analytical instrumentation are an important topic for the civil and environmental engineering students. This course including the three modules will help the students to obtain a solids foundation of the fundamental background of the chemical and/or physical principles exploited during analytical separations measurement in addition to a discussion of the different methods for spectroscopy and microscopy.

12. Faculty Resources:

The faculty members qualified to teach this course are: Dr. Ahmed Eldyasti, Dr. Magdalena Krol and one or more of future hires in Geotechnical/Geoenvironmental Engineering or Environmental Engineering within the Department of Civil Engineering. Module 1 & 2 & 3 will be offered once a year.

13. Crosslisted Courses: N/A
14. Bibliography and Library Statement:


15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. Each of the three modules will require demo sessions on the analytical techniques covered in that module. It is anticipated that the new engineering building will have central facilities in chromatography, spectroscopy and microscopy that can be used for these demo sessions.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6121

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Air Pollution Engineering

5. **Short Course Title:** Air pollution Engineering

6. **Effective Session:** Winter 2017

7. **Calendar (Short) Course Description:**
   This course is aimed at preparing the students to the diverse nature of the air pollution problem, and atmospheric dispersion of air pollutants and is composed of 3 stand-alone modules. There are no prerequisites for this course.

8. **Expanded Course Description:**
   This course introduces the student to aspects of physics, epidemiology, legislation, chemistry, technology, meteorology, and dispersion modeling relevant to air pollution, and develops the basic skills required to evaluate air pollution problems. This course will be composed of 3 stand-alone modules. The first module will introduce the students to identify, formulate, analyse and solve air pollution and design problems. This module will also help the student to apply knowledge of chemistry and mathematics to the analysis of fate and transport of indoor and outdoor air pollutants. The second module will discuss different standards and regulation of air quality, while the third module will focus on the control systems of air pollutants. Details of the modules can be found below

**Module 1: Introduction to Air pollution**
This module will introduce students to perform simple health risk calculations using given risk factors, calculate air pollutant emission rates, given emission factors, study the atmospheric chemistry of Sulfur and Nitrogen, and particulate air pollutants. At the completion of this component, students will have the background to describe the atmospheric chemistry of sulfur and nitrogen compounds relevant to acidic deposition, calculate the volume and composition of gases evolved by fuel combustion, identify the major variables affecting formation of nitrogen oxides in combustion processes, describe the formation of secondary pollutant due to photochemical reactions.

**Module 2: Standards and Regulation of Air Pollution**
Module 2 will help the students to understand the principal aspects of air pollution regulation, identify the sectorial origins of major air pollutants in North America. At the end of this module, students can determine if the level of air pollutants of different engineering projects

**Module 3: Control systems of air pollutants**
This module focuses on the design and calculation of control systems of air pollutants including physical, chemical, and biological control systems such as packed beds, bubble plates, tray absorbers, fixed-bed adsorbers, biofilters, biotrickling filters, and bioscrubbers. At the end of this topic, students will be able to determine the optimum control system for each engineering system.

9. Evaluation:

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<td>Quizzes and Assignments</td>
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10. Integrated Courses: N/A

11. Rationale:
Air pollution is an important topic to cover the general objectives of the civil engineering department of climate change and sustainable development. This course including the three modules will help the students to obtain a solid foundation of the air pollution engineering and the contribution of it in the climate change and different engineering technologies to control this pollution.

12. Faculty Resources:
The faculty members qualified to teach this course are: Dr. Ahmed Eldyasti and one or more of future hires in Environmental Engineering within the Department of Civil Engineering. Module 1 & 2 will be offered once a year. Module 3 is expected to be offered every 2 years.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

Module 1, 2 & 3:
15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available free of charge.
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6210

3. **Credit Value**: 3 Credits (1 Credit per module)

4. **Long Course Title**: Advanced Soil Mechanics

5. **Short Course Title**: Advanced Soil Mechanics

6. **Effective Session**: Fall 2015

7. **Calendar (Short) Course Description**: Soil properties and behaviour examined using Critical State Soil Mechanics (CSSM). Topics include: soil as a geomaterial; soil properties and their measurement; soil constitutive modelling; isotropic and anisotropic elastic models; plasticity theory; elastic-plastic model; Cam-clay model; critical states; shear strength of soils; stress-dilatancy; elastic-viscoplastic model; applications of elastic-plastic soil models.

8. **Expanded Course Description**: This course explores fundamental behaviour of soils using Critical State Soil Mechanics (CSSM) concepts. The main goal of the course is to provide the students with advanced-level understanding of soil behaviour and properties, with the purpose of focussing their attention on the CSSM concepts and on the importance of considering changes in effective stress and volume change together in describing soil behaviour. Topics include: soil as a geomaterial; soil properties and their measurement; soil constitutive modelling; isotropic and anisotropic elastic models; plasticity theory; elastic-plastic model; Cam-clay model; critical states; shear strength of soils; stress-dilatancy; elastic-viscoplastic model; applications of elastic-plastic soil models. After successfully completing this course, the students will be able to apply principles of soil mechanics in general and CSSM concepts in particular to arrive at safe and economical solutions to a variety of geotechnical engineering problems, such as foundations, deep excavations, tunnels, slopes, etc. The students will be able to use the fundamental concepts learned in this course as a ‘foundation’ for a lifelong learning of the ‘art’ that is geotechnical engineering. The course is divided into three modules. The details of the modules are as following:

**Module 1: Soil Classification, Properties and their Measurements (Level 1)**
Soil formation; soil types; clay mineralogy; soil properties and their measurements; index properties; soil classification; effective stress and pore-water pressure; stress and strain variables; soil state parameters; pore-water pressure parameters; soil laboratory tests;

**Module 2: Idealized Soil Behaviour (Level 2)**
Idealization of soil stress-strain behaviour; linear elastic idealization of soil behaviour.
anisotropic elastic and non-linear elastic idealization; plasticity and yielding; elastic-plastic soil model; Cam-clay; critical states.

**Module 3: Shear Strength and Deformation Characteristics of Soils (Level 3)**
Plastic potential, flow rules and stress-dilatancy; dilatancy and strength of soils; drained and undrained shear strengths; consolidation phenomenon; creep and viscoplasticity; elastic-viscoplastic soil model; other advanced models of soil behaviour; applications of elastic-plastic models.

### 9. Evaluation:

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### 10. Integrated Courses: N/A

### 11. Rationale:
After successfully completing this course, the students will be able to apply principles of soil mechanics in general and CSSM concepts in particular to arrive at safe and economical solutions to a variety of geotechnical engineering problems, such as foundations, deep excavations, tunnels, slopes, etc. The students will be able to use the fundamental concepts learned in this course as a ‘foundation’ for a lifelong learning of the ‘art’ that is geotechnical engineering.

### 12. Faculty Resources:
The faculty members qualified to teach this course are: Dr. Jit Sharma, and Dr. Ryle Beddoe. It is anticipated that the course will be offered once every year.

### 13. Crosslisted Courses: N/A

### 14. Bibliography and Library Statement:
Textbooks:


Journals:

1. Geotechnique [http://www.icevirtuallibrary.com/content/serial/geot]

15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available free of charge.
New Course Proposal

1. **Program:** Civil Engineering
2. **Course Number:** GS/CIVL 6211
3. **Credit Value:** 3 Credits (1 Credit per module)
4. **Long Course Title:** Geosynthetics for Geotechnical Engineers
5. **Short Course Title:** Geosynthetics
6. **Effective Session:** Fall 2015
7. **Calendar (Short) Course Description:**
   This course provides students a fundamental understanding of geosynthetic design for a geotechnical engineer. The 3 module course focuses on the manufacturing and industrial applications of a wide variety of geosynthetics, design calculations and considerations and evaluation of a geosynthetic design failure. There are no prerequisites for this course.
8. **Expanded Course Description:**
   This course provides students a fundamental understanding of geosynthetic design for a geotechnical engineer, and is set up in 3 modules taken as a whole individually. The course is dividing into three stand-alone modules. The first focuses on the manufacturing and industrial applications of a wide variety of geosynthetics. The second component focuses on geotextiles, where students will examine design calculations and considerations for a number of applications. The course finishes by requiring the students to examine and evaluate a geosynthetic design failure, where they will be asked to provide an alternative solution and/or mitigation technique to the design.

   **Module 1:** Geosynthetics for Civil Engineers
   This module will provide an introduction to a number of different geosynthetics, including geotextiles, geogrids, geonets, geomembranes, geocomposites, etc. The course will examine the manufacturing process and typical industrial applications and design of these materials.

   **Module 2:** Geosynthetic Design
   Building on geosynthetic knowledge acquired in Module 1, this component will focus on using geotextiles in geotechnical design. Students will first be introduced to the overall material properties of geotextiles (e.g. mechanical, hydraulic, degradation) before studying different design calculations and applications, including: separation, soil reinforcement, filtration, drainage, erosion, etc. Discussion on application to industry as well as allowable versus ultimate design will be facilitated.

   **Module 3:** Geotechnical Laboratory Tests II
   Students will be presented with selected case studies in which geosynthetic designs have failed in practice. Designing numerical models and performing
simulations, laboratory tests, and research in geosynthetics, students will be expected to provide a report on their findings. The report will include their reason and analysis of failure, and provide an alternative solution based on numerical modelling results. Students will also provide their recommendations for future work in the manufacturing, application and construction method of the geosynthetic under observation.

9. Evaluation:

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<td>Technical Report</td>
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<td><em>Used to evaluate students theoretical knowledge</em></td>
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<td>Design Project (Technical Report)</td>
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<th>Module 3:</th>
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<td>Data Analyses and Technical Report</td>
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<td>Oral Presentation</td>
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<td>Participation in Discussion groups</td>
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10. Integrated Courses: N/A

11. Rationale:
This course imparts students with the background and advanced understanding of geosynthetics used in geotechnical engineering practice. Geosynthetics are minimally addressed in undergraduate programs, and this course will provide students entering industry with significant geosynthetic design experience.

12. Faculty Resources:
The faculty members that could teach this course are: Dr. Ryley Beddoe and Dr. Jit Sharma.

Course Frequency: It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A
14. Bibliography and Library Statement:

Module 1, 2 & 3:


ASTM Standards (as required)

15. Physical Resources:

There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available at the Department of Civil Engineering.
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6212

3. **Credit Value**: 3 Credits (1 Credit per module)

4. **Long Course Title**: Unsaturated Soil Mechanics

5. **Short Course Title**: Unsaturated Soil Mechanics

6. **Effective Session**: Fall 2015

7. **Calendar (Short) Course Description**: This 3-module course provides students a fundamental understanding of the basic principles of unsaturated soil mechanics presented as an extension of classical saturated soil mechanics. Students are expected to have completed soil mechanics/geotechnical engineering course at the undergraduate level.

8. **Expanded Course Description**: The course provides a fundamental understanding of the basic principles of unsaturated soil mechanics presented as an extension of classical saturated soil mechanics, including stress state variables, soil-water retention properties, soil suction measurements, hydraulic conductivity, and shear strength. It is anticipated that at the conclusion of this course, students will develop a fundamental understanding of the concepts related to unsaturated soils; and will be able to perform analytical calculations and derivations related to the behavior of three-phase granular media. It is also expected that students will be able to describe, interpret, and develop soil water characteristic curves (SWCCs) based on laboratory data or other estimation procedures and will be able to Solve design problems related to flow, deformation, and strength in unsaturated soils.

**Module 1: Basic Concepts in the Mechanics and Hydraulics of Unsaturated Soils**
This module will introduce students to unsaturated soil mechanics. Students will develop an appreciation for the following concepts:
1. Phases of an unsaturated soil;
2. Phase properties and relations;
4. Soil water retention, soil water characteristic curves, measurement of Soil water characteristic curves
5. Water flow in capillary systems
6. Mechanical interactions at the microscale
7. Differences between saturated and unsaturated soil mechanics and practical applications

**Module 2: Theory and Applications of Variability Saturated Flow**

www.yorku.ca/grads/ | www.facebook.com/YorkUGradStudies
This module focuses specifically on providing students a fundamental understanding of flow in the variably saturated porous media. At the conclusion of this module students will be able to differentiate between saturated and unsaturated flow on a fundamental level and have familiarity with the governing partial differential equation for the unsaturated flow. Students will also have an understanding of initial-boundary value problems involving unsaturated flow with some modeling experience. Following are the important topics covered in this module:

1. Flow phenomena and derivation of various forms of Richards' equation;
2. Unsaturated hydraulic conductivity;
3. Measurement and estimation of unsaturated hydraulic properties;
4. Modeling variably saturated flow using HYDRUS 1D
5. Practical Applications

**Module 3: Shear Strength and Compression Characteristics of Unsaturated Soils**

This module will focus on shear strength and compression characteristics of the unsaturated soils. At the conclusion of this module the students will have an understanding of the shear strength of the unsaturated soils in relation relation to the saturated soils. Students will also be familiar with the experimental procedures to measure unsaturated shear strength properties. It is also expected that students will develop an appreciation for constitutive relationships for volume change related deformation state variables to stress state variables. Following are the important topics covered in this module:

1. Theory of Shear Strength in unsaturated soils;
2. Triaxial Test Procedures for Unsaturated Soils;
3. Interpretation of Triaxial Test Results and typical test results;
4. Concepts of Volume Change and Deformation in unsaturated soils; and
5. Measurement of Stress-Deformation Properties for Unsaturated Soils
6. Application to Practical Problems in Geotechnical Engineering;
9. Evaluation:

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10. Integrated Courses: N/A

11. Rationale:

Climate change has resulted in decrease/increase in annual rainfall, extreme precipitation events and extended periods of droughts. These events have led to water table fluctuations and unsaturated soils seasonally become saturated and vice versa. This increase/decrease in depth of the unsaturated zone has made the study of unsaturated soil mechanics more relevant to the geotechnical engineering design. This course provides students with an opportunity to implement unsaturated soil mechanics into geotechnical engineering practice. Application of the theory to practice is illustrated by a number of detailed case histories and modeling examples.

12. Faculty Resources:

The faculty member that is qualified to teach this course are Dr. Rashid Bashir and one or more of the new hires in Geotechnical Engineering area within the Department of Civil Engineering. It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A
14. Bibliography and Library Statement:


15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course have already been sourced by the Department.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6220

3. **Credit Value:** 3 Credits (1 Credit per Module)

4. **Long Course Title:** Advanced Foundations Planning, Analysis and Design

5. **Short Course Title:** Advanced Foundation Engineering

6. **Effective Session:** Winter 2016

7. **Calendar (Short) Course Description:**

   This course presents the planning, analysis, and design of shallow and deep foundations at an advanced level. This course is designed to fully prepare a student to carry out sub-surface investigations, analysis and design of shallow and deep foundations.

8. **Expanded Course Description:**

   This course focuses on the application of soil mechanics in the analysis and design of foundations. The course is problems-oriented and the students are encouraged to use a holistic approach to foundation design. The course emphasizes the importance of site investigation and parameter selection in foundation design calculations. Theoretical aspects of foundation design are complemented with design problems and case histories. Actual field problems are discussed and the concepts taught in class are applied to solve real engineering problems.

   At the conclusion of this course, it is expected that students will learn how to plan a site investigation, classify and characterize soils for foundation design, estimate the capacity of foundations, and estimate the foundation settlements. It is also expected that the students will develop an appreciation for principles of groundwater flow, settlement and heave analysis. Students are also expected to formulate convincing arguments to define foundation types and testing to solve specific foundation engineering problems.

   The course is divided into three modules. The details of the modules are as following:

   **Module 1: Site and Soil Investigation**

   The first module deals with the site and soil investigation. It is expected that on completion of the first module students will be knowledgeable to design a site investigation and soil testing program. Interpret the site investigation and soil test data to come up with a site geologic profile and the associated engineering properties to be used in foundation design. It is also expected that students will also be knowledgeable to identify problematic soils and site conditions. Following are contents of this module
1. Natural Soil Deposits: Soil Origin, Residual and gravity transported Soils, Alluvial, Lacustrine Glacial and Aeolian deposits, and Organic Soils

2. Subsurface Exploration:
   a. Purpose of Subsurface Exploration and Data Requirements;
   b. Subsurface Exploration Program and Methods of Exploration
   c. Planning the Exploration Program;
   d. Procedures for Sampling Soil
   e. Split-Spoon Sampling
   f. Sampling with a Scraper Bucket
   g. Sampling with a Thin-Walled Tube
   h. Sampling with a Piston Sampler

3. The Standard Penetration Test (SPT)
   a. SPT Correlations
   b. Design N Values

4. Other Penetration Test Methods
   a. Cone Penetration Test (CPT)

5. Observation of Water Table

6. Vane Shear Test

7. Pressuremeter Test (PMT)

8. The Borehole Shear Test

9. Flat Dilatometer Test

10. Coring of Rocks

11. Drilling and/or Exploration of Closed Landfills or Hazardous Waste Site

12. Preparation of Boring Logs

13. Geophysical Exploration

14. Subsoil Exploration Geotechnical Report

Module 2: Design of Shallow Foundation

The second module deals with the analysis and design of shallow foundations. A detailed review of the bearing capacity equation will be presented. Details of motivation for using different foundation types, LRFD vs. ASD approach and issues to consider in design will be discussed. Structural design of shallow foundations, settlement analysis of shallow foundations on clay and sand, balancing bearing capacity and settlement in design, strategies to mitigate the effects of expansive soils on foundations will also be discussed. Design and construction of mat foundations will also be discussed. The module will conclude with case histories and development of design reports.

Module 3: Design of Deep Foundation

The third module of the course deals with the analysis and design of deep foundations. The following are the content of this module.

1. Shallow vs Deep foundations

2. Single Piles – Static Capacity and Lateral Loads; Pile/Pole Buckling
   a. Load testing of deep foundations
   b. Static analyses of piles and drilled shafts in clay
   c. Static analyses of piles and drilled shafts in sand
   d. Time dependency of capacities

3. Single Piles: Dynamic Analysis, Load Tests
a. Pile driving formulas
b. Wave equation analyses

4. Drilled shafts
   a. Construction, inspection, specifications and case histories
   b. Structural issues and design

5. Pile Foundations: Groups
   a. Single Piles versus Pile Groups
   b. Vertically Loaded Pile Groups
   c. Efficiency of Pile Groups
   d. Stresses on Underlying Strata from Piles
   e. Settlements of Pile Groups
   f. Pile Caps
   g. Negative Skin Friction
   h. Laterally Loaded Pile Groups
   i. Matrix Analysis for Pile Groups

6. Drilled Piers or Caissons
   a. Practical Considerations for Drilled Piers
   b. Capacity Analysis of Drilled Piers
   c. Settlements of Drilled Piers
   d. Drilled Pier Design Examples
   e. Laterally Loaded Drilled Pier Analysis

7. Case Histories
8. Design Examples

9. Evaluation:
   
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<td>Design Report</td>
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10. Integrated Courses: N/A

11. Rationale:
This course provides students with an opportunity to analyze and design foundations at an advanced level. The skills learned in this course are routinely required by practicing geotechnical engineers.

12. Faculty Resources:
The faculty members qualified to teach this course are: Dr. Laifa Cao (Adjunct Professor); Dr. Rashid Bashir, and Dr. Jit Sharma. It is anticipated that the course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

Module 1:

Module 2 & 3:

15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available free of charge.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6221

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Geotechnical Modelling

5. **Short Course Title:** Geotechnical Modelling

6. **Effective Session:** Winter 2016

7. **Calendar (Short) Course Description:**
Principles and applications of theoretical, numerical and physical modelling in geotechnical engineering. Topics include: Introduction to modelling; idealization of soil behaviour; constitutive modelling; numerical modelling; physical modelling; centrifuge modelling; theoretical modelling. Applications include: embankments; soft ground tunnelling; dams; retaining walls; foundations; soil reinforcement; soil-structure interaction.

8. **Expanded Course Description:**
The main aim of this course is to provide the students with a comprehensive treatment of the five techniques of geotechnical modelling, that is, constitutive, theoretical, numerical, physical and centrifuge. The course adopts a less rigorous approach in presenting the complex mathematical aspects of geotechnical modelling and places emphasis on the application of a particular technique in solving real-life geotechnical problems. Topics include: Introduction to modelling; idealization of soil behaviour; constitutive modelling; numerical modelling; physical modelling; centrifuge modelling; theoretical modelling. Applications of geotechnical modelling techniques include: embankments; soft ground tunnelling; dams; retaining walls; foundations; soil reinforcement; soil-structure interaction. After successfully completing this course, the students will be able to use techniques of geotechnical modelling to achieve optimal and safe design of various geotechnical structures. They will also be able to appreciate the limitations of a particular technique of geotechnical modelling and will be able to combine two or more techniques to overcome such limitations.

The course is divided into three modules. The details of the modules are as following:

- **Module 1: Introductory Soil Behaviour and Geotechnical Modelling (Level 2)**
  Introduction to geotechnical modelling; types of geotechnical models and their examples; empiricism in geotechnical engineering and its pros and cons; geological models; essential characteristics of soil behaviour; particle-continuum duality; stress and strain variables; stiffness; dilatancy; strength.

- **Module 2: Constitutive Modelling of Soils (Level 3)**
Constitutive modelling (elasticity-based models; elastic-perfectly plastic models; elastic-strain hardening plastic models; modelling non-monotonic loading; modelling rate effects; selection of model input parameters; calibration of constitutive models); Numerical modelling (salient features of the finite element and the finite difference methods; numerical solution schemes; validation and verification of numerical models); Theoretical modelling (closed-form solutions to idealize problems; elastic stress distributions; plastic failure analysis); Applications.

Module 3: Physical Modelling in Geotechnics (Level 3)
Physical modelling (dimensional analysis; scaling laws; small-scale models; near-full-scale models; instrumented field trials); Centrifuge modelling (principles; scaling laws; types of centrifuges; model preparation; simulation of geotechnical processes; simulation of earthquake loading; use of appropriate pore fluid; instrumentation; modelling of models).

9. Evaluation:

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<th>Module 1:</th>
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10. Integrated Courses: N/A

11. Rationale:
After successfully completing this course, the students will be able to use techniques of geotechnical modelling to achieve optimal and safe design of various geotechnical structures. They will also be able to appreciate the limitations of a particular technique of geotechnical modelling and will be able to combine two or more techniques to overcome such limitations.

12. Faculty Resources:
The faculty members qualified to teach this course are: Dr. Jit Sharma, Dr. Rashid Bashir and Dr. Ryle Beddoe. It is anticipated that the course will be offered once every year.

13. Crosslisted Courses: N/A
14. Bibliography and Library Statement:

Textbooks:


Journals:

1. Geotechnique [http://www.icevirtuallibrary.com/content/serial/geot]

15. Physical Resources:
The course requires a computer lab equipped with high-end workstations that have state-of-the-art geotechnical modelling software (such as GeoStudio, Rocscience, FLAC and PLAXIS) installed on them. One such lab will be available at the Department’s disposal in the new building for the Lassonde School of Engineering. The makers of GeoStudio suite of software have donated 40 network licenses to the Department. Rocscience, FLAC and PLAXIS software will be acquired w.e.f. July 2015.
New Course Proposal

1. Program: Civil Engineering

2. Course Number: GS/CIVL 6222

3. Credit Value: 3 Credits (1 Credit per module)

4. Long Course Title: GeoHazards

5. Short Course Title: GeoHazards


7. Calendar (Short) Course Description:
   This course is designed to develop a student’s understanding of how geohazards impact geotechnical engineers. The course will be delivered in 3 stand-alone modules, designed to first develop the student’s knowledge on the triggers, mechanisms and risks associated with geohazards such as earthquakes, volcanic eruptions, floods, tsunami’s before focusing on Landslide susceptibility and risk specifically in Modules 2 & 3.

8. Expanded Course Description:

   This 3-module course investigates how geohazards impact geotechnical engineers.

   **Module 1: GeoHazards for Geotechnical Engineers**
   This module will introduce students to a number of geohazards, studying how they are triggered, climatic influence, and potential mitigation techniques. It will integrate topics of risk management and students will be asked to qualitatively estimate risk and envision risk-appropriate mitigation strategies. Case studies will be used to develop understanding of both the scientific processes and political decisions based on geohazards risk. After the student has completed this component he/she will be able to identify, quantify and evaluate geohazards and their risks to society.

   **Module 2: Landslides I**
   This module focuses specifically on one geohazard, landslides, and will provide students with an in-depth understanding of landslide investigation, evaluation and mitigation design. Topics will include site investigations, soil shear strength properties and slope stability analyses. State of the art investigation and monitoring techniques will also be presented. Upon completion of this module, the student will be able to evaluate the probability and consequences of a landslide and be able to suggest proper mitigation and remediation techniques.

   **Module 3: Landslides II**
   This module will focus on examining the current trends in landslide research, including topics such as, but not limited to: climate change, liquefaction,
hazard mapping, debris flow modelling, etc. Students will complete an in-depth study of a current landslide case, utilizing state of the art modelling software, provide their investigation findings and recommendations for mitigation/remediation. Upon completion of this module, the student will be versed in current state of practice in landslide research, and be able to design, model and interpret the results of a slope failure using industry standard software packages.

9. Evaluation:

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<td>Group work and participation</td>
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<td>Case Studies</td>
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<td>Final Exam</td>
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<td>Used to evaluate students theoretical knowledge</td>
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<td>Design Project (Technical Report)</td>
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<td>Final Exam</td>
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<td>Group work and class participation</td>
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<td>Data Analyses and Technical Report</td>
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<td>Oral Presentation</td>
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<td>Final Class Exam</td>
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10. Integrated Courses: N/A

11. Rationale:
This course provides students with an understand of geohazards and how they affect civil engineers. With an increase in "mega" events, and understanding of these geohazards is critical for engineers in order to properly assess the susceptibility and risk of these hazards. This knowledge will be acquired in a small group setting, affording students with significant opportunity to interact with the instructor and each other, as well as providing significant opportunities to improve written and oral communication skills.

12. Faculty Resources:
The faculty members that could teach this course are: Dr. Ryley Beddoe, Dr. Jit Sharma, and Dr. Rashid Bashir.

Course Frequency: It is anticipated that Module 1 & 2 will be taught once a year, and that Module 3 will be taught every other year.
13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

Module 1:


Module 2 & 3:


15. Physical Resources:

There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. Licenses for all applicable software for numerical modelling are available at the Department of Civil Engineering.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6213

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Laboratory and Field Investigation for Geotechnical Engineers

5. **Short Course Title:** Geotechnical Lab and Field Testing

6. **Effective Session:** Fall 2016

7. **Calendar (Short) Course Description:**
   This 3-module course investigates soil behaviour through hands-on geotechnical in-situ and laboratory techniques. The course will develop the student’s knowledge of core geotechnical laboratory tests used in industry, working towards state of the art field investigation techniques. Classwork will also include design, execution and evaluation of the testing methodology and results. There are no prerequisites for this course.

8. **Expanded Course Description:**

   This 3 module course investigates soil behaviour by first developing a student’s knowledge of core geotechnical laboratory tests used in industry, working towards state of the art field investigation techniques.

   **Module 1: Geotechnical Laboratory Tests I**
   This module will introduce students to a number of geotechnical laboratory tests, focusing on characterization, limit and compaction tests. Students will select, design, and lead their peers through a soil characterization test. Focus will include highlighting the relevance of the results and how they are most frequently used in industry. At the completion of this component, the student will have hands-on experience for a minimum of 6 geotechnical ASTM tests, and will be able to calculate, disseminate and apply the results in a geotechnical design problem.

   **Module 2: In-situ Field Investigation for Geotechnical Engineers**
   This module focuses specifically on providing students with in-situ field investigation experience most often encountered by geotechnical engineers. Students will first be taught the theoretical background, followed by hands-on experience for tests such as: standard penetration tests, cone penetration tests, and soil sampling from boreholes. When completed, students will quantify the soil strata, position of groundwater, apply the test results to a geotechnical design and identify the inherent strengths and biases associated with each testing method.

   **Module 3: Geotechnical Laboratory Tests II**
This final module will focus on advanced geotechnical laboratory testing methods, including but not limited to direct shear, oedometer, falling head permeability, and triaxial tests. Students will be required to determine the geotechnical soil properties they require for a geotechnical design problem. Students will then carry out the necessary laboratory tests, and use their results to complete the requested design.

9. Evaluation:

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<th>Module 1: Geotechnical Laboratory Design</th>
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<td>e.g. Proper selection of ASTM standards, design of laboratory manual, worksheets for peers, etc.</td>
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<th>Execution of Lab in Class</th>
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<td>e.g. Prep of laboratory and materials, methodology presented to peers, etc.</td>
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<th>Data Analyses and Technical Report</th>
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<td>Participation in Peers Laboratories</td>
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<th>Module 2: Quizzes and Assignments</th>
<th>30%</th>
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<tbody>
<tr>
<td>Used to evaluate students theoretical knowledge of in-situ field investigations taught</td>
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<thead>
<tr>
<th>Lead In-situ Field Investigation</th>
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<tbody>
<tr>
<td>Methodology and field kit presented to peers</td>
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<thead>
<tr>
<th>Participation and On-Site Assignments</th>
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<tbody>
<tr>
<td>Participation during peers lead in-situ investigations, completion of on-site assignments, etc.</td>
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<tr>
<th>Data Analyses and Technical Report</th>
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<tr>
<th>Module 3: Geotechnical Laboratory Design</th>
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<tr>
<td>e.g. Proper selection of ASTM standards, design of laboratory manual, worksheets for peers, etc.</td>
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<tr>
<th>Execution of Lab in Class for Peers</th>
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<td>e.g. Prep of laboratory and materials, methodology presented to peers, etc.</td>
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<tr>
<th>Data Analyses and Technical Report</th>
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<tr>
<td>Participation in Peers Laboratories</td>
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<td><strong>TOTAL</strong></td>
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10. Integrated Courses: N/A

11. Rationale:

This course imparts students with the geotechnical laboratory and in-situ field investigation background and experience that are sought after by their employers and industry. A deeper understanding for the importance of soil properties and how they apply to geotechnical design problems will be acquired in a small group setting, affording students with significant
opportunity to also improve their oral communication, leadership, and written communication skills.

12. Faculty Resources:
The faculty members that could teach this course are: Dr. Ryley Beddoe, Dr. Jit Sharma and Dr. Rashid Bashir.

Course Frequency: It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

Module 1, 2 & 3: Germaine and Germaine (2009). *Geotechnical Laboratory Measurements for Engineers*. Wiley
ASTM Standards (as required by students)


15. Physical Resources:
The required physical resources for this course are extensive, and divided by Module.

Module 1 & 3:

Laboratory requirements for this course will follow closely to the undergraduate laboratory used in 3rd year Soil Mechanics laboratories with the following exception:

1. Triaxial Cell and Data acquisition system
2. Tensiometers

These pieces of equipment will be purchased prior to the first Module 3 class.

Module 2:

This module will utilize field equipment typically used by geotechnical consultants. The cost of this equipment and operation is significant, and as such the field component of this course will be undertaken in conjunction with an industrial partner, who will provide equipment and operators at-cost or in-kind (TBD). Acquisition of small handheld equipment (e.g. shovels, buckets, augers, etc.) will be purchased by the Department.
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6223

3. **Credit Value**: 3 Credits (1 Credit per module)

4. **Long Course Title**: Ground Improvement Techniques

5. **Short Course Title**: Ground Improvement Techniques

6. **Effective Session**: Winter 2017

7. **Calendar (Short) Course Description**: Principles and applications of ground improvement techniques. Topics include: Densification, compaction, prefabricated drains (PVDs), vacuum preloading, electrokinetics, chemical stabilization, soil freezing, grouting, soil reinforcement using geosynthetics, anchors, nails and micropiles, stone columns, deep cement mixing (DCM) columns.

8. **Expanded Course Description**: This course provides the students with in-depth knowledge of various techniques of ground improvement that are commonly used in geotechnical engineering practice. Topics include: Densification, compaction, prefabricated drains (PVDs), vacuum preloading, electrokinetics, chemical stabilization, soil freezing, grouting, soil reinforcement using geosynthetics, anchors, nails and micropiles, stone columns, deep cement mixing (DCM) columns. The students' understanding of the scientific principles for each technique is reinforced using published case studies on the application of the technique. After successfully completing this course, the students will be able to choose and design a particular ground improvement technique (or a combination of them) for a given ground condition from the viewpoints of safety and economic considerations. The course is divided into three modules. The details of the modules are as following:

**Module 1: Mechanical Ground Improvement Techniques (Level 2)**
Introduction; problematic soil conditions; need for ground improvement; mechanical techniques of ground improvement (shallow compaction, deep compaction, types of compaction equipment; field compaction control, mechanical and hydraulic characteristics of compacted fills, use of surfactants in compaction, densification of loose granular soils using vibratory methods and dynamic compaction).

**Module 2: Dewatering, Chemical Stabilization and Ground Freezing (Level 2)**
Hydraulic techniques (dewatering systems, prefabricated vertical drains (PVDs), surcharge preloading, vacuum preloading, electrokinetic dewatering); chemical stabilization (stabilization using cement and lime, deep cement mixing columns, lime columns); ground freezing techniques for ground strengthening and groundwater control during construction.
Module 3: Soil Reinforcement and Grouting (Level 2)
Soil reinforcement (geosynthetics, anchors, nails, micropiles); stone columns (installation techniques, design, advantages, limitations). Grouting techniques (permeation grouting, compaction grouting, jet grouting, types of grouts and their properties, grouting in difficult ground conditions).

9. Evaluation:

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<th>Module 1: Quizzes and Assignments</th>
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<td>Examination</td>
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<td><strong>TOTAL</strong></td>
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10. Integrated Courses: N/A

11. Rationale:
After successfully completing this course, the students will be able to choose and design a particular ground improvement technique (or a combination of them) for a given ground condition from the viewpoints of safety and economic considerations.

12. Faculty Resources:
The faculty members qualified to teach this course are: Dr. Jit Sharma and Dr. Rashid Bashir. It is anticipated that the course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:
Textbooks:


Journals:

1. Geotechnique [http://www.icevirtuallibrary.com/content/serial/geot]

15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction.
New Course Proposal

1. **Program:** Civil Engineering
2. **Course Number:** GS/CIVL 6310
3. **Credit Value:** 3 Credits (1 Credit per module)
4. **Long Course Title:** Advanced Hydrogeology
5. **Short Course Title:** Advanced Hydrogeology
6. **Effective Session:** Fall 2015
7. **Calendar (Short) Course Description:**
   This course advances the student’s knowledge of undergraduate hydrogeology through theory, field visits, and computer simulations and is composed of 3 stand-alone modules. There are no prerequisites for this course.
8. **Expanded Course Description:**
   Advanced Hydrogeology will focus on saturated and unsaturated flow in porous media, followed by mechanics of pumping of confined and unconfined aquifers. Details of the modules can be found below.

**Module 1: Saturated Groundwater Flow**
This module will focus on saturated hydrogeology. Confined and unconfined aquifers will be discussed along with analytical and numerical solutions to groundwater flow equations. At the completion of this component, students will understand the difference between confined and confined aquifers, be able to use Darcy’s Law for homogeneous and layered systems, and understand how to model basic groundwater systems.

**Module 2: Flow in Unsaturated Soils**
This module will provide students with a fundamental understanding of flow in variably saturated porous media. At the conclusion of this module students will be able to differentiate between saturated and unsaturated flow on a fundamental level and have familiarity with the governing partial differential equation for the unsaturated flow. Students will also have an understanding of initial-boundary value problems involving unsaturated flow with some modeling experience. Following are the important topics covered in this module:
1. Flow phenomena and derivation of various forms of Richards’ equation;
2. Unsaturated hydraulic conductivity;
3. Measurement and estimation of unsaturated hydraulic properties;
4. Modeling variably saturated flow using HYDRUS 1D
5. Practical Applications
Module 3: **Field Methods**
The last module will teach students the governing theories for pumping groundwater wells in confined and unconfined, leaky and non-leaky aquifers. In addition, pumping of multiple wells, effects of various boundaries, and slug/bail tests will be discussed. This will be accompanied by a site visit to see a pump test in progress. At the completion of this module, students will understand the different pumping methods and know how to apply different techniques given specific site conditions.

### 9. Evaluation:

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<th>Module 1:</th>
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<td>Participation and Group Work</td>
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<td>Examination</td>
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<td>Participation</td>
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### 10. Integrated Courses: N/A

### 11. Rationale:
The academic objectives of the Civil Engineering program include sustainable development. By taking this course, students will obtain a solid foundation of subsurface contaminant fate and transport, as well as, advance their knowledge of emerging contaminants. This will provide the students with expertise to work in the fields of environmental site assessments, site remediation, and brownfield redevelopment.

### 12. Faculty Resources:
The faculty members qualified to teach Module 1 and 2 are: Dr. Magdalena Krol and Dr. Rashid Bashir. Module 3 will be taught by Dr. Magdalena Krol. It is anticipated that this course will be offered once every year.

### 13. Crosslisted Courses: N/A

### 14. Bibliography and Library Statement:
15. **Physical Resources:**
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. The course utilizes open source software as much as possible.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6320

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Flow and Transport in the Vadose Zone

5. **Short Course Title:** Flow and Transport in the Vadose Zone

6. **Effective Session:** Winter 2016

7. **Calendar (Short) Course Description:**

   This 3-module course provides students a fundamental understanding of the flow and transport in the vadose zone. Theoretical as well as applied aspects of various processes and mechanisms of flow and transport are presented within the context of contaminant migration and remediation.

8. **Expanded Course Description:**

   The course covers theoretical as well as applied aspects of various processes and mechanisms of flow and transport in the unsaturated zone with emphasis on contaminant migration and remediation. Details of conceptual and mathematical description of water flow and solute transport are also presented. A brief overview of the use of the finite element method for solving the governing partial differential equations for flow and transport are also provided. Special attention is given to the highly nonlinear nature of the governing flow equation. A significant portion of the course will be focused on coupled movement of water, vapor, and energy (including the surface energy balance). This portion of the course will lead to the soil cover design for waste containment facilities using numerical models. The course will conclude with emphasis on preferential/nonequilibrium water flow and solute transport using dual-porosity and dual-permeability models.

**Module 1: Flow in variably saturated porous media**

This module focuses specifically on providing students a fundamental understanding of flow in the variably saturated porous media. At the conclusion of this module students will be able to differentiate between saturated and unsaturated flow on a fundamental level and have familiarity with the governing partial differential equation for the unsaturated flow. Students will also have an understanding of initial-boundary value problems involving unsaturated flow with some modeling experience. Following are the important topics covered in this module:

1. Theory of Water Flow through Unsaturated Soils
2. Darcy’s Law for Unsaturated Soils
3. Flow phenomena and derivation of various forms of Richards' equation;
Module 2: Solute transport in the vadose zone

This module focuses on the transport in the variably saturated porous media. At the conclusion of this module, students will have an appreciation for various transport processes in the vadose zone. It is also expected that student will develop an understanding of the quantitative aspects of solute migration and will be able to apply this understanding to the field problems. The topics of colloidal and oxygen transport are also presented in the module with the expectation that this will enhance the students understating beyond the traditional transport process.

Following are the important topics covered in this module:

1. Theory of transport in Unsaturated Soils
   a. Basic formulations of sorption and degradation
   b. Plug flow (piston flow) modeling approach
   c. Convective/Dispersive approach
2. Quantitative approach
   a. Development of transport equations
   b. coupling mass-transfer and mass transport relations
   c. Numerical solution of transport equations
3. Transport of decaying solutes in vadose zone
4. Oxygen transport
5. Colloid transport
6. Modeling solute transport with HYDRUS ad C/TRAN
7. Case studies and practical applications

Module 3. Advanced topics in Vadose zone flow and Transport

This module focuses on some of the advanced topics in flow and transport in the vadose zone. The students are exposed to some of the theoretical and practical aspects of moisture and energy balance at the ground surface. Climate data compilation, and classification are discussed with the intent that students can formulate the soil atmosphere boundary condition. Numerical aspects of the flow and transport problems with the atmospheric boundary conditions are also discussed. Students are also be exposed to the transport of atmospheric oxygen into the vadose zone. Various practical and modeling aspects of soils covers are also be discussed.

1. Ground Surface Moisture Flux Boundary Conditions
2. Climatic Classification for a Site
3. Boundary Value Framework for Near-Ground-Surface Design
4. Numerical Modeling of Ground Surface Moisture Flux Conditions
5. Modeling of Water and Solute Transport in Macroporous/Fractured Systems, (Mobile-Immobile, Multi-porosity approach
6. Modeling with Design of soil covers
7. Case studies and practical applications

9. Evaluation:
### Module 1:

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<th>Assignments</th>
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<tr>
<td>Term Paper &amp; Presentation</td>
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<tr>
<td>Examination</td>
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10. **Integrated Courses:** N/A

11. **Rationale:**

At the conclusion of this course it is expected that the students will have an understating to characterize, measure and parameterize structural, flow and transport properties of variably-saturated porous media. It is also expected that the students can quantify driving forces and resulting fluxes of water, and solute in unsaturated soils. Students will also be familiar with the modern measurement methods and analytical tools for hydrological and hydrogeological data collection and can interpret and conduct modelling of flow and transport in the unsaturated zone.

12. **Faculty Resources:**

The faculty member that is qualified to teach this course is Dr. Rashid Bashir and one or more of the new hires in the Geotechnical/Geoenvironmental Engineering within the Department of Civil Engineering.

It is anticipated that this course will be offered once every year.

13. **Crosslisted Courses:** N/A

14. **Bibliography and Library Statement:**


15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are already been sourced.
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6321

3. **Credit Value**: 3 Credits (1 Credit per module)

4. **Long Course Title**: Contaminant Hydrogeology

5. **Short Course Title**: Contaminant Hydrogeology

6. **Effective Session**: Winter 2016

7. **Calendar (Short) Course Description**: This course introduces students to contaminant hydrogeology through theory, field visits, and computer simulations and is composed of 3 stand-alone modules. There are no prerequisites for this course.

8. **Expanded Course Description**: Contaminant Hydrogeology is a course designed to teach students about the transport of pollutants through the subsurface. The course is divided into three modules that focus on contaminant fate and transport, multiphase flow and fractured networks, and end with an investigation into new and emerging environmental pollutants. Details of the modules can be found below.

**Module 1: Contaminant Fate and Transport**
This module will introduce students to subsurface contaminant transport focusing on different transport mechanisms such as advection, diffusion, and sorption. Modelling of contaminant transport will be presented and typical contaminants will be discussed. This will be followed by a site visit where sampling of contaminated groundwater and soil will be performed. At the end of the course, students will understand subsurface contaminant movement, be able to characterize different contaminants by their transport properties, and perform groundwater and soil sampling.

**Module 2: Multiphase Flow and Fractured Networks**
Module 2 will focus on multiphase flow, emphasizing transport of light and dense non-aqueous phase liquids (LNAPLs and DNAPLs). Pollution of fractured aquifers will also be discussed, outlining transport in fractured domains and modelling methods. Upon completion of this module, students should be able to understand the processes of NAPL movement through homogenous and fractured domains.

**Module 3: Emerging Contaminants**
The last module will focus on new and emerging contaminants in the subsurface. The students will build on their knowledge gained in Module 1&2 to research the environmental risk of these compounds. This will be followed by a parametric modelling study examining the different properties affecting subsurface transport of emerging contaminants.

### 9. Evaluation:

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<td>Site Visit Presentation</td>
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<th>Module 3:</th>
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<td>Group Modelling Study</td>
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### 10. Integrated Courses: N/A

### 11. Rationale:

The academic objectives of the Civil Engineering program include sustainable development. By taking this course, students will obtain a solid foundation of subsurface contaminant fate and transport, as well as, advance their knowledge of emerging contaminants. This will provide the students with expertise to work in the fields of environmental site assessments, site remediation, and brownfield redevelopment.

Module 1 overlaps with Module 1 of Site Remediation. It is anticipated that Module 1 will be the same for both these courses, taught by the same faculty member.

### 12. Faculty Resources:

The faculty members qualified to teach this course are: Dr. Magdalena Krol and Dr. Rashid Bashir. It is anticipated that this course will be offered once every year.

### 13. Crosslisted Courses: N/A

### 14. Bibliography and Library Statement:


15. Physical Resources:
There are no physical resources required for this course.
New Course Proposal

1. **Program:** Civil Engineering
2. **Course Number:** GS/CIVL 6311
3. **Credit Value:** 3 Credits (1 Credit per module)
4. **Long Course Title:** Site Remediation
5. **Short Course Title:** Site Remediation
6. **Effective Session:** Fall 2016
7. **Calendar (Short) Course Description:**
   This course outlines the design and operation of site remediation activities and is composed of 3 stand-alone modules. There are no prerequisites for this course.
8. **Expanded Course Description:**
   Site Remediation expands the students’ knowledge about subsurface contaminant fate and transport and delves into site remediation technologies. The course will include a site visit to an active remediation site and introduce students to new and emerging technologies. Details of the modules can be found below.

   **Module 1: Contaminant Fate and Transport**
   This module will introduce students to subsurface contaminant transport focusing on different transport mechanisms such as advection, diffusion, and sorption. Modelling of contaminant transport will be presented and typical contaminants will be discussed. This will be followed by a site visit where sampling of contaminated groundwater and soil will be performed. At the end of the course, students will understand subsurface contaminant movement, be able to characterize different contaminants by their transport properties, and perform groundwater and soil sampling.

   **Module 2: Remediation Technologies**
   Module 2 will focus on different remediation technologies employed at contaminated sites, including soil venting, bioremediation, and thermal methods. Following, a Brownfields site will be visited where the same technologies have been, or are currently being, applied. At the end of the module, students will understand how to choose a remediation technology based on site stratigraphy and environmental risk, and have a greater understanding of how they are applied on site.

   **Module 3: New Remediation Methods**
   The last module will focus on new and emerging remediation technologies such as new thermal methods or nanoparticles. The students will be given a technology
to evaluate and, based on their knowledge gained in Module 1&2, apply it to real-world example.

9. Evaluation:

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10. Integrated Courses: N/A

11. Rationale:
The academic objectives of the Civil Engineering program include sustainable development. By taking this course, students will obtain a solid foundation of subsurface contaminant fate and transport, as well as, remediation technologies.

12. Faculty Resources:
The faculty members qualified to teach this course are: Dr. Magdalena Krol and one or more of the new hires in the Geoenvironmental Engineering area within the Department of Civil Engineering.

It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available within the Department of Civil Engineering.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6410

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Advanced Reinforced Concrete Design

5. **Short Course Title:** Advanced Reinforced Concrete Design

6. **Effective Session:** Fall 2015

7. **Calendar (Short) Course Description:**
   This 3 module course provides students with an understanding of advanced topics in reinforced concrete analysis and design. The content focuses on detailed sectional analysis, slender columns and strut and tie models, and the Modified Compression Field Theory for shear design. Students are expected to have completed reinforced concrete design at the undergraduate level.

8. **Expanded Course Description:**
   This course is intended to provide advanced topics in the mechanics and design of reinforced concrete. Topics in mechanics will include flexural analysis using actual stress distribution, fibre approaches, and rectangular stress blocks; development of moment-curvature and moment-rotation responses of structural members, and moment-area theorems to compute displacements. Topics in design will include slender columns; components of strut and tie models, design of deep beams, and brackets and corbels using strut and tie models; the Modified Compression Field Theory for shear design; concepts of shear friction; elastic, yield line, and strip method of analyses for two-way slabs; and design of structural walls.

   **Module 1:** **Detailed Analysis**
   This module focuses on detailed analysis of reinforced concrete members including flexure using actual stress distributions, fibre approaches, and rectangular stress blocks; flexural-axial load interaction; development of moment-curvature and moment-rotation relationships; and computation of displacements using moment-area theorems. Students will be introduced to sectional analysis software.

   **Module 2:** **Advanced Design**
   This module will provide students with procedures to design slender columns in buildings; an understanding of the components of strut and tie models; and application of strut and tie models to design deep beams, brackets, and corbels. Yield line analysis and the strip method of
analyses will be applied to the design of two-way slabs. Design of slender and squat walls for aseismic design will be reviewed.

Module 3: **Advanced Topics**
This module will consist of advanced topics in shear design of reinforced concrete members, including the Modified Compression Field Theory and its implementation into design standards such as CSA A23.3 and nonlinear finite element software; and shear friction concepts.

9. **Evaluation:**

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10. **Integrated Courses:** N/A

11. **Rationale:**
This course provides students with advanced tools to analyse and design reinforced concrete structures that are not included at the undergraduate level. These tools are routinely required by practicing structural engineers. One of the objectives of the Civil Engineering graduate program is to provide training to such practicing engineers.

12. **Faculty Resources:**
The faculty members that are qualified to teach this course are Dr. Dan Palermo and future hires in the structural area with the Department of Civil Engineering.

It is anticipated that this course will be offered once every year.

13. **Crosslisted Courses:** N/A
14. Bibliography and Library Statement:

**Module 1:**


**Module 2 & 3:**


15. Physical Resources:

There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available free of charge.
New Course Proposal

1. **Program:** Civil Engineering
2. **Course Number:** GS/CIVL 6411
3. **Credit Value:** 3 Credits (1 Credit per module)
4. **Long Course Title:** Structural Dynamics and Earthquake Engineering
5. **Short Course Title:** Structural Dynamics and Earthquake Engineering
6. **Effective Session:** Fall 2015
7. **Calendar (Short) Course Description:**
   This 3-module course provides students with an introduction to modern seismology, ground-faulting and characteristics of earthquakes, derivation of the dynamic equations of motion of multi-degree of freedom systems, time-history analysis to ground excitations, damping, nonlinear hysteresis, nonlinear spectra, modal properties, analysis in the frequency domain, torsional response of structures, performance limit states and principles of base isolation.
8. **Expanded Course Description:**
   Introduction to modern seismology, ground-faulting and characteristics of earthquakes, measures of earthquake intensity and strong-ground motion databases. Definition of random excitations. Description of Impulsive loads (Blasts). Basic dynamic properties of physical systems. Derivation and solution of the dynamic equations of motion for Single, Multi-degree of freedom, and Continuous systems, methods for time-history and frequency-based dynamic analysis, modal properties, effects of hysteresis on nonlinear response, nonlinear spectra. The various type of interaction (soil-structure, fluid-structure, multiple support excitation). Sensitivity of the response of buildings to torsion, design code approaches to modeling the seismic loading. Measures of seismic protection through Base Isolation, Additional Damping, Active & Passive Control. The course will be delivered in three modules as follows:

**Module 1: Foundation in Seismology and Earthquake Engineering**
   Introduction to basic seismology, mechanisms of earthquake generation, magnitude and intensity measures. Near-field and far-field characteristics; fling step, directivity. Soil amplification and site effects. Soil liquefaction. Seismic zonation, hazard maps. Derivation and solution of equations of motion of single degree of freedom systems (SDOF) to harmonic, impulsive and random excitation. Resonant amplification, viscous damping, hysteretic damping, experimental methods to measure damping.

**Module 2: Idealization of Structures as MDOF Systems; Eigenvalues and Modal Analysis**

Module 3: Structural Irregularity. T-μ-q relationships in nonlinear spectra definition.
Principles of Base Isolation.

9. Evaluation:

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10. Integrated Courses: N/A

11. Rationale:
The course builds through three different modules the essential state of the art knowledge in Structural Dynamics as it applies to Civil Engineering Structures. The intended fields
of application are (a) Earthquake Engineering, (b) Random vibrations under service conditions, and (c) Response to Impulsive or Blast loading generated by accidental events. Basic principles to promote understanding of dynamic behavior, and methods of protection and control of the implications of dynamic loads are intertwined throughout the course delivery.

12. Faculty Resources:
The faculty members that are qualified to teach this course are Dr. Palermo and future hires in the Structural Engineering area with the Department of Civil Engineering.

It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

Module 1:


EXPERIMENTAL STRUCTURAL DYNAMICS. An Introduction to Experimental Methods of Characterizing. Vibrating Structures. ROBERT E. COLEMAN.

Harris and Sabnis, “Structural Modeling and Experimental Techniques” CRC Press 1999


J. Humar, Dynamics of Structures, 3rd Edition, CRC Press

Module 2:


Module 3:


15. Physical Resources:
Classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available free of charge. Also a number of experiments will be conducted in the Structures Laboratory for demonstration and class projects.
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6420

3. **Credit Value**: 3 Credits (1 Credit per Module)

4. **Long Course Title**: Advanced Prestressed Concrete

5. **Short Course Title**: Advanced Prestressed Concrete

6. **Effective Session**: Winter 2016

7. **Calendar (Short) Course Description**: This course provides students with an understanding of the mechanics and fundamental concepts of prestressed reinforced concrete. The content will include analysis and design principles according to Canadian design standards. The course will culminate with an applied design project of a prestressed concrete structure. Students are expected to have completed reinforced concrete design at the undergraduate level.

8. **Expanded Course Description**: This course is intended to provide an introduction to the mechanics and fundamental concepts of prestressed reinforced concrete. The course will be delivered in three modules, covering mechanics of prestressed reinforced concrete, design of prestressing systems, and ending with an applied design project of a prestressed reinforced structure:

   **Module 1:** **Mechanics of Prestressed Reinforced Concrete**
   This module provides fundamentals of prestressing systems and their mechanical and time-dependent properties, such as creep, relaxation, and behaviour of anchors. Pre-tensioning and post-tensioning technology will be discussed, including pre- and post-tensioning systems and operations, and methods of construction covering partial prestressing and segmental launching. Procedures to estimate prestress losses during post-tensioning will be covered. The module will conclude with an introduction to sectional design of prestressed concrete members.

   **Module 2:** **Design of Prestressing Systems**
   This module focuses on detailed analysis and design of prestressed reinforced concrete sections. Analysis includes the response of members to axial load and flexure with consideration of short- and long-term behaviour. Detailed design will include flexure, shear and torsion, bond, bearing, camber and deflections, and design of non-prestressed reinforcement. Design will cover continuous beams, slabs, restraint actions in statically indeterminate prestressed structures, and cable layout design by the load balancing method. Students will be introduced to sectional analysis...
Module 3: **Design Project**
Module three is based on an applied design project of a prestressed concrete structure (building or bridge). Students will perform detailed analysis and design according to the requirements of the National Building Code of Canada or the Canadian Highway Bridge Design Code and CSA A23.3 Design of Concrete Structures. Students will be exposed to advanced software for the analysis and assessment of the design. Advanced reinforced concrete mechanics theories to interpret the shear stress states in prestressed girders and panels are also included. The module includes two design reports and a final presentation.

9. **Evaluation:**

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10. **Integrated Courses:** N/A

11. **Rationale:**
This course provides students with advanced tools to analyse and design prestressed reinforced concrete structures. This content is typically not covered at the undergraduate level. These tools are routinely required by practicing structural engineers. One of the objectives of the Civil Engineering graduate program is to provide training to such practicing engineers.

12. **Faculty Resources:**

www.yorku.ca/grads/ | www.facebook.com/YorkUGradStudies
The faculty members that are qualified to teach this course are Dr. Dan Palermo and future hires in the Structural Engineering area within the Department of Civil Engineering.

It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:


(http://www.orderline.com)


(http://www.orderline.com)

2015 National Building Code of Canada

Canadian Standards Association (CSA) Standard S6-14 - Canadian Highway Bridge Design Code
(http://shop.csa.ca)

15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available free of charge.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6421

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Introduction to Seismic Design of Reinforced Concrete Structures

5. **Short Course Title:** Introduction to Seismic Design of Reinforced Concrete Structures

6. **Effective Session:** Winter 2016

7. **Calendar (Short) Course Description:**
   This 3-module course provides students with an introduction to seismic design of reinforced concrete structures. Topics range from a review of seismic hazard to the requirements of the National Building Code to state of the art in seismic design philosophy. Students are expected to have completed reinforced concrete design at the undergraduate level. Structural Dynamics & Earthquake Engineering (GS/CIVL 6411) is a prerequisite.

8. **Expanded Course Description:**
   Review of seismic hazard in Canada; building code provisions for earthquake loads; uniform hazard spectra; linear elastic modal response spectrum analysis; linear elastic time history analysis; equivalent static force procedure; advanced state-of-the-art nonlinear modeling techniques including the finite element method; emerging methods such as performance-based earthquake engineering and displacement-based design; ductility concepts; plastic hinge formulations; capacity design philosophy for seismic resistance; seismic analysis and design of common seismic force resisting systems including slender and squat shear walls, moment resisting frames, and coupled shear walls and coupling beams; shear wall-moment resisting frame interaction; and lessons learned from recent earthquakes.

   **Module 1:** **Introduction to Seismicity and Seismic Design Codes**
   This module with focus on seismic design hazard, and definition of spectra and uniform hazard spectra prescribed in the National Building Code. A review of code approaches to estimate seismic force demands will form a major component of this module, including equivalent static force procedure, linear elastic modal response spectrum analysis, and linear elastic time history analysis.

   **Module 2:** **State-of-the-art Seismic Design**
This module is intended to introduce students to state of the art in seismic design philosophy. Topics will include performance-based and displacement based seismic design, and nonlinear methods of analysis. Concepts in ductility and plastic hinges will be reviewed in detail. Students will perform a literature review of a topic related to this module and deliver a presentation on their work.

Module 3:  
**Detailing for Earthquake Resistance**  
The third module will review common seismic force resisting systems recognized by the National Building Code, including slender and squat shear walls, moment resisting frames, and coupled shear walls and coupling beams. The capacity design philosophy for seismic resistance will be applied to detailing structural members for earthquake resistance. Lessons learned from recent earthquakes will be presented to provide a critical assessment of our current understanding of earthquake resistance.

9. **Evaluation:**

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10. Integrated Courses: N/A
11. Rationale:
This course provides students with knowledge to design reinforced concrete structures to resist earthquake forces. This content is typically not covered at the undergraduate level. Practicing structural engineers are required to design structures for the effects of earthquakes as part of their job requirements. One of the objectives of the Civil Engineering graduate program is to provide training to such practicing engineers.

12. Faculty Resources:
The faculty members that are qualified to teach this course are Dr. Palermo and future hires in the structural area with the Department of Civil Engineering.

It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:
Module 1: 2015 National Building Code of Canada


2015 National Building Code of Canada


15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available free of charge.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6413

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Advanced Structural Steel Design

5. **Short Course Title:** Advanced Structural Steel Design

6. **Effective Session:** Fall 2016

7. **Calendar (Short) Course Description:**
   This 3 module course provides students with an understanding of advanced topics in the design of steel structures. Topics will include principles of local and global buckling and stability; plastic design of steel structures; plate girders; and composite members. Emphasis will be placed on overall structural analysis and design. Students are expected to have completed structural steel design at the undergraduate level.

8. **Expanded Course Description:**
   This course is intended to provide advanced topics in the mechanics and design of structural steel. Topics will include principles of local and global buckling and stability; plastic design of steel structures; plate girders; and composite members. Emphasis will be placed on overall structural analysis and design, including performance-based seismic design of steel structures. The course will consist of 3 modules:

   **Module 1:** **Design of Steel Structures**
   This module will provide students with advanced topics in design of steel structures including local and global buckling and stability, plate girders, and composite members. Students will also be introduced to plastic design of steel structures.

   **Module 2:** **Performance-Based Design of Steel Structures**
   This module will focus on seismic design of steel structures with an emphasis on performance-based design. Seismic force resisting systems recognized in the National Building Code will be reviewed, including moment resisting frames, steel plate shear walls, and various bracing options for frames. Concepts in ductile design and detailing of steel structures will be introduced.

   **Module 3:** **Design Project**
This module will be based on an applied design project of a steel building. Students will perform detailed analysis and design according to the requirements of the National Building Code and CSA S16 Design of Steel Structures. Students will prepare two design reports and deliver a presentation of their design.

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10. Integrated Courses: N/A

11. Rationale:
This course provides students with advanced tools to analyse and design steel structures that are not included at the undergraduate level. These tools are routinely required by practicing structural engineers. One of the objectives of the Civil Engineering graduate program is to provide training to such practicing engineers.

12. Faculty Resources:
The faculty members that are qualified to teach this course include future hires in the Structural Engineering area within the Department of Civil Engineering.

It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

www.yorku.ca/grads/ | www.facebook.com/YorkUGradStudies
Module 1:

Canadian Institute of Steel Construction (2012) “Handbook of Steel Construction”


Module 2 & 3:


Canadian Institute of Steel Construction (2012) “Handbook of Steel Construction”


15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available free of charge.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6414

3. **Credit Value:** 3 Credits (1 credit per module)

4. **Long Course Title:** Bridge Engineering

5. **Short Course Title:** Bridge Engineering

6. **Effective Session:** Fall 2016

7. **Calendar (Short) Course Description:**
This 3 module course provides students with tools in bridge engineering from an understanding of bridge loads, to simplified and advanced methods of analysis, to planning and selection of bridge systems, to design of reinforced concrete, structural steel, and prestressed reinforced bridges and their management, maintenance and monitoring, including corrosion repair. Students are expected to have completed reinforced concrete and structural steel design courses at the undergraduate level.

8. **Expanded Course Description:**
This course provides a comprehensive understanding of current methods for bridge design with emphasis on prestressed concrete bridges. Topics will include calculation of design loads for bridges and application of loads on bridges with reference to the Canadian Highway Bridge Design Code. Various bridge systems, such as reinforced concrete, structural steel, and prestressed concrete will be introduced, including planning and selection. This course will cover the idealization of bridges for simplified and advanced methods of analysis. Detailed bridge design will include design for traffic, wind, accidental, and extreme loads. Students will also be introduced to fundamentals of bridge management, maintenance and monitoring, including corrosion repair.

**Module 1: Loads on Bridges, Bridge Systems & Hardware, Principles of Design**
In the first module, students will be introduced to the calculation of design loads for bridges and placement of loads on bridge decks with reference to the Canadian Highway Bridge Design Code. Various bridge systems are presented along with methods for idealization in analysis. Basic bridge hardware and other component such as stoppers, bearings, approach slabs, and embankment fills are also discussed.

**Module 2: Bridge Design**
Module two will focus on the design of bridges to traffic, wind and accidental loads, including reinforced concrete, structural steel, and prestressed concrete bridges. Emphasis will be placed on prestressed concrete bridges. Students will become familiar with the Canadian Highway Bridge Design Code provisions. Planning and
selection of bridge systems will be discussed.

**Module 3: Designing for Extreme Events and Corrosion – Maintenance and Monitoring**

Module three is intended to expose students to the design of bridges to extreme events. Students will also be introduced to fundamentals of bridge management, maintenance in corrosive environments and monitoring. Other topics include: corrosion hazards in the climatic conditions of Canada; mechanisms of transport; diffusion and binding of chlorides in contaminated concrete; corrosion initiation and propagation time; effects of corrosion on mechanical properties of bridge materials; methodology for assessment of the structural implications of corrosion particularly with reference to load bearing capacity, earthquake resistance and residual service life of bridge structures; corrosion inhibitors; novel technologies for corrosion protection; repairs of corroded structures; required global and local interventions for earthquake resistance of old, lightly reinforced construction that has suffered corrosion damage.

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<td></td>
<td>Examination</td>
<td>60%</td>
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<td>TOTAL</td>
<td>1 Credit</td>
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10. Integrated Courses: N/A

11. Rationale:

This course provides students with tools to analyse and design bridges. This content is not covered at the undergraduate level. Bridge design is one of the main components in
infrastructure renewal and in the urban expansion of our cities. It is an advanced topic of specialized training for structural engineers; proper design impacts resilience of highway infrastructure. Considering that due to exposure bridges are among the most susceptible of structures to corrosion in cold climates, maintenance and management of these structures are a priority topic for Canadian practicing engineers.

12. Faculty Resources:
The faculty members that are qualified to teach this course are Dr. Dan Palermo and future hires in the structural area with the Department of Civil Engineering.

It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

Module 1, 2, & 3:

CPCI (Canadian Prestressed Concrete Institute) DESIGN MANUAL - Fourth Edition (http://www.cpci.ca/en/resources/design_manual/)


Module 3:

Canadian Standards Association (CSA) Standard S6-14 - Canadian Highway Bridge Design Code (http://shop.csa.ca)


15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available free of charge.
New Course Proposal

1. **Program:** Civil Engineering
2. **Course Number:** GS/CIVL 6422
3. **Credit Value:** 3 Credits (1 Credit per module)
4. **Long Course Title:** Advanced Topics in Structural Engineering
5. **Short Course Title:** Advanced Topics in Structural Engineering
6. **Effective Session:** Winter 2017
7. **Calendar (Short) Course Description:**
   This 3-module course comprises cutting-edge, new concepts and technological developments in structural engineering. Topics include: computer-based modelling of structures; seismic assessment of existing structures; and, novel construction materials in structural engineering. These topics are presented as three stand-alone modules.

8. **Expanded Course Description:**
   This 3-module course comprises cutting-edge, new concepts and technological developments in structural engineering. Topics include: computer-based modelling of structures; seismic assessment of existing structures; and, novel construction materials in structural engineering. These topics are presented as three stand-alone modules.

   **Module 1:** **Computer-based Modelling of Structures**
   Numerical evaluation of dynamic response in the time and in the frequency domain. Hysteretic lumped and distributed plasticity models. Numerical modeling of structures for Earthquake response analysis using commercial software or freeware (e.g. OPENSEES).

   **Module 2:** **Seismic Assessment of Existing Structures**
   This module establishes the strength and deformation capacity of reinforced concrete structures, and the hierarchy of mechanisms of resistance and failure of structures. The effects of typical deficiencies of old-type lightly reinforced construction on available deformation capacity are estimated. Response is evaluated for old-type beam-column joints, anchorages and lap-splices, short-columns. Other topics include: establishing the pushover (resistance) curve of the structure using a force and a displacement approach; lateral stiffness, strength at yielding and at failure; examples of direct assessment of structures damaged in past earthquakes; forensic investigation of collapse; maximum tolerable ground acceleration in existing structures limiting collapse.

   **Module 3:** **Novel Construction Materials in Structural Engineering**

9. Evaluation:

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<tr>
<th>Module 1:</th>
<th>Assignments</th>
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<td>Design Project</td>
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<tr>
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<td>Design Project</td>
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<td><strong>TOTAL</strong></td>
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<th>Module 3:</th>
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<td>Examination</td>
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<tr>
<td><strong>TOTAL</strong></td>
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<td>1 Credit</td>
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10. Integrated Courses: N/A

11. Rationale:
This course provides students with modern tools that are used for simulation of complex structural problems require advanced level simulation capabilities and modeling of inelastic behavior. These skills are not taught in any other previous course taken by the students. It also provides them with information on recent assessment procedures established by North American and European Seismic Guidelines and on emerging construction materials that are increasingly being used in the design of new structures and in the repairing of existing structures.

12. Faculty Resources:
The faculty members that are qualified to teach this course are Dr. Dan Palermo and future hires in the Structural Engineering area within the Department of Civil Engineering.
13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

Module 1:

FEMA 440: Improvement of Nonlinear Static Seismic Analysis Procedures.


Module 2:


Building Code Requirements and Specification for Masonry Structures (5-13 & 6-13), Masonry Standards Joint Committee (MSJC), Standards ASCE/SEI 5-13, 6-13, Stock No. TMS13 / ISBN: 9781929081431

Also, several reports that may be obtained FREE OF CHARGE from the Federal Emergency Management Agency (FEMA) of the United States Government, see http://www.fema.gov/earthquake-publications/index-earthquake-publications

Module 3:

ACI 440-3R.12: Guide Test Methods for Fiber-Reinforced Polymers (FRPs) for Reinforcing or Strengthening Reinforced Concrete or Masonry Structures

440.8M-13 Specification for Carbon and Glass Fiber-Reinforced Polymer Materials Made by Wet Layup for External Strengthening; Topic: Fiber-Reinforced Polymers(FRP); Format: PDF, ePub, or Kindle, Author: AcI Committee 440, Published: 5/23/2014

15. Physical Resources:

There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All software required for this course are available free of charge.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6510

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Advanced Transportation Engineering

5. **Short Course Title:** Advanced Transportation Engineering

6. **Effective Session:** Fall 2015

7. **Calendar (Short) Course Description:**

This course deals with fundamentals of transportation engineering, essential elements of geometric design of highways, traffic safety, and principles of transportation planning and traffic demand forecasting.

8. **Expanded Course Description:**

This course deals with fundamentals of transportation engineering, essential elements of geometric design of highways, traffic safety, and principles of transportation planning and traffic demand forecasting. It is presented in terms of three stand-alone modules. The details of each module are as follows:

**Module 1: Fundamentals of Transportation Engineering**

Topics in this module include: introduction to transportation engineering; traffic flow characteristics (volume, speed, density, time and space headways, gaps, etc.); basic traffic flow theory (speed-density-flow models and linear regression models).

**Module 2: Highway Capacity Analysis and Design**

This module includes topics such as: highway capacity analysis; Measure of Effectiveness (MOE), Passenger Car Equivalents (PCE), and Level of Service (LOS); capacity adjustments by heavy vehicles and driver population; basic freeway and/or highway sections and ramp sections; roadway classification criterion and types of roadways; highway design (single line sketch, interchange design, horizontal alignment design, vertical alignment design, cross-section design).

**Module 3: Urban Transportation Planning Framework**

This module comprises the following topics: introduction to transportation planning and traffic demand forecasting; network analysis (traffic analysis zone); trip generation model (trip production and trip attraction); trip distribution model (Fratar and gravity model); modal split model (Logit model); network assignment; .

9. **Evaluation:**

[www.yorku.ca/grads] | [www.facebook.com/YorkUGradStudies]
Module 1:  Assignments  30% 
  Mid-term Exam  30% 
  Final Exam  40% 
  TOTAL  1 Credit

Module 2:  Assignments  30% 
  Mid-term Exam  30% 
  Final Exam  40% 
  TOTAL  1 Credit

Module 3:  Assignments  30% 
  Term Paper & Presentation  30% 
  Final Exam  40% 
  TOTAL  1 Credit

10. Integrated Courses: N/A

11. Rationale:

This course is a mandatory foundational course for students pursuing their Master’s or doctoral degree in Transportation Engineering. After completing this course, the students will be able to move on to other more advanced and specialized topics in Transportation Engineering.

12. Faculty Resources:

The faculty members that are qualified to teach this course are Dr. Sabbir Saiyed, P.Eng., Adjunct Professor and future hires in the Transportation Engineering/Materials area within the Department of Civil Engineering. It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:


15. Physical Resources:

There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All the software required for this course will be sourced prior to the first offering of the course. Most of the software is available in public domain at no charge for use by instructors and students.
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6520

3. **Credit Value**: 3 Credits (1 Credit per module)

4. **Long Course Title**: Pavement Materials, Analysis and Design

5. **Short Course Title**: Pavement Materials, Analysis and Design

6. **Effective Session**: Winter 2016

7. **Calendar (Short) Course Description**:

   This 3-module course provides students with an introduction to sustainable design of pavements for highways, airports and other industrial applications. Pavement materials and principles of analysis and design of pavements are covered in detail.

8. **Expanded Course Description**:

   This course provides students with guidance for analysis and design of pavements and supporting materials for highways, airports and other industrial applications. The first module of the course tries to develop a clear understanding of the physical and mechanical characteristics of transportation materials, such as: concrete, asphalt, aggregates, and stabilized soils. The second module of the course discusses the concepts of mechanism analysis, characterization, and modeling based on analytically performed and/or numerically operated stress analyses of various types of infrastructure materials and structures. The third module of the course addresses the design of flexible and rigid pavement. The details of the each module are as follows:

   **Module 1: Pavement Materials**

   Given that most of a pavement structures contains “engineered soils”, its design requires a good understanding of the properties of the aggregates that the engineer must work with along with an appreciation of pavement-subgrade interaction. The first part of the course deals with materials, in particular with the properties of soils that comprise the subgrade and the unbound granular layers, as well as the aggregates used to make asphalt or Portland cement concrete, which must meet certain requirements. The characterization of bituminous materials and the design of bituminous mixtures is also addressed. At the conclusion of this module, the students will be familiar with various pavement materials, their important engineering properties. Students will also become familiar with veracious testing procedures to characterize pavement materials.

   **Module 2: Pavement Analysis**

   The second module of the course addresses advanced analysis techniques, including pavement mechanics (multi-layered elastic theory and slab theory) that
allows the engineer to estimate stresses and strains in various layers of pavement structure and the subgrade, as well as how the pavement and subgrade interact mechanically. An appreciation for damage (fatigue) analysis is necessary in order to properly understand the design philosophy associated with pavement structures. Although many procedures exist for estimating the required layer thickness for a given traffic volume, distribution of truck types and design life, most design procedures are based directly or indirectly on the same set of principles.

Module 3: Pavement Design

The Third module of the course concerns itself with the design and construction of highway pavements. A few design procedures are presented to demonstrate how the theory is incorporated into the design tables for both flexible and rigid pavements. Students will also develop and understanding take into account factors such as drainage, stability of the foundation materials and capacity of the road in pavement designs. Additional topics such as stability considerations for the design of embankments, as well as the design of culverts, are also introduced.

9. Evaluation:

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<tr>
<th>Module 1: Pavement Materials</th>
<th>Assignments</th>
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<td>Term Paper &amp; Presentation</td>
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<td>Exam</td>
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<th>Module 2: Pavement Analysis</th>
<th>Assignments</th>
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<td>Term Paper &amp; Presentation</td>
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<th>Module 3: Pavement Design</th>
<th>Assignments</th>
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<td>Term Paper &amp; Presentation</td>
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<td>Exam</td>
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10. Integrated Courses: N/A

11. Rationale:
This course provides students with knowledge to analyze and design flexible and rigid pavements. It is anticipated that at the conclusion of this course students will have a better understanding of the characteristics of the flexible and rigid pavements and will be well versed in the analysis and design of pavements and supporting materials.

12. Faculty Resources:

The faculty members that are qualified to teach this course are Dr. Rashid Bashir and future hires in the Transportation Engineering/Materials area within the Department of Civil Engineering.

It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:


15. Physical Resources:

There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction.
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6511

3. **Credit Value**: 3 Credits (1 Credit per module)

4. **Long Course Title**: Intelligent Transportation Systems

5. **Short Course Title**: Intelligent Transportation Systems

6. **Effective Session**: Fall 2016

7. **Calendar (Short) Course Description**:

This course introduces the students to essential features of intelligent transportation systems (ITS) and provides them with the opportunity to explore and investigate the applications of the ITS in delivering safe and efficient transportation systems and in preserving of transportation assets.

8. **Expanded Course Description**:

This course introduces the students to essential features of intelligent transportation systems (ITS) and provides them with the opportunity to explore and investigate the applications of the ITS in delivering safe and efficient transportation systems and in preserving of transportation assets. The course is presented in terms of three stand-alone modules. Details of these modules are given below:

**Module 1: Principles of Intelligent Transportation Systems (ITS)**


**Module 2: Economics of Intelligent Transportation Systems**

Cost-benefit analysis of ITS; benefits to road network operations; evaluation of benefits; planning and financing of ITS; the ITS framework plan; implementation strategies; contracts; public-private partnerships (PPPs); launching of ITS at programme and project level; regional deployment of ITS.

**Module 3: Case Studies of Intelligent Transportation Systems**
ITS in transitional and developing countries; special considerations; ITS in the long-term; future scenarios; forward-thinking ITS programmes and projects; ITS case studies from GTA, other parts of Canada and from different parts of the world.

9. Evaluation:

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<tr>
<th>Module</th>
<th>Assignments</th>
<th>Mid-term Exam</th>
<th>Final Exam</th>
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<td>35%</td>
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10. Integrated Courses: N/A

11. Rationale:

This course is a mandatory foundational course for students pursuing their Master's or doctoral degree in Transportation Engineering, particularly in the area of Transportation System and Planning. After completing this course, the students will be able to: appreciate the pros and cons of various ITS in use; conduct cost-benefit analysis of ITS systems; and select and/or customize ITS based on design requirements.

12. Faculty Resources:

www.yorku.ca/grads/ | www.facebook.com/YorkUGradStudies
The faculty members that are qualified to teach this course are: Dr. Sabbir Saiyed, P.Eng., Adjunct Professor in the area of Transportation Systems and Planning and future hires in the Transportation Engineering/Materials area within the Department of Civil Engineering. It is anticipated that this course will be offered once every year.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

2. Various other online sources
3. Journal of the Transportation Research Board (TRB)

15. Physical Resources:

There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6521

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Road Safety Engineering

5. **Short Course Title:** Road Safety Engineering

6. **Effective Session:** Winter 2017

7. **Calendar (Short) Course Description:**

   This course is designed to provide students with a strong theoretical and methodological foundation in road safety analysis. It focuses on the analysis of road accident data, the evaluation of safety countermeasures, the roadway safety management process, and the roadway design consistency.

8. **Expanded Course Description:**

   This course deals with fundamentals of transportation engineering, essential elements of geometric design of highways, traffic safety, and principles of transportation planning and traffic demand forecasting. It is presented in terms of three stand-alone modules. The details of each module are as follows:

   **Module 1: Fundamental Principles of Road Safety**
   
   Topics in this module include: definition, quantification and magnitude of road safety; the roadway safety management process; identification of accident-prone locations.

   **Module 2: Road Safety Countermeasures and their Evaluation**
   
   Topics in this module include: road safety countermeasures and their evaluation; application of accident reduction and modification factors; development of safety performance functions using empirical Bayes (EB) technique; network screening based on safety performance functions.

   **Module 3: Roadway Design Consistency and Safety Management**
   
   This module comprises the following topics: use of statistical computing software (e.g. R-language) for roadway accident data analysis and for development of safety performance functions; appraisal of roadway design consistency for rural two-lane highway; development of operating speed prediction models using linear regression techniques; estimation of the magnitude of speed differentials along a section of rural roadways.

9. **Evaluation:**

www.yorku.ca/grads/ | www.facebook.com/YorkUGradStudies
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<td>Final Exam</td>
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<td><strong>TOTAL</strong></td>
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<td>1 Credit</td>
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10. Integrated Courses: N/A

11. Rationale:

This course is a technical elective course for students pursuing their Master’s or doctoral degree in Transportation Engineering, particularly those whose research is focussed on road safety analysis and prediction.

12. Faculty Resources:

The faculty members that are qualified to teach this course are Dr. Sabbir Saiyed, P.Eng., Adjunct Professor and future hires in the Transportation Engineering/Materials area within the Department of Civil Engineering. It is anticipated that this course will be offered once every two years.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:

9. Institute of Transportation Engineers, Issue Brief 8: Toolbox of Countermeasures and Their Potential Effectiveness for Intersection Crashes
10. Institute of Transportation Engineers, Toolbox of Countermeasures and Their Potential Effectiveness for Roadway Departure Crashes
11. Additional reading materials (e.g. various journal articles) will be listed or distributed in class.

15. Physical Resources:

There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction. All the software required for this course will be sourced prior to the first offering of the course. The software required for this course are available in public domain at no charge for use by instructors and students.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6000

3. **Credit Value:** Non-credit (0 Credit)

4. **Long Course Title:** Graduate Seminar Series in Civil Engineering

5. **Short Course Title:** Graduate Seminar

6. **Effective Session:** Fall 2015

7. **Calendar (Short) Course Description:**

The Graduate Seminar Series comprises at least twelve individual seminar events organized by the Department of Civil Engineering approximately once a month throughout the academic year and an annual conference-style all-day Graduate Symposium in which MASc and PhD students give presentations based on their respective research projects. Each MASc student is expected to give at least one presentation at the Graduate Symposium. Each PhD student is expected to give at least two presentations at the Graduate Symposium. All graduate students (MASc and PhD) are required to attend at least 10 graduate seminars during the course of their respective degree programs.

8. **Expanded Course Description:**

The Graduate Seminar Series comprises at least twelve individual seminar events organized by the Department of Civil Engineering approximately once a month throughout the academic year and an annual conference-style all-day Graduate Symposium in which MASc and PhD students give presentations based on their respective research projects. Each MASc student is expected to give at least one presentation at the Graduate Symposium. Each PhD student is expected to give at least two presentations at the Graduate Symposium. All graduate students (MASc and PhD) are required to attend at least 10 graduate seminars during the course of their respective degree programs.

Guest speakers will be invited to give presentations on current issues in engineering or the economy, including emerging technologies in the Civil Engineering discipline, societal concerns related to infrastructure, resilience and sustainability, state-of-the-art developments from other fields of engineering, engineering labour issues, economic theory and development, ethical and legal issues, forensic investigations, and other matters affecting the Civil Engineering profession in particular and Engineering profession in general. Guest speakers may be faculty members from within the Department of Civil Engineering or faculty from other Departments at York University or invited professors from other institutions, successful businessmen, entrepreneurs, inventors, or public policy makers.
9. Evaluation:

MASc students will be required to show proof of attendance in at least 10 graduate seminars in order to complete the requirements for this non-credit course. In addition, each MASc student must give at least one presentation based on the student’s research project at the annual Graduate Symposium.

PhD students will be required to show proof of attendance in at least 10 graduate seminars in order to complete the requirements for this non-credit course. In addition, each PhD student must give at least two presentations based on the student’s research project at the annual Graduate Symposium.
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6001

3. **Credit Value**: Non-credit (0 Credit)

4. **Long Course Title**: Doctor of Philosophy (PhD) in Civil Engineering Thesis

5. **Short Course Title**: PhD Civil Engineering Thesis

6. **Effective Session**: Fall 2015

7. **Calendar (Short) Course Description**: Thesis Requirement for Doctor of Philosophy (PhD) in Civil Engineering. Prerequisites: None.

8. **Expanded Course Description**: Thesis Requirement for Doctor of Philosophy (PhD) in Civil Engineering. Prerequisites: None.

9. **Evaluation**: The evaluation of the PhD thesis in Civil Engineering will be done in accordance with the regulations of the Faculty of Graduate Studies, York University, as described at:

   http://gradstudies.yorku.ca/current-students/regulations/degree-types/
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6002

3. **Credit Value**: Non-credit (0 Credit)

4. **Long Course Title**: Master of Applied Science in Civil Engineering Thesis

5. **Short Course Title**: MASc Civil Engineering Thesis

6. **Effective Session**: Fall 2015

7. **Calendar (Short) Course Description**:

   Thesis Requirement for Master of Applied Science in Civil Engineering. Prerequisites: None.

8. **Expanded Course Description**:

   Thesis Requirement for Master of Applied Science in Civil Engineering. Prerequisites: None.

9. **Evaluation**:

   The evaluation of the MASc thesis in Civil Engineering will be done in accordance with the regulations of the Faculty of Graduate Studies, York University, as described at:

   [http://gradstudies.yorku.ca/current-students/regulations/degree-types/](http://gradstudies.yorku.ca/current-students/regulations/degree-types/)
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6100

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Special Topics in Environmental Engineering

5. **Short Course Title:** Special Topics in Environmental Engineering

6. **Effective Session:** Fall 2016/Winter 2017 onward

7. **Calendar (Short) Course Description:**
   This course is a placeholder for Directed Reading courses in Environmental Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

8. **Expanded Course Description:**
   This course is a placeholder for Directed Reading courses in Environmental Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

9. **Evaluation:**
   To be set by the instructor offering the Directed Reading course.

10. **Integrated Courses:** N/A

11. **Rationale:**
    Such a course is needed for each of the 6 sub-disciplines within Civil Engineering in order to provide some degree of flexibility to the instructor(s) as well as to the students. Offering a course as a Directed Reading courses also offers the instructor(s) an opportunity to test the
demand for a new course before embarking on formal development of such a course.

12. Faculty Resources:
The course will be taught by the faculty member proposing to teach the Directed Reading course.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:
Bibliography will be prepared by the course instructor, who will also be responsible for ensuring that the students have access to all the required course materials.

15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6200

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Special Topics in Geotechnical Engineering

5. **Short Course Title:** Special Topics in Geotechnical Engineering

6. **Effective Session:** Fall 2016/Winter 2017 onward

7. **Calendar (Short) Course Description:**
This course is a placeholder for Directed Reading courses in Geotechnical Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

8. **Expanded Course Description:**
This course is a placeholder for Directed Reading courses in Geotechnical Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

9. **Evaluation:**
To be set by the instructor offering the Directed Reading course.

10. **Integrated Courses:** N/A

11. **Rationale:**
Such a course is needed for each of the 6 sub-disciplines within Civil Engineering in order to provide some degree of flexibility to the instructor(s) as well as to the students. Offering a course as a Directed Reading courses also offers the instructor(s) an opportunity to test the
demand for a new course before embarking on formal development of such a course.

12. Faculty Resources:
The course will be taught by the faculty member proposing to teach the Directed Reading course.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:
Bibliography will be prepared by the course instructor, who will also be responsible for ensuring that the students have access to all the required course materials.

15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction.
New Course Proposal

1. **Program:** Civil Engineering

2. **Course Number:** GS/CIVL 6300

3. **Credit Value:** 3 Credits (1 Credit per module)

4. **Long Course Title:** Special Topics in Geoenvironmental Engineering

5. **Short Course Title:** Special Topics in Geoenvironmental Engineering

6. **Effective Session:** Fall 2016/Winter 2017 onward

7. **Calendar (Short) Course Description:**
   This course is a placeholder for Directed Reading courses in Geoenvironmental Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student's research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

8. **Expanded Course Description:**
   This course is a placeholder for Directed Reading courses in Geoenvironmental Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student's research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

9. **Evaluation:**
   To be set by the instructor offering the Directed Reading course.

10. **Integrated Courses:** N/A

11. **Rationale:**
   Such a course is needed for each of the 6 sub-disciplines within Civil Engineering in order to provide some degree of flexibility to the instructor(s) as well as to the students. Offering a course as a Directed Reading courses also offers the instructor(s) an opportunity to test the
demand for a new course before embarking on formal development of such a course.

12. Faculty Resources:
The course will be taught by the faculty member proposing to teach the Directed Reading course.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:
Bibliography will be prepared by the course instructor, who will also be responsible for ensuring that the students have access to all the required course materials.

15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction.
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6400

3. **Credit Value**: 3 Credits (1 Credit per module)

4. **Long Course Title**: Special Topics in Structural Engineering

5. **Short Course Title**: Special Topics in Structural Engineering

6. **Effective Session**: Fall 2016/Winter 2017 onward

7. **Calendar (Short) Course Description**: This course is a placeholder for Directed Reading courses in Structural Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

8. **Expanded Course Description**: This course is a placeholder for Directed Reading courses in Structural Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

9. **Evaluation**: To be set by the instructor offering the Directed Reading course.

10. **Integrated Courses**: N/A

11. **Rationale**: Such a course is needed for each of the 6 sub-disciplines within Civil Engineering in order to provide some degree of flexibility to the instructor(s) as well as to the students. Offering a course as a Directed Reading courses also offers the instructor(s) an opportunity to test the
demand for a new course before embarking on formal development of such a course.

12. Faculty Resources:
The course will be taught by the faculty member proposing to teach the Directed Reading course.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:
Bibliography will be prepared by the course instructor, who will also be responsible for ensuring that the students have access to all the required course materials.

15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction.
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6500

3. **Credit Value**: 3 Credits (1 Credit per module)

4. **Long Course Title**: Special Topics in Transportation Engineering

5. **Short Course Title**: Special Topics in Transportation Engineering

6. **Effective Session**: Fall 2016/Winter 2017 onward

7. **Calendar (Short) Course Description**: This course is a placeholder for Directed Reading courses in Transportation Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

8. **Expanded Course Description**: This course is a placeholder for Directed Reading courses in Transportation Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student’s research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

9. **Evaluation**: To be set by the instructor offering the Directed Reading course.

10. **Integrated Courses**: N/A

11. **Rationale**: Such a course is needed for each of the 6 sub-disciplines within Civil Engineering in order to provide some degree of flexibility to the instructor(s) as well as to the students. Offering a course as a Directed Reading courses also offers the instructor(s) an opportunity to test the
demand for a new course before embarking on formal development of such a course.

12. Faculty Resources:
The course will be taught by the faculty member proposing to teach the Directed Reading course.

13. Crosslisted Courses: N/A

14. Bibliography and Library Statement:
Bibliography will be prepared by the course instructor, who will also be responsible for ensuring that the students have access to all the required course materials.

15. Physical Resources:
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction.
New Course Proposal

1. **Program**: Civil Engineering

2. **Course Number**: GS/CIVL 6600

3. **Credit Value**: 3 Credits (1 Credit per module)

4. **Long Course Title**: Special Topics in Water Resources Engineering

5. **Short Course Title**: Special Topics in Water Resources Engineering

6. **Effective Session**: Fall 2016/Winter 2017 onward

7. **Calendar (Short) Course Description**:
   This course is a placeholder for Directed Reading courses in Water Resources Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student's research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

8. **Expanded Course Description**:
   This course is a placeholder for Directed Reading courses in Water Resources Engineering. A new course in Environmental Engineering may be offered as a Directed Reading courses, depending on the needs of a graduate student's research project for a maximum of two successive course offerings and subject to approval by the Graduate Program Director (GPD). After two successive offerings, the course instructor(s) must develop a full proposal for the course so that a permanent course code could be assigned to it and the course added to the calendar of Civil Engineering graduate courses. In case of more than one Directed Reading courses being offered in any given term, the courses will be distinguished using sections listed alphabetically.

9. **Evaluation**:
   To be set by the instructor offering the Directed Reading course.

10. **Integrated Courses**: N/A

11. **Rationale**:
    Such a course is needed for each of the 6 sub-disciplines within Civil Engineering in order to provide some degree of flexibility to the instructor(s) as well as to the students. Offering a course as a Directed Reading courses also offers the instructor(s) an opportunity to test the
demand for a new course before embarking on formal development of such a course.

12. **Faculty Resources:**
The course will be taught by the faculty member proposing to teach the Directed Reading course.

13. **Crosslisted Courses:** N/A

14. **Bibliography and Library Statement:**
Bibliography will be prepared by the course instructor, who will also be responsible for ensuring that the students have access to all the required course materials.

15. **Physical Resources:**
There are no required physical resources for this course with the exception of classroom space to conduct lectures and/or problem-based learning. This space will be available in the new engineering building currently under construction.
Appendix E

Full CVs of Current Full-time and Adjunct Faculty Members in Civil Engineering

<table>
<thead>
<tr>
<th>Faculty Member</th>
<th>Type of Appointment</th>
<th>Rank of Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bashir, Rashid</td>
<td>Full-time Professorial Stream</td>
<td>Associate Professor</td>
</tr>
<tr>
<td>Beddoe, Ryley</td>
<td>Full-time Professorial Stream</td>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Eldyasti, Ahmed</td>
<td>Full-time Professorial Stream</td>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Krol, Magdalena</td>
<td>Full-time Professorial Stream</td>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Palermo, Dan</td>
<td>Full-time Professorial Stream</td>
<td>Associate Professor</td>
</tr>
<tr>
<td>Sharma, Jitendrapal</td>
<td>Full-time Professorial Stream</td>
<td>Professor and Department Chair</td>
</tr>
<tr>
<td>Cao, Laifa</td>
<td>Limited term; renewable; no salary</td>
<td>Adjunct Professor</td>
</tr>
<tr>
<td>Saiyed, Sabbir</td>
<td>Limited term; renewable; no salary</td>
<td>Adjunct Professor</td>
</tr>
</tbody>
</table>
Personal Information

Identification
Dr. Rashid Bashir
Correspondence language: English
Sex: Male
Designated Group: Visible Minority

Language Skills

<table>
<thead>
<tr>
<th>Language</th>
<th>Read</th>
<th>Write</th>
<th>Speak</th>
<th>Understand</th>
<th>Peer Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Panjabi; Punjabi</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Urdu</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Address
The primary address is denoted by (*)

Home                      Primary Affiliation (*)
902-75 North Park Road    Department of Civil Engineering
Thornhill                  Lassonde School of Engineering
L4J 0H8                     425 Life Science Building
Canada, Ontario            4700 Keele Street, York University
                            Toronto
                            M3J 1P3

Telephone
The primary telephone is denoted by (*)

<table>
<thead>
<tr>
<th>Mobile</th>
<th>306-716-5671</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work (*)</td>
<td>1-416-736-2100 extension: 33315</td>
</tr>
</tbody>
</table>

Email
The primary email is denoted by (*)

| Work (*) | Rashid.Bashir@lassonde.yorku.ca |
Education

Degrees

<table>
<thead>
<tr>
<th>Year</th>
<th>Degree</th>
<th>Institution</th>
<th>Supervisor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996/7</td>
<td>Bachelor's Honours</td>
<td>University of Engineering and Technology, Taxlia</td>
<td></td>
</tr>
</tbody>
</table>

Recognitions

<table>
<thead>
<tr>
<th>Year</th>
<th>Award</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013/11</td>
<td>Collaborating for success award</td>
<td>The Collaborating for Success Awards are dedicated to celebrating and rewarding leaders who demonstrate above and beyond collaborative behaviors that support a One Golder approach in their everyday professional activities. Enhancing collaboration across project teams, client teams, geographies, disciplines, or client sectors and working together as one connected Golder community - the concept of One Golder - is an important piece of our Global Strategy. This award is recognition by one's managers and senior colleagues, for above and beyond collaborative behaviors in &quot;Sharing our Knowledge &amp; learning from each other&quot;.</td>
</tr>
<tr>
<td>2011/12</td>
<td>Golder Excellence Award</td>
<td>For project participation in Environmental Impact Assessment for De Beers Gahcho Kué Project. For demonstrating technical excellence towards the client and/or business problem.</td>
</tr>
</tbody>
</table>

User Profile

Research Specialization Keywords: Mine waste management, Unsaturated Soil Mechanics, Unsaturated Flow and Transport

Research Disciplines: Civil Engineering, Mining Engineering and Geological Engineering, Earth Science

Areas of Research: Soil and Sediments, Mining and Petroleum Contamination, Geotechnics, Climate Changes and Impacts

Fields of Application: Environment, Natural Resources, Energy
# Employment

## Academic Work Experience

<table>
<thead>
<tr>
<th>Year</th>
<th>Position</th>
<th>University</th>
<th>Engineering</th>
<th>Tenure Status</th>
<th>Work Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010/9 - 2010/12</td>
<td>Lecturer - Sessional - Part-time - Lecturer</td>
<td>University of Saskatchewan</td>
<td>Engineering - Civil and Geological Engineering</td>
<td>Tenure Status: Non Tenure Track</td>
<td>Instructor for CE-416-Geotechnical Practice. Instructed the course on practical application of soil mechanics concepts to the analysis and design of foundations, excavations, slopes, earthworks and earth-retaining systems. Topics covered in the course included: design and construction of shallow foundations on soils and rocks based on bearing capacity and settlement analysis; design and installation of deep foundations including driven and bored piles; design and construction of earth retaining systems; slope stability; geosynthetics and soil reinforcement; ground improvement; and, special construction techniques. Practicum component of the course included hands-on experience in extracting design parameters from results of site investigation and laboratory tests and preparing a geotechnical design report.</td>
</tr>
<tr>
<td>2009/1 - 2009/4</td>
<td>Lecturer - Sessional - Part-time - Lecturer</td>
<td>University of Saskatchewan</td>
<td>Engineering - Civil and Geological Engineering</td>
<td>Tenure Status: Non Tenure Track</td>
<td>Instructor for CE-466-Geotechnical Modelling. Course covered analysis, design and construction of various earth structures, and comprehended virtually every aspect of geotechnical engineering from a modeling perspective. Topics for this course included: embankments; geosynthetic reinforced steep slopes and retaining walls; earth and mine tailings dams; deep excavations; and tunnels. The role of instrumentation to ensure the safety of earth structures and determination of their performance during their service life was also presented. Application of key concepts, was emphasized during hands-on computer sessions based on the state-of-the-art geotechnical software.</td>
</tr>
<tr>
<td>Years</td>
<td>Position</td>
<td>Institution</td>
<td>Engineering</td>
<td>Tenure Status</td>
<td>Work Description</td>
</tr>
<tr>
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<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2009/1 - 2009/4</td>
<td>Lecturer - Sessional - Part-time - Lecturer</td>
<td>University of Saskatchewan - Engineering - Civil and Geological Engineering</td>
<td>Tenure Status: Non Tenure Track</td>
<td>Work Description: Instructor for CE-856-Advanced Earth Structures (Graduate Course) Course Description: Includes analysis and design of earth slopes, embankments and retaining structures, theory and numerical simulation of seepage through earth structures, methods of stability analysis and their application to natural and engineered slopes, field instrumentation and monitoring the performance of earth structures.</td>
<td></td>
</tr>
<tr>
<td>2006/1 - 2006/12</td>
<td>Research Engineer - Term - Full-time</td>
<td>McMaster University - Engineering - Centre for Effective Design of Structures, Civil Engineering</td>
<td>Tenure Status: Non Tenure Track</td>
<td>Work Description: Carried out numerical modeling of moisture transport in masonry walls using industry standard software. Completed a derivation for vapor, liquid and heat transport equations from first principles using relative humidity as the driving potential for moisture transport. Developed a finite element formulation for simulation of heat, air and moisture movement in masonry walls.</td>
<td></td>
</tr>
<tr>
<td>2001/9 - 2005/8</td>
<td>Teaching Assistant - Term - Part-time</td>
<td>McMaster University - Engineering - Civil Engineering</td>
<td>Tenure Status: Non Tenure Track</td>
<td>Work Description: Assisted in teaching of following courses over a four year period: Engineering Mechanics; Fluid Mechanics; Pavement materials and design; Structural Analysis; Geotechnical Engineering I; Geotechnical Engineering II, Foundation Engineering and Mechanics of Materials.</td>
<td></td>
</tr>
<tr>
<td>1997/9 - 2000/8</td>
<td>Research Assistant - Consultation - Full-time</td>
<td>King Fahad Univ of Petroleum &amp; Minerals - Engineering - Civil Engineering</td>
<td>Tenure Status: Non Tenure Track</td>
<td>Work Description: Worked on an industry funded (Saudi Aramco) research project on pipeline soil interaction. The project developed guidelines for analysis and design of pipelines under sand overburden and railroad and highway crossings. These guidelines fortify API (American Petroleum Institute) Recommended Practice 1102 on analysis and design of buried pipelines. Conducted specialized soil testing on three different soils associated with buried pipelines in eastern province of Saudi Arabia. Non-linear finite element analyses were carried out to numerically model the behavior of buried pipelines under wide variety of different loading and installation conditions. The project resulted in development of a computer program for the analysis and design of buried pipelines currently used by Saudi Aramco. Received Engineering Services Achievement Award (2001) from Saudi Aramco in recognition for outstanding contribution to the development of computer program “Analysis and design of Buried Pipelines”.</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Position</td>
<td>Company/Institute</td>
<td>Tenure Status</td>
<td>Work Description</td>
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<td>---------------</td>
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<td></td>
</tr>
<tr>
<td>1997/9 - 2000/8</td>
<td>Teaching Assistant - Term - Part-time</td>
<td>King Fahad Univ of Petroleum &amp; Minerals - Engineering - Civil Engineering</td>
<td>Non Tenure Track</td>
<td>Work Description: Teaching Assistant for following course over a three year period including two summer semesters. Courses included: Engineering Mechanics, Structural Analysis, Geotechnical Engineering, Foundation Engineering, Mechanics of Materials. Responsibilities included: Marking assignments, quizzes, laboratory reports and midterm exams Instructing class and laboratory tutorials and student supervision in the laboratory</td>
<td></td>
</tr>
<tr>
<td>1996/5 - 1997/8</td>
<td>Research Associate - Consultation - Full-time</td>
<td>Sustainable Development Policy Institute - Sustainable Development Policy Institute</td>
<td>Non Tenure Track</td>
<td>Work Description: The work was conducted as a part of a larger World Bank multi-country research study. In each of the six countries, two projects were selected and data collected for 15 schemes of each project. The work was primarily about exploring the determinants of rural water supply scheme (RWSS) sustainability. The two complementary hypotheses explored were that demand responsive project rules and social mobilization are positively correlated with scheme sustainability. The work involved field investigations and analyses based on data collected from village focus group meetings, household interviews, interviews with the project field staff and technical evaluations. Main focus of work was technical evaluation of the water supply schemes in terms or operation, maintenance and sustainability, field report writing and contribution to the country report.</td>
<td></td>
</tr>
</tbody>
</table>

**Non-academic Work Experience**

<table>
<thead>
<tr>
<th>Time</th>
<th>Position</th>
<th>Company/Institute</th>
<th>Work Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010/5 - 2014/6</td>
<td>Senior Geotechnical Engineer - Golder Associates</td>
<td></td>
<td>Work Description: Carried out climate classification, climate change analysis, coupled plant soil-atmosphere and oxygen transport modeling. Designed more than 8 soil covers for tailings and other waste management facilities in Canada, Australia and Africa. Conducted infiltration assessments and evapotranspiration water balance studies for various mining and landfill projects. Designed and instrumented a number of soil cover test plots and test covers for performance monitoring. Carried out thermal analysis with climate change considerations for a soil covers in North West territories. Evaluated soil covers for climate change consideration in Northern Saskatchewan. Involved in research and development of a new thermal conductivity sensor for suction measurements. Carried out numerical and laboratory studies for sequestration of the saline water in the dewatered oil sands coarse sand tailings.</td>
</tr>
<tr>
<td>Year</td>
<td>Position</td>
<td>Company</td>
<td>Work Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------</td>
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<tr>
<td>2007/9 - 2010/5</td>
<td>Corporate Mine Hydrogeologist - Cameco Corporation - Technical Services</td>
<td>Cameco Corporation - Technical Services</td>
<td>Work Description: Provided hydrogeology support to Northern uranium mining operations Designed and implemented depressurization at Eagle Point mine which, resulted in successful mining of 6.3 Million lbs. of uranium. Developed dewatering plans for flooded Cigar Lake Mine. Developed a reliability based design procedure to address the uncertainty in frequency and volume of inflows at underground mines in Athabasca Basin. The design procedure one of its kind combines the ideas of hydraulic reliability index and effective reserve to design appropriate mine dewatering systems. Testified as subject matter expert in front of the Canadian Nuclear Safety Commission. Managed large and complex mining projects. Although research and development were not core responsibilities, however work done during employment resulted in 2 Journal and more than 10 conference proceedings and presentations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Student/Postdoctoral Supervision</td>
</tr>
<tr>
<td>2012/5 - 2013/5</td>
<td>Co-Supervisor</td>
<td>Choudhary Zeeshan Ahmed - Master's non-Thesis - University of Saskatchewan</td>
<td>Completed Thesis/Project Title: The effect of surface active agents on Atterberg limits of fine grained soils Present Position: Transportation Engineer at Parsons</td>
</tr>
</tbody>
</table>
## Contributions

### Publications

#### Journal Articles

<table>
<thead>
<tr>
<th>Year</th>
<th>Published</th>
<th>Authors</th>
<th>Title</th>
<th>Journal/Citation Details</th>
<th>Refereed?</th>
<th>Open Access?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013/4</td>
<td>Published</td>
<td>Bashir R, Hatley J</td>
<td>&quot;Inflows in uranium mines of northern Saskatchewan, risks and mitigation&quot;</td>
<td>CIM (Canadian Institute of Mining, Metallurgy and Petroleum) Journal., 4(2), 95-108</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2011/10</td>
<td>Published</td>
<td>Hatley J, Bashir R</td>
<td>&quot;Shaft sinking experience in Athabasca Basin and geoscientific investigations for future shafts&quot;</td>
<td>Geomechanics and Tunnelling, 4(5), 454–463</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>2011/2</td>
<td>Published</td>
<td>Smith J, Henry E, Bashir R</td>
<td>&quot;Solute-dependent Capillarity Induced Focused Flow During Infiltration into Alcohol Contaminated Soil&quot;</td>
<td>Vadose Zone Journal, 10(1), 403-411</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

#### Conference Publications

<table>
<thead>
<tr>
<th>Year</th>
<th>Published</th>
<th>Authors</th>
<th>Title</th>
<th>Meeting Details</th>
<th>Refereed?</th>
<th>Invited?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012/9</td>
<td>Published</td>
<td>Bashir R, Hatley J</td>
<td>&quot;Dewatering of a flooded underground uranium mine in Northern Saskatchewan&quot;</td>
<td>Paper</td>
<td>IMWA Annual Conference, Australia, 2012-09-14</td>
<td>Yes</td>
</tr>
<tr>
<td>2011/11</td>
<td>Published</td>
<td>Klemmer S, Miln D, Bashir R</td>
<td>&quot;Rock Mass Air Permeability Test Results and Applications to Underground Mining&quot;</td>
<td>Abstract</td>
<td>Maintenance Engineering &amp; Mine Operators Conference 2011 (MEMO 2011), Canada, Saskatchewan, Saskatoon, 2009-11-06</td>
<td>No</td>
</tr>
</tbody>
</table>
2011/9 Published
Refereed?: Yes Invited?: No

2010/8 Published
Refereed?: Yes Invited?: No

2010/8 Published
Liu H, Bashir R, et al., "Quantifying the effect of localized depressurization on a deep underground orebody at the McArthur River Mine through cross hole hydraulic testing and ground water modelling" Paper Uranium 2010, 3rd conference on uranium, Canada, Saskatchewan, Saskatoon, 2010-08-15
Refereed?: Yes Invited?: No

2010/8 Published
Robson, D, Bashir R, et al, "Underground mining of the lower 163 and 163 deep zone through groundwater drainage at the eagle point mine" Paper Uranium 2010, 3rd international conference on Uranium, Canada, Saskatchewan, Saskatoon, 2012-08-05
Refereed?: Yes Invited?: No

2010/5 Published
"Thompson J, Hawkes C, Bashir R, Miln D, "Assessing factors that affect groundwater inflows into underground excavations in a fractured sandstone."
Poster
In CIM 2010 Conference and Exhibition, Mining Your Foundation for a Better World, May. Vancouver, Canada., Canada, British Columbia, Vancouver, 2010-05-09
Refereed?: No Invited?: No

2010/5 Published
"Klemmer S, Milne D, Hawkes C, Bashir R, "Air permeability test results and application to underground mining."
Poster
In CIM 2010 Conference and Exhibition, Mining Your Foundation for a Better World, May. Vancouver, Canada., Canada, British Columbia, Vancouver, 2010-05-10
Refereed?: No Invited?: No

2008/10 Published
Refereed?: Yes Invited?: No

2008/6 Published
Refereed?: Yes Invited?: No

2008/6 Published
Refereed?: Yes Invited?: No
Personal Information

Identification
Dr. Ryley Anne Beddoe
Correspondence language: English

Language Skills

<table>
<thead>
<tr>
<th>Language</th>
<th>Read</th>
<th>Write</th>
<th>Speak</th>
<th>Understand</th>
<th>Peer Review</th>
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</thead>
<tbody>
<tr>
<td>English</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>French</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Address
The primary address is denoted by (*)

Primary Affiliation (*)
4700 Keele Street, Toronto, ON
425 Life Science Building
Lassonde School of Engineering
Department of Civil Engineering
Toronto
M3J 1P3
Canada, Ontario

Telephone
The primary telephone is denoted by (*)

Work (*)  416-736-2100 extension: 33292

Email
The primary email is denoted by (*)

Personal  beddoe.ryley@gmail.com
Work (*)  ryley.beddoe@lassonde.yorku.ca

Education

Degrees
2014/4  Doctorate - Department of Civil Engineering - Queen's University at Kingston
Supervisors: Dr. Andy Take (2009/9 / 2014/4)
### Recognitions

<table>
<thead>
<tr>
<th>Year</th>
<th>Award Description</th>
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</thead>
<tbody>
<tr>
<td>2013/10</td>
<td>Graduate Student Paper Award Winner - Prize / Award Canadian Geotechnical Society Amount: 1000 Description: The CGS Graduate Student Awards is presented for the best paper authored or co-authored and presented by a geotechnical graduate student at an accredited Canadian University.</td>
</tr>
<tr>
<td>2013/3</td>
<td>Queen’s 3 Minute Thesis Competition - Prize / Award Queen's University at Kingston Description: University wide competition for masters and doctoral students in which participants present their research and its wider impact in 3 minutes or less to a panel of non-specialist judges.</td>
</tr>
<tr>
<td>2013/3</td>
<td>Kingston Graduate Student Presentation Competition - Prize / Award Kingston Chapter - Canadian Geotechnical Society Description: Kingston Chapter of the Canadian Geotechnical Society's Graduate student presentation competition.</td>
</tr>
<tr>
<td>2011/9 - 2011/4</td>
<td>Queen Elizabeth II Scholarship in Science and Technology - Prize / Award Queen's University at Kingston Description: Scholarship awarded to encourage and support the best students involved in science and technology research.</td>
</tr>
<tr>
<td>2009/9 - 2011/4</td>
<td>Queen's Graduate Scholarship - Prize / Award Queen's University at Kingston Description: Scholarship promoting excellence in graduate studies at the master's and doctoral levels. Award is a merit-based scholarship available to graduate students in all graduate disciplines in Ontario Universities.</td>
</tr>
</tbody>
</table>

### User Profile

Research Specialization Keywords: landslides, physical modelling, liquefaction

Research Disciplines: Civil Engineering

Areas of Research: Natural Risks, Soil and Sediments, Surveying and Land Management

Fields of Application: Environment, Natural Resources

### Employment

**Academic Work Experience**

<table>
<thead>
<tr>
<th>Year</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014/7</td>
<td>Assistant Professor - Full-time - Assistant Professor</td>
</tr>
<tr>
<td></td>
<td>York University - Lassonde School of Engineering - Civil Engineering</td>
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<tr>
<td></td>
<td>Tenure Status: Tenure Track</td>
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### Research Funding History

#### Awarded

<table>
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<tr>
<th>Year Range</th>
<th>Title</th>
<th>Funding Sources</th>
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<tr>
<td>2014/7 - 2019/6</td>
<td>Start-up Grant - Grant</td>
<td>Lassonde School of Engineering</td>
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<tr>
<td></td>
<td></td>
<td>York University</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Funding: 132000</td>
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<tr>
<td></td>
<td></td>
<td>Portion of Funding Received: 132000</td>
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<tr>
<td></td>
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<td>Funding Competitive?: No</td>
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Activities

Supervisory Activities

Student/Postdoctoral Supervision

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Degree</th>
<th>Institution</th>
<th>Status</th>
<th>Thesis/Project Title</th>
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<tbody>
<tr>
<td>2013/5 - 2013/9</td>
<td>Travis Denley</td>
<td>Bachelor's</td>
<td>Queen's University</td>
<td>Completed</td>
<td>Large Scale flume testing: Test Methodology</td>
</tr>
<tr>
<td>2013/5 - 2013/9</td>
<td>Gemma Bullard</td>
<td>Bachelor's</td>
<td>Queen's University</td>
<td>In Progress</td>
<td>Large Scale Flume Testing: PIV Analysis</td>
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Memberships

Committee Memberships

<table>
<thead>
<tr>
<th>Year</th>
<th>Committee/Member</th>
<th>Committee Name</th>
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<tbody>
<tr>
<td>2013/9 - 2014/4</td>
<td>Faculty of Applied Science Graduate Council</td>
<td>Queen's University at Kingston</td>
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<tr>
<td>2013/9 - 2014/4</td>
<td>Society of Graduate and Professional Students</td>
<td>Queen's University at Kingston</td>
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<tr>
<td>2011/9 - 2014/4</td>
<td>Safety Committee</td>
<td>Civil Engineering Department - Queen's University at Kingston</td>
</tr>
<tr>
<td>2013/9 - 2014/3</td>
<td>Civil Graduate Club</td>
<td>Queen's University at Kingston</td>
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<tr>
<td>2010/9 - 2011/4</td>
<td>Kennedy Field Station Advisory Committee</td>
<td>Queen's University at Kingston</td>
</tr>
<tr>
<td>2007/9 - 2009/4</td>
<td>Civil Graduate Club</td>
<td>Queen's University at Kingston</td>
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</table>

Contributions

Presentations

<table>
<thead>
<tr>
<th>Year</th>
<th>Title</th>
<th>Conference Details</th>
<th>Main Audience</th>
<th>Invited?</th>
<th>Keynote?</th>
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</thead>
</table>
| 2013-10-01    | "Observed transition from slide to flow in physical model landslide tests."
               |                                                        | Canadian Geotechnical Society Conference, Canada, Quebec, Montreal
               |                                                        | Researcher  | Yes      | No       |
| 2013-10-01    | "Physical modeling of rainfall induced landslides"
               |                                                        | Graduate Student Paper Presentation - Canadian Geotechnical Society Conference, Canada, Quebec, Montreal
               |                                                        | Researcher  | Yes      | Yes      |
**Interviews and Media Relations**

**Broadcast Interviews**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>2013-03-19 - 2013-03-19</td>
<td>3 Minute Thesis (presentation and interview) All in a Day - CBC</td>
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**Publications**

**Journal Articles**

<table>
<thead>
<tr>
<th>Year</th>
<th>Date</th>
<th>Authors</th>
<th>Title</th>
<th>Journal</th>
<th>Volume</th>
<th>Issue</th>
<th>Pages</th>
<th>Refereed?</th>
<th>Invited?</th>
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<tbody>
<tr>
<td>2014/5</td>
<td>Accepted</td>
<td>Take, W.A., Beddoe, R.A., Davoodi-Bilesavar, R., and Philips, R</td>
<td>Effect of antecedent rainfall conditions on the triggering of static liquefaction landslides</td>
<td>Landslides</td>
<td></td>
<td></td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>2014/1</td>
<td>Published</td>
<td>Take, W.A. and Beddoe, R.A</td>
<td>Base liquefaction: a mechanism for shear-induced failure of loose granular slopes</td>
<td>Canadian Geotechnical Journal, 51(5), 496 - 507</td>
<td></td>
<td></td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>2010/7</td>
<td>Published</td>
<td>Beddoe, R.A., Take, W.A., and Rowe, R.K</td>
<td>Development of suction measurement techniques to quantify the water retention curve of GCLs</td>
<td>Geosynthetics International, 15(5), 301-312</td>
<td></td>
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**Conference Publications**

<table>
<thead>
<tr>
<th>Year</th>
<th>Date</th>
<th>Authors</th>
<th>Title</th>
<th>Journal</th>
<th>Location</th>
<th>Refereed?</th>
<th>Invited?</th>
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</thead>
<tbody>
<tr>
<td>2013/10</td>
<td>Published</td>
<td>Beddoe, R.A. and Take, W.A.</td>
<td>Observed transition from slide to flow in physical model landslide tests</td>
<td>Paper 66th Canadian Geotechnical Conference, , Montreal, 2013-09-30</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Dr. Ahmed Khiray Eldyasti
Correspondence language: English
Sex: Male

Contact Information
The primary information is denoted by (*)

Address

Mailing (*)
4700 keele Street
425 Life Science Building
Lassonde School of Engineering
Department of Civil Engineering, York University
Toronto Ontario M3J1P3
Canada

Telephone

Mobile             +1-519-697 9593
Work (*)           +1-417-736 5901 extension: 31329

Email

Personal           ahmed.eldyasti@gmail.com
Work (*)           ahmed.eldyasti@lassonde.yorku.ca
Dr. Ahmed Eldyasti

Language Skills

<table>
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<tr>
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<th>Speak</th>
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<tr>
<td>French</td>
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<td>Yes</td>
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</tbody>
</table>

Degrees

- 2013/5  
  Research Associate, Environmental Engineering, University of Western Ontario  
  Supervisors: Prof. George Nakhla, 2013/5 - 2014/6
- 2013/5  
  Post-doctorate, Environmental Engineering, Trojan Technologies Inc.  
  Supervisors: Dr. Tedd Meo, 2013/5 - 2014/6
- 2013/4  
  Research Associate, Environmental Engineering, University of Western Ontario  
  Supervisors: Prof. George Nakhla and Prof. Jesse Zhu, 2009/9 - 2013/4
- 2013/4  
  Doctorate, Civil and Environmental Engineering (Environment and Sustainability),  
  University of Western Ontario  
  Supervisors: Prof. George Nakhla and Prof. Jesse Zhu, 2009/9 - 2013/4
- 2006/4  
  Master's Thesis, Environmental Engineering, Alexandria University  
  Supervisors: Prof. Abd El-Kawy Khalifa and Prof. Wael Khadr, 2002/9 - 2006/4
- 2002/8  
  Bachelor's, Civil Engineering, Alexandria University

Recognitions

2013/5 - 2014/6  
MITACS Accelerate Postdoctoral fellowship - 52,500
MITACS Distinction  
MITACS Accelerate is Canada’s premiere research internship program to connect  
companies with research-based universities through postdoctoral fellows, who apply  
their specialized expertise to business research challenges. Postdoctoral fellow  
transfers his skills from theory to real-world application, while the company gains a  
competitive advantage by accessing high-quality research expertise. The value of  
MITACS accelerate is $45,000 per year for maximum of two years.
2013/2 - 2013/12 Nominated for “Governor General's Gold Medals”
University of Western Ontario
Distinction
Governor General’s Gold Medal is recognition of the outstanding scholastic achievements of students in Canada, which is running for more than 140 years. The Governor General’s Gold Medal is awarded for the student with the highest averages from university. The purposes of this medal are to encourage scholarship across Canada and recognize outstanding graduate students; to maintain a spirit of universality across the country, the Directives were designed to ensure that the medals are awarded based on academic criteria only; and to present the medals on behalf of, and in the name of the Governor General at an appropriate ceremony where possible. I was nominated for faculty of engineering and the school of graduate studies to run the computation among all faculties at Western University

2013/1 - 2013/4 Ross and Jean Clark scholarship - 1,000
University of Western Ontario
Distinction
Ross and Jean Clark Scholarship is an award for graduate students specializing in Environmental Engineering which will demonstrate how their research will benefit Ontario, Canada and the world and achieved a minimum 80% academic average. The value of Ross and Jean Clark Scholarship is $1,000 for one year.

2012/12 - 2013/4 Graduate Thesis Research Award - 1,500
University of Western Ontario
Distinction
Graduate Thesis Research Award is an award for doctoral degree student based on the merit of the candidate’s thesis and oral examination. The value of this award is $1,500

2012/4 - 2013/3 Top Poster in 9th ANNUAL Earth Day Colloquium - 500
Centre of Environment and Sustainability at Western University
Prize / Award
The annual Earth Day Colloquium is a one day event showcasing research being conducted in the field of Environment and Sustainability. Celebrating the interdisciplinary nature of this field, the Colloquium provides a forum for a broad range of topics in the Sciences, Engineering, Social Sciences, Business, Policy and Management. The Earth Day Colloquium, organized every year by a committee of graduate students in the Environment and Sustainability Program, is in its eighth year and continues to grow in breadth and dimension as well as interest, drawing larger audiences every year.

2012/4 - 2013/4 Ontario Graduate Scholarship (OGS) - 15,000
Government of Ontario
Distinction
The Ontario Graduate Scholarship (OGS) is a provincial award to encourage excellence in graduate studies at the master's and doctoral levels and it is a merit-based scholarship. The value of the OGS is $15,000 per year for up to two years.

2011/10 - 2012/9 Julie Lassonde Scholarship for Green Technologies and Processes - 10,000
University of Western Ontario
Distinction
Julie Lassonde Scholarship for Green Technologies and Processes is an award for one candidate among all full-time graduate student in any program of Engineering based on academic achievement (minimum 78 per cent average), research related to the faculty's strategic research plan which will also demonstrate how their research will benefit Ontario, Canada and the world. The value of Julie Lassonde Scholarship is $10,000 for one year.
2011/10 - 2011/10  Top Poster Presentation in 61st Canadian Chemical Engineering Conference (CSChE 2011) - 250
Canadian Society for Chemical Engineering (CSChE) Prize / Award
Best poster among over 35 posters at the technical sessions of the 61st Canadian Chemical Engineering Conference (CSChE 2011)

2011/10 - 2011/10  Top Seminar Presentation in 4th Particle Technology Research Centre Conference (PTRC) - 150
Particle Technology Research Centre at Western University Prize / Award
Best presentation among over 25 presentations at the technical sessions of the 4th Particle Technology Research Centre Conference (PTRC)

2011/10 - 2011/10  Top Poster in 4th Particle Technology Research Centre Conference (PTRC) - 100
Particle Technology Research Centre at Western University Prize / Award
Best poster among over 15 posters at the technical sessions of the 4th Particle Technology Research Centre Conference (PTRC)

2011/10 - 2011/10  Top Seminar Presentation in 61st Canadian Chemical Engineering Conference (CSChE 2011) - 500
Canadian Society for Chemical Engineering (CSChE) Prize / Award
Best presentation among over 100 presentations at the technical sessions of the 61st Canadian Chemical Engineering Conference (CSChE 2011)

2010/9 - 2010/9  Top Poster in 3rd Particle Technology Research Centre Conference (PTRC) - 100
Particle Technology Research Centre at Western University Prize / Award
Best presentation among over 9 posters at the technical sessions of the 3rd Particle Technology Research Centre Conference (PTRC)

2010/9 - 2010/9  Top Seminar Presentation in 3rd Particle Technology Research Centre Conference (PTRC) - 250
Particle Technology Research Centre at Western University Prize / Award
Best presentation among over 15 presentations at the technical sessions of the 3rd Particle Technology Research Centre Conference (PTRC)

2010/3 - 2010/3  Top Academic Presenter in Academic Communication workshop
Academic Communication workshop at Western University Prize / Award
Best presentation among over 9 presentations at the Academic Communication workshop

User Profile

Research Specialization Keywords: Biochemical Recovery, Biofilm, Biological nutrient recovery, Biological Solids Treatment, Renewable Energy, Sustainable BioEnergy, Waste-to-energy, Wastewater Treatment

Research Disciplines: Water and Environment, Civil Engineering, Chemical Engineering, Biomedical Engineering and Biochemical Engineering

Areas of Research: Biotechnology, Used Water, Urban, Industrial and Agricultural Waste Water Treatment, Chemical Pollutants, Recycling and Processing of Solid Waste

Fields of Application: Environment, Energy, Natural Resources
Employment

2014/7 - 2020/7
Assistant Professor
Civil Engineering, Lassonde School of Engineering, York University
Full-time, Assistant Professor
Tenure Status: Tenure Track
Tenure track assistant professor to achieve an independent research in the area of environmental engineering along with teaching of graduate and undergraduate students 1.5 credit per year. This position was full time work for five days per week.

2013/5 - 2014/6
Research Associate-NSERC CREAT
Chemical and Biochemical Engineering, Faculty of Engineering, University of Western Ontario
Part-time
Tenure Status: Non Tenure Track
• Scale up of biological treatment processes using bioparticles technology • Commercialization and marketing of bioparticles technology • Co-supervising M.Eng and M.E.Sc. students • Design and scale up of Anaerobic Fluidized Bed Bioreactor (ANFBBR) to treat industrial and municipal solids and produce Biogases This position was part time work for two days per week.

2013/5 - 2014/6
MITACS Accelerated Post-Doctoral Fellowship
Research and development, Research Team, Trojan Technologies Inc.
Full-time
Tenure Status: Non Tenure Track
• Evaluation and Modeling of High-rate sieve microfiltration (Salsnes Filters) for Primary treatment of municipal and industrial wastewater • Design a sizing tools for Salasnes filter and BHS marinex processes for ballast water • Design a chemical dosing devices for Salasnes filter and BHS marinex processes • Evaluating the effect of combined physical treatment processes with UV disinfection This position was full time work for five days per week.

2013/1 - 2013/4
Instructor for Water Resources Management
Civil and Environmental Engineering, Faculty of Engineering, University of Western Ontario
Part-time, Sessional, Lecturer
Tenure Status: Non Tenure Track
Teaching the student the introduction to water resources management for civil and environmental engineers. In this course, the content covers broad range of topics relevant to current water resources management practice. Students exposed to methods and tools for effective management of water resources. Course introduced Ontario water management rules and regulations and water management including the issues in the Upper Thames River Basin. The general objectives were Using the engineering approach in addressing water resources management problems by understanding: definition of integrated water resources management; principles of sustainable development; characteristics of various management tools; various uses of water; water supply issues; and water demand issues. Additionally, this course was focusing in the understanding of the systems approach to water resources management. This position was part time work for one days per week.
2009/9 - 2013/4
Research Assistant
Civil and Environmental Engineering, Faculty of Engineering, University of Western Ontario
Full-time
Tenure Status: Non Tenure Track
• Design and commissioning of the Impact of food wastes on municipal wastewater treatment plants with InSinkErator, USA. • Design and development of biological waste-to-energy integrated system to produce biohydrogen and biogas using attached and suspended growth systems. • Evaluation of thin stillage digestibility for GreenField Ethanol Plant using Integrated Biohydrogen Reactor Clarifier System (IBRCS). • Optimization, development, and modeling of St. George wastewater pollution control plant (WPCP) using a BioWin® 3.1. • Evaluation of Sludge Dewaterability and digestibility for the Adelaide Wastewater Treatment Plant using time-to-filter and centrifugation tests. • Optimization, development, and modeling of St. George wastewater pollution control plant (WPCP) using a BioWin® 3.1. • Evaluation of Sludge Dewaterability for the Sudbury Wastewater Treatment Plant using time-to-filter and centrifugation tests. This position was full time work for five days per week.

2009/9 - 2013/4
Teaching Assistant
Civil and Environmental Engineering, Faculty of Engineering, University of Western Ontario
Part-time
Tenure Status: Non Tenure Track
Conducted tutorials, demonstrated laboratory classes and marked assignments for different civil and environmental engineering courses i.e. Municipal Engineering Design and Civil and Environmental Engineering Design Project. This includes the following courses: CEE 3355b – Municipal Engineering Design; CEE 4441a – Civil and Environmental Engineering Design Project; EnvSus 9015 – Engineering Solutions; EnvSus 9015 – Engineering Solutions; and CEE 4405a – Air Pollution. This position was part time work for two days per week.

2002/9 - 2007/7
Research Assistant
Civil and Environmental Engineering, Faculty of Engineering, Arab Academy for Science & Technology & Maritime Transport, Cairo, Egypt
Full-time
Tenure Status: Non Tenure Track
• Design of the water and wastewater distribution systems • Optimization and development of the water and wastewater distribution systems • Risk assessment of the water and wastewater distribution systems. This position was full time work for five days per week.

2002/9 - 2007/7
Teaching Assistant
Civil and Environmental Engineering, Faculty of Engineering, Arab Academy for Science & Technology & Maritime Transport, Cairo, Egypt
Full-time
Tenure Status: Non Tenure Track
Conducted tutorials, demonstrated laboratory classes and marked assignments for different civil and environmental engineering courses. This position was full time work for five days per week.

2005/7 - 2007/3
Technical Engineer
Project Construction, United Investment and Construction Development company, Cairo, Egypt
• Monitoring the construction phases • Drawing drafts and as built using AutoCAD. This position was part time work for one day per week.
2004/1 - 2005/12  Professional Engineer
Environmental projects, United Investment and Construction Development company, Cairo, Egypt
• Monitoring the pump station construction phases • Drawing drafts and as built using AutoCAD This position was part time work for two days per week.

2002/9 - 2004/2  Executive Engineer
Environmental projects, United Investment and Construction Development company, Cairo, Egypt
• Design the drainage sewers network • Drawing drafts and as built using AutoCAD This position was part time work for two days per week.

Research Funding History

Awarded \(n=1\)

2014/7 - 2020/7  Startup fund, Grant
Principal Applicant

Funding Sources:

\begin{align*}
2014/7 - 2020/7 & \quad \text{York University} \\
& \quad \text{Startup fund} \\
& \quad \text{Total Funding - 135,000} \\
& \quad \text{Portion of Funding Received - 135,000} \\
& \quad \text{Funding Competitive?: No}
\end{align*}

Under Review \(n=3\)

2014/12 - 2020/12  Novel Path to Renewable Fuels (NPRFuel), Grant
Co-applicant

Funding Sources:

\begin{align*}
2014/12 - 2020/12 & \quad \text{Ministry of Research and Innovation (MRI) (Ontario)} \\
& \quad \text{Ontario Research Fund-Research Excellence} \\
& \quad \text{Total Funding - 4,000,000} \\
& \quad \text{Portion of Funding Received - 0} \\
& \quad \text{Funding Competitive?: Yes}
\end{align*}

Co-applicant: Animesh Dutta; Brant Peppley; Edwin Tam; George Nakhla; Keith Taylor; Kimberley McAuley; Mehdi Shdikhzadeh; Nathalie Méthot; Nihar Biswas; Ragish Seth; Sophie Boisvenue;

Principal Applicant: Hisham Hafez

2015/5 - 2020/5  Renewable Energy Production and Recovery from Industrial Wastewater/Wastes, Grant
Principal Applicant

Funding Sources:

\begin{align*}
2015/5 - 2020/5 & \quad \text{Ministry of Research and Innovation (MRI) (Ontario)} \\
& \quad \text{Early Researcher Awards program} \\
& \quad \text{Total Funding - 190,000} \\
& \quad \text{Portion of Funding Received - 0} \\
& \quad \text{Funding Competitive?: Yes}
\end{align*}

2012/5 - 2017/5  Clean Technologies for Water Refining and Nutrient and energy Recovery, Grant
Co-investigator

Funding Sources:

\begin{align*}
2012/5 - 2017/5 & \quad \text{Natural Sciences and Engineering Research Council of Canada (NSERC)} \\
& \quad \text{CREAT} \\
& \quad \text{Total Funding - 1,650,000} \\
& \quad \text{Portion of Funding Received - 0} \\
& \quad \text{Funding Competitive?: Yes}
\end{align*}

Co-applicant: Ajay Ray; Ernest Yanful; Mita Ray;
Student/Postdoctoral Supervision

2015/12 - 2014/6
Co-Supervisor
Wang, Zhenqi, Master's Thesis (In Progress) , Western University
Student Degree Expected Date: 2013/1
Thesis/Project Title: Treatment of municipal biosolids using Anaerobic Fluidized Bed Bioreactor (ANFBBR)
Present Position: Masters student, Western University, London, ON, Canada

2015/9 - 2014/6
Co-Supervisor
Li, Kai, Master's Thesis (In Progress) , Western University
Student Degree Expected Date: 2013/9
Thesis/Project Title: Scale up of biological treatment processes using bioparticles technology
Present Position: Masters student, Western University, London, ON, Canada

2015/8 - 2014/6
Co-Supervisor
Donohue, Joseph, Master's Thesis (In Progress) , Western University
Student Degree Expected Date: 2013/9
Thesis/Project Title: Scale up of biological nutrient removal treatment processes using Circulating Fluidized Bed Bioreactor (CFBBR)
Present Position: Masters student, Western University, London, ON, Canada

2014/9 - 2016/8
Principal Supervisor
Moharram, Moomen, Master's Thesis (In Progress) , Alexandria University
Student Degree Expected Date: 2016/8
Thesis/Project Title: Renewable energy production of methanol from from Industrial Wastewater/Wastes using ammonia oxidizing bacteria (AOB)
Present Position: Teaching assistant, Alexandria University, Alex, Egypt

2014/9 - 2016/8
Principal Supervisor
Unknown, Master's Thesis (In Progress) , Cairo University, Cairo, Egypt
Student Degree Expected Date: 2016/8
Thesis/Project Title: Novel technology for bioenergy recovery from food waste
Present Position: Technical engineer, ElDAR, Cairo, Egypt

2011/3 - 2012/5
Principal Supervisor
Balasundharam, Vaishaali, Bachelor's (Completed) , Western University
Thesis/Project Title: Impact of calcium on biofilm morphology, structure, detachment and performance in denitrifying fluidized bed bioreactors (DFBBRs)
Present Position: Masters student, Western University, London, ON, Canada

2010/2 - 2012/1
Principal Supervisor
Morales, Naris, Bachelor's (Completed) , Western University
Thesis/Project Title: Biological nutrient removal from leachate using a pilot liquid–solid circulating fluidized bed bioreactor (LSCFB)
Present Position: Masters student, Western University, London, ON, Canada

Event Administration

2010-11-01 - 2011-11-10
Chair of the graduate committee, 61st Canadian Chemical Engineering Conference (CSChE 2011), October 23–26, London, ON, Canada, Conference, 2011-10-23 - 2011-10-26

Editorial Activities

2012/1 - 2015/12
Reviewer, Biotechnology and Bioengineering, Journal

2012/1 - 2015/12
Reviewer, Bioresource Technology, Journal

2011/12 - 2015/12

2012/1 - 2015/9
Reviewer, The Canadian Journal of Chemical Engineering, Journal
2012/3 - 2015/6  Reviewer, Chemical Engineering Journal, Journal
2012/2 - 2015/4  Reviewer, Biochemical Engineering Journal, Journal

**Committee Memberships**

2010/12 - 2014/6  Co-chair, Egyptian Canadian Association of Ontario (ECAO), Egyptian Canadian Association of Ontario (ECAO)
Vice-Chairman and Founder of Egyptian Canadian Association of Ontario (ECAO) to run the association in absent of the chair to manage subcommittees for two terms (4 years).

2012/7 - 2013/7  Committee Member, Graduate Teaching Assistant (GTA) Union Steward, Graduate Teaching Assistant (GTA) Union
Graduate Teaching Assistant (GTA) Union Steward to vote for motions, select committees member, develop new committees.

2012/7 - 2013/7  Committee Member, Graduate Engineering Society (GES) of UWO, Graduate Engineering Society (GES) of UWO
GES Councilor of Graduate Engineering Society (GES) of UWO to vote and select new members and committees.

2011/8 - 2012/9  Co-chair, Graduate Engineering Society (GES) of UWO, Graduate Engineering Society (GES) of UWO
Internal Vice-President of Graduate Engineering Society (GES) of UWO to manage the communication with the GES and the university affairs.

2011/7 - 2012/7  Chair, UWO Ontario Water Works Association and Water Environment Association of Ontario (WEAO/OWWA) Joint Student Chapter, UWO Ontario Water Works Association and Water Environment Association of Ontario (WEAO/OWWA) President of UWO Ontario Water Works Association and Water Environment Association of Ontario (WEAO/OWWA) Joint Student Chapter to organize, manage, and coordinate the student chapter activities.

2010/7 - 2011/9  Co-chair, Graduate Engineering Society (GES) of UWO, graduate Engineering Society (GES) of UWO
External Vice-President of Graduate Engineering Society (GES) of UWO to manage the communication with the GES and the university affairs.

2010/7 - 2011/7  Committee Member, UWO Society of Graduate Students (SOGS), UWO Society of Graduate Students (SOGS)
SOGS Councilor of UWO Society of Graduate Students (SOGS) to vote for motions, select committees member, develop new committees.

2010/7 - 2011/7  Co-chair, UWO Ontario Water Works Association and Water Environment Association of Ontario (WEAO/OWWA) Joint Student Chapter, UWO Ontario Water Works Association and Water Environment Association of Ontario (WEAO/OWWA) External Vice-President of UWO Ontario Water Works Association and Water Environment Association of Ontario (WEAO/OWWA) Joint Student Chapter to manage the communication with the association and the university affairs.

**Other Memberships**

2002-08-01 - 2020-08-01  Member of Egyptian Engineering Syndicate, Egyptian Engineering Syndicate
Member of Egyptian Engineering Syndicate to receive services as a civil engineer, participate in conferences and workshops

2010-07-01 - 2020-07-01  Member of Canadian Society for Civil Engineering (CSCE), Canadian Society for Civil Engineering (CSCE)
Member of Canadian Society for Civil Engineering (CSCE) to receive services as a civil engineer, participate in conferences and workshops
Member of Water Environment Federation (WEF) and Water Environment Association of Ontario (WEAO), Member of Water Environment Federation (WEF) and Water Environment Association of Ontario (WEAO) to receive services as an environmental engineer, participate in conferences and workshops.

Member of Western Canada Water (WCW), Western Canada Water (WCW) to receive services as an environmental engineer, participate in conferences and workshops.

Member of American Institute of Chemical Engineers (AIChE), American Institute of Chemical Engineers (AIChE) to receive services as an environmental engineer, participate in conferences and workshops.

Member of Egyptian Canadian Association of Ontario (ECAO), Egyptian Canadian Association of Ontario (ECAO) to participate in youth activities.

Presentations

   Main Audience: Researcher
   Invited?: No, Keynote?: No

   Main Audience: Researcher
   Invited?: No, Keynote?: No

   Main Audience: Researcher
   Invited?: No, Keynote?: No

   Main Audience: Researcher
   Invited?: No, Keynote?: No

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   Invited?: No, Keynote?: No

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   Invited?: No, Keynote?: No
Main Audience: Researcher
Invited?: No, Keynote?: No

Main Audience: Researcher
Invited?: No, Keynote?: No

Main Audience: Researcher
Invited?: No, Keynote?: No

Main Audience: Researcher
Invited?: No, Keynote?: No

Main Audience: Researcher
Invited?: No, Keynote?: No

Main Audience: Researcher
Invited?: No, Keynote?: No

Main Audience: Researcher
Invited?: No, Keynote?: No

Main Audience: Researcher
Invited?: No, Keynote?: No

Main Audience: Researcher
Invited?: No, Keynote?: No

Main Audience: Researcher
Invited?: No, Keynote?: No
Main Audience: Researcher
Invited?: No, Keynote?: No

Publications

Journal Articles

Revision Requested
Refereed?: Yes, Open Access?: No

Accepted
Refereed?: Yes, Open Access?: No

Published
Refereed?: Yes, Open Access?: No

Published
Refereed?: Yes, Open Access?: No

Published
Refereed?: Yes, Open Access?: No

Published
Refereed?: Yes, Open Access?: No

Published
Refereed?: Yes, Open Access?: No

Book Chapters

Published, Water Environment & Technology (WE&T)
Refereed?: No
Refereed?: Yes

Conference Publications

Paper
Published
Refereed?: Yes, Invited?: No

Paper
Published
Refereed?: Yes, Invited?: No
Professor Magdalena M. Krol  
Correspondence language: English  
Sex: Female  

Contact Information  
The primary information is denoted by (*)  

Address  
Primary Affiliation (*)  
4700 Keele St.  
425 Life Science Building  
Lassonde School of Engineering  
York University  
Toronto Ontario M3J 1P3  
Canada  

Telephone  
Work (*)  
416-736-2100 extension: 31328  

Email  
Work (*)  
magdalena.krol@lassonde.yorku.ca
Professor Magdalena Krol

**Language Skills**

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<th>Language</th>
<th>Read</th>
<th>Write</th>
<th>Speak</th>
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**Degrees**

- 2014/6  
  Post-doctorate, Civil and Environmental Engineering, University of Toronto  
  Supervisors: Brent Sleep, 2013/1 - 2014/6

- 2012/12  
  Post-doctorate, Civil and Environmental Engineering, University of Western Ontario  
  Supervisors: Denis O’Carroll, 2011/1 - 2012/12

- 2011/1  
  Doctorate, Civil and Environmental Engineering, University of Toronto  
  Supervisors: Brent Sleep, 2004/9 - 2010/12

- 2000/5  
  Master's Thesis, Civil and Environmental Engineering, University of Western Ontario  
  Supervisors: Kerry Rowe, 1997/9 - 2000/1

- 1997/5  
  Bachelor’s, Civil Engineering, University of Western Ontario

**Recognitions**

2011/12  
Outstanding Student Paper Award  
American Geophysical Union  
Prize / Award  
Awarded to undergraduate and graduate presenters to promote and recognize high quality research in the geophysical sciences.

2011/1  
NSERC Postdoctoral Fellowship (PDF) - 40,000  
Natural Sciences and Engineering Research Council of Canada (NSERC)  
Distinction  
The Postdoctoral Fellowship is given to the most promising and highly qualified researchers in order for them to pursue postdoctoral programs.

2009/9  
McCuaig-Throop Bursary  
University of Toronto  
Prize / Award  
The McCuaig-Throop bursary provides full-time students in a graduate degree program financial assistance on the basis of academic performance.
2008/9 Ontario Graduate Scholarship in Science and Technology
University of Toronto
Distinction
The Ontario Graduate Scholarship in Science and Technology (OGSST) program is designed to encourage excellence in graduate studies in science and technology.

2008/9 Joseph Bazylewicz Fellowship
University of Toronto
Prize / Award
The Joseph Bazylewicz Fellowship is awarded to a full-time student based on financial need and academic standing.

User Profile

Research Specialization Keywords: gas movement in subsurface, groundwater and soil remediation, heat and transport modelling, nano-scale zero valent iron

Research Disciplines: Civil Engineering

Areas of Research: Ground Water and Water Tables, Soil Decontamination, Clean Technologies, Mining and Petroleum Contamination, Bioremediation

Fields of Application: Environment, Natural Resources

Employment

2014/7 Assistant Professor in Civil Engineering
Civil Engineering, Lassonde School of Engineering, York University
Full-time, Assistant Professor
Tenure Status: Tenure Track

2013/1 - 2014/6 Post Doctoral Researcher
Civil Engineering, Engineering, University of Toronto
Full-time
Tenure Status: Non Tenure Track
Established limiting nutrients and conservative estimates of microbiologically influenced corrosion of used nuclear fuel containers. Initiated modelling of biogeochemical and hydrogeological processes in the used nuclear fuel deep geological repository.

2012/9 - 2012/12 Sessional Lecturer in Civil Engineering
Civil Engineering, Faculty of Engineering, Ryerson University
Part-time, Sessional, Lecturer
Tenure Status: Non Tenure Track
Instructed a graduate course dealing with site remediation. Topics included subsurface flow, contaminant transport, contaminant properties, Ontario regulations, risk assessment, design and operation of different soil remediation technologies. Coordinated a site visit to the Toronto Port Lands and invited guest lecturers from industry and academia to expose students to real-life remediation problems and solutions.

2011/1 - 2012/12 Post Doctoral Fellow
Civil and Environmentmal Engineering, Engineering, University of Western Ontario
Full-time
Tenure Status: Non Tenure Track
Examined nano-Zero Valen Iron (nZVI) particle transport in porous media, through the use of a computer model, to establish the capability of this emerging technology to remediate contaminated aquifers. Assisted in field applications of nZVI including site preparation, injection, and sampling. Supervised several graduate and summer students and aided in preparation of grants.
2008/5 - 2010/12 Research Assistant
Civil Engineering, Engineering, University of Toronto
Full-time
Tenure Status: Non Tenure Track
Developed a two-dimensional electro-thermal model that accurately models subsurface heating by electrical resistance heating (ERH) as well as contaminant transport. Conducted a statistical analysis on the effect of electrical conductivity and groundwater flux values on subsurface heating and contaminant transport. Combined the ERH model to a macroscopic invasion percolation model to assess the effect of gas bubble formation on mass transport.

2005/9 - 2009/5 Teaching Assistant
Civil Engineering, Engineering, University of Toronto
Part-time
Tenure Status: Non Tenure Track
Assisted in teaching undergraduate courses dealing with hydrogeology, geology, contaminant transport and subsurface flow modelling. Led tutorials, labs, and review sessions and was responsible for marking quizzes, labs, and exams.

2008/9 - 2008/12 Sessional Lecturer
Civil Engineering, Engineering, University of Toronto
Part-time, Sessional, Lecturer
Tenure Status: Non Tenure Track
Instructor for a fourth year/graduate course entitled “Groundwater Flow and Contamination”. Topics included: groundwater flow through saturated and unsaturated media, hydraulics of wells, groundwater modelling, contaminant transport, and remediation techniques.

2004/9 - 2007/5 Research Assistant
Civil Engineering, Engineering, University of Toronto
Full-time
Tenure Status: Non Tenure Track
Developed a two-dimensional electro-thermal model that accurately models subsurface heating by electrical resistance heating (ERH) as well as contaminant transport. Aided in experimental design by modelling potential experimental layouts.

2001/1 - 2003/2 Environmental Engineer
Remediation Engineering, GZA GeoEnvironmental Inc.
Designed remediation treatment technologies, managed remediation projects, and communicated with clients. Coordinated preparation of multi-million dollar bids by attending public meetings, contacting different regional ministries, and collaborating with other consulting firms. Prepared phase one and two reports on numerous contaminated sites which involved interpretation of groundwater field investigations with respect to environmental and human risk. Evaluated risk to human health and the environment from exposure to contaminated media, according to the Massachusetts Contingency Plan. Performed groundwater, soil, and air sampling (indoor and outdoor).

2000/2 - 2000/9 Private Tutor
NCJ Educational Services
Tutored high school students with learning disabilities in math, physics, history, and chemistry, as well as, prepared teaching curriculum.

1999/12 - 2000/2 Civil Engineering Consultant
Halton Public Works
Conducted a literature review on landfill covers, vegetation, landfill end-uses, as well as, the rehabilitation and aftercare of completed landfills.
1997/9 - 1999/12  Teaching Assistant  
Civil and Environmental Engineering, Engineering, University of Western Ontario  
Part-time  
Tenure Status: Non Tenure Track  
Assisted in teaching undergraduate courses dealing with mechanics of materials, hydraulics, applied mathematics, vector mechanics, landfill design, and contaminant transport through saturated media. Prepared and corrected quizzes and assignments for undergraduate classes and undertook one-to-one tutorials with undergraduate students.

1997/9 - 1999/12  Research Assistant  
Civil and Environmental Engineering, Engineering, University of Western Ontario  
Full-time  
Tenure Status: Non Tenure Track  
Designed and conducted laboratory experiments to evaluate diffusion of dissolved trichloroethylene (TCE) and pure TCE through soil-bentonite slurry walls. Modelled experimental results using a one and a half dimensional model (POLLUTE) and conducted a sensitivity analysis on several transport parameters.

1995/10 - 1996/12  Director  
Discovery Western Engineering and Science Camp  
Developed and approved engineering science camp teaching curriculum. Recruited corporate sponsors to obtain funding and managed camp finances. Co-ordinated and prepared advertising and media relations campaign to promote camp. Recruited and trained staff (eight employees).

Leaves of Absence and Impact on Research

2007-05-01 - 2008-05-01  Parental, University of Toronto  
Prolonged PhD studies by one year.

Research Funding History

Awarded [n=2]

2014/7 - 2019/7  Principal Applicant  
Start Up Grant, Grant  
Funding Sources:  
2014/7 - 2019/7  York University  
Total Funding - 135,000  
Portion of Funding Received - 135,000  
Funding Competitive?: No

2013/1 - 2014/12  Co-investigator  
Modelling of biogeochemical and hydrogeological processes in a deep geological repository for used nuclear fuel., Grant  
Funding Sources:  
2013/1 - 2014/12  Nuclear Waste Management Organization (NWMO)  
Total Funding - 120,000  
Portion of Funding Received - 75,000  
Funding Competitive?: No

Completed [n=1]

2011/1 - 2012/12  Principal Applicant  
Postdoctoral Fellowship, Scholarship
Funding Sources:
2011/1 - 2012/12 Natural Sciences and Engineering Research Council of Canada (NSERC)
Total Funding - 80,000
Portion of Funding Received - 80,000
Funding Competitive?: Yes

Student/Postdoctoral Supervision

2014/7 - 2016/7
Briggs, Scott, Post-doctorate (In Progress), University of Toronto
Co-Supervisor
Student Degree Expected Date: 2016/7
Thesis/Project Title: Modelling of Biogeochemical and Hydrogeological Processes in a Deep Geological Repository for Used Nuclear Fuel

2014/5 - 2016/7
Portella, Renan, Bachelor's (In Progress), Federal Technological University of Parana
Co-Supervisor
Student Degree Expected Date: 2017/5
Thesis/Project Title: Optimizing Macroscopic Invasion Percolation Model for Thermal Remediation
Present Position: Summer Exchange Student

2013/1 - 2016/5
Salman Sabahi, Doctorate (In Progress), University of Toronto
Co-Supervisor
Student Degree Expected Date: 2016/5
Thesis/Project Title: Simulation of Nano-Scale Zero Valent Iron (NZVI) Transport and NAPL Targeting for Design of Subsurface Remediation Systems
Present Position: PhD Student

2012/4 - 2015/1
Chowdhury, Ahmed, Doctorate (In Progress), University of Western Ontario
Co-Supervisor
Student Degree Expected Date: 2015/1
Thesis/Project Title: Electrokinetics enhanced remediant delivery through contaminated porous media
Present Position: PhD Student

2011/9 - 2012/4
, Bachelor's (Completed), University of Western Ontario
Co-Supervisor
Thesis/Project Title: Stormwater Runoff Attenuation and Reduction by a Green Roof
Present Position: Masters Student in Urban Planning at McGill

2011/9 - 2012/8
Kristina Nagle, Bachelor's (Completed), University of Western Ontario
Co-Supervisor
Thesis/Project Title: Stormwater Retention, Drainage and Evapotranspiration by an Experimental Green Roof
Present Position: Environmental Scientist at CH2M HILL

2011/9 - 2014/2
Zhang, Dai (Robin), Master's Thesis (Completed), University of Toronto
Co-Supervisor
Thesis/Project Title: Influences of gas phase movement on contaminant transport during electrical resistance heating
Present Position: Staff Scientist/ Junior Modeler at Geosyntec

Event Administration

2014-03-19

2013-10-31

Organizational Review Activities

2014-01-01 - 2014-06-01
Examiner, Professional Engineers of Ontario
Responsibilities included setting the hydrogeology exam and marking any exam that was submitted to the PEO.

2008-09-01 - 2013-12-31
Reviewer, Professional Engineers of Ontario
Reviewed PEO hydrogeology exams

Other Memberships

2009-09-01 - 2015-07-01
Member, American Geophysical Union

2013-09-01 - 2014-09-01
Member, Professional Engineers of Ontario

2005-09-01 - 2010-12-31
Member, Family Care Office
Mentored new graduate or undergraduate student parents and students expecting children. Volunteered at student parents conferences and served as a member on panels at Family Care Office events.

Presentations

   Main Audience: Researcher
   Invited?: Yes, Keynote?: No

   Invited?: No, Keynote?: No

   Invited?: No, Keynote?: No

   Invited?: No, Keynote?: No

   Invited?: No, Keynote?: No

   Invited?: No, Keynote?: No

   Invited?: No, Keynote?: No
   Invited?: No, Keynote?: No

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    Invited?: No, Keynote?: No

    Invited?: No, Keynote?: No

    Invited?: No, Keynote?: No

Broadcast Interviews


Publications

Journal Articles

   In Press
   Refereed?: Yes

   Published
   Refereed?: Yes

   Published
   Refereed?: Yes


Reports


Conference Publications
**PART I**

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<th>Family name</th>
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<td>Palermo</td>
<td>Daniel</td>
<td>D</td>
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**APPOINTMENT AT A POSTSECONDARY INSTITUTION**

- **Title of position:** Associate Professor
- **Department:** Lassonde School of Engineering
- **Campus:**
- **Canadian postsecondary institution:** York

**ACADEMIC BACKGROUND**

<table>
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<td>CANADA</td>
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<td>Master’s</td>
<td>Civil Engineering</td>
<td>Toronto</td>
<td>CANADA</td>
<td>1998/06</td>
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<tr>
<td>Doctorate</td>
<td>Structural Engineering</td>
<td>Toronto</td>
<td>CANADA</td>
<td>2002/06</td>
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**TRAINING OF HIGHLY QUALIFIED PERSONNEL**

Indicate the number of students, fellows and other research personnel that you:

<table>
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<th>Over the past six years (excluding the current year)</th>
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<td></td>
<td>Supervised</td>
<td>Co-supervised</td>
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<td>Others</td>
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<td><strong>Total</strong></td>
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<td>Associate Professor</td>
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<td>Lassonde School of Engineering</td>
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<td>2013/07</td>
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<td>Associate Chair Undergraduate Studies</td>
<td>University of Ottawa</td>
<td>Civil Engineering</td>
<td>2011/07 to 2012/07</td>
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<tr>
<td>Associate Professor</td>
<td>University of Ottawa</td>
<td>Civil Engineering</td>
<td>2011/05 to 2013/06</td>
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<tr>
<td>Structures Laboratory Director</td>
<td>University of Ottawa</td>
<td>Civil Engineering</td>
<td>2007/07 to 2012/06</td>
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<tr>
<td>Assistant Professor</td>
<td>University of Ottawa</td>
<td>Civil Engineering</td>
<td>2005/01 to 2011/04</td>
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<tr>
<td>Government of Italy Scholarship Visitor</td>
<td>The European School for Advanced Studies in Reduction of Seismic Risk, Pavia, Italy</td>
<td>Earthquake Engineering</td>
<td>2004/05 to 2004/07</td>
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<tr>
<td>Assistant Professor</td>
<td>University of Calgary</td>
<td>Civil Engineering</td>
<td>2003/12 to 2004/12</td>
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<tr>
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<td>McMaster University</td>
<td>Civil Engineering</td>
<td>2003/01 to 2003/08</td>
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<tr>
<td>Visiting Assistant Professor</td>
<td>University of Toronto</td>
<td>Civil Engineering</td>
<td>2002/07 to 2002/12</td>
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<tr>
<td>Lecturer</td>
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<td>Civil Engineering</td>
<td>2002/01 to 2002/05</td>
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<td>Lecturer</td>
<td>University of Toronto</td>
<td>Professional Development Centre</td>
<td>2000/01 to 2001/04</td>
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<td>Special Lecturer</td>
<td>University of Toronto</td>
<td>Civil Engineering</td>
<td>1999/09 to 2003/12</td>
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<tr>
<td>Junior Design Engineer</td>
<td>Yolles Partnership Inc.</td>
<td>Structural Engineering</td>
<td>1997/07 to 1998/05</td>
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<tr>
<td>NSERC Summer Research Assistant</td>
<td>University of Toronto</td>
<td>Civil Engineering</td>
<td>1994/05 to 1994/08</td>
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## RESEARCH SUPPORT

<table>
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<th>Title of proposal, funding source and program, and time commitment (hours/month)</th>
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<td>Denis Mitchell &amp; 25 others</td>
<td>Reducing Urban Seismic Risk NSERC Strategic Networks</td>
<td>856,800 1,303,800 1,295,150 1,189,500 354,750</td>
<td>(3%) (4%) (4%) (4%) (2%) 2008 2009 2010 2011 2012</td>
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<tr>
<td>Daniel Palermo</td>
<td>Investigating Emerging Seismic Mitigation Technology for Improving the Seismic Behaviour/Retrofit of Reinforced Concrete Members Public Works and Government Services Canada</td>
<td>20,000</td>
<td>2010</td>
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<tr>
<td>Daniel Palermo</td>
<td>Structural Assessment of Solarium Structures Pilette Forensic Engineering</td>
<td>9,380</td>
<td>2011</td>
</tr>
</tbody>
</table>

List all sources of support (including NSERC grants and university start-up funds) held as an applicant or a co-applicant: a) support held in the past four (4) years but now completed; b) support currently held, and c) support applied for. For group grants, indicate the percentage of the funding directly applicable to your research. Use additional pages as required.

### a) Support held in the past 4 years

- **Daniel Palermo**
  - Performace of Reinforced Concrete Elements Subjected To Extreme Loads
    - NSERC
    - Discovery Grants
  - Amount per year: 17,000 17,000 17,000 17,000
  - Years of tenure: 2007 2008 2009 2010 2011

- **Denis Mitchell & 25 others**
  - Reducing Urban Seismic Risk
    - NSERC
    - Strategic Networks
  - Amount per year: 856,800 1,303,800 1,295,150 1,189,500 354,750
  - Years of tenure: 2008 2009 2010 2011 2012

- **Daniel Palermo**
  - Investigating Emerging Seismic Mitigation Technology for Improving the Seismic Behaviour/Retrofit of Reinforced Concrete Members
    - Public Works and Government Services Canada
  - Amount per year: 20,000
  - Years of tenure: 2010

- **Daniel Palermo**
  - Structural Assessment of Solarium Structures
    - Pilette Forensic Engineering
  - Amount per year: 9,380
  - Years of tenure: 2011
## RESEARCH SUPPORT

<table>
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<th>Family name and initial(s) of applicant</th>
<th>Title of proposal, funding source and program, and time commitment (hours/month)</th>
<th>Amount per year</th>
<th>Years of tenure (yyyy)</th>
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<tbody>
<tr>
<td>Palermo</td>
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List all sources of support (including NSERC grants and university start-up funds) held as an applicant or a co-applicant: a) support held in the past four (4) years but now completed; b) support currently held, and c) support applied for. For group grants, indicate the percentage of the funding directly applicable to your research. Use additional pages as required.

### a) Support held in the past 4 years

<table>
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<tr>
<th>Daniel Palermo</th>
<th>Blast Performance of FRP Strengthened Concrete Columns</th>
<th>20,300</th>
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<tr>
<td></td>
<td>Lassonde School of Engineering</td>
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### b) Support currently held

<table>
<thead>
<tr>
<th>Daniel Palermo</th>
<th>Canadian Seismic Research Network: Reducing Urban Seismic Risk</th>
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<tr>
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<td>2,500</td>
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<td>Office of Vice-President Research</td>
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<td>2012</td>
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<tr>
<td></td>
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<td></td>
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<td>2014</td>
</tr>
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Form 100 (2009 W), page 3.1 of 4

PROTECTED WHEN COMPLETED

Version française disponible
List all sources of support (including NSERC grants and university start-up funds) held as an applicant or a co-applicant: a) support held in the past four (4) years but now completed; b) support currently held, and c) support applied for. For group grants, indicate the percentage of the funding directly applicable to your research. Use additional pages as required.

### b) Support currently held

<table>
<thead>
<tr>
<th>Family name and initial(s) of applicant</th>
<th>Title of proposal, funding source and program, and time commitment (hours/month)</th>
<th>Amount per year</th>
<th>Years of tenure (yyyy)</th>
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<td></td>
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<td>19,000</td>
<td>2016</td>
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<tr>
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<td>Years Supervised or Co-supervised</td>
<td>Title of Project or Thesis</td>
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<tr>
<td>Chef, Isabelle</td>
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<td>Co-supervised 2014 -</td>
<td>Seismic and Tsunami Performance Assessment of Structures</td>
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<td>Zaidi, Mohammed</td>
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<td>Co-supervised 2011 -</td>
<td>Repair and Retrofit of Ductile Shear Walls</td>
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<tr>
<td>Al-Saddon, Zaid</td>
<td>Doctoral</td>
<td>Co-supervised 2009 -</td>
<td>Retrofitting Non-Ductile Concrete Frames</td>
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<td>Cortes, Wilmar</td>
<td>Doctoral</td>
<td>Supervised 2009 -</td>
<td>Retrofit of Concrete Shear Walls</td>
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<td>Al-Faesly, Taofiq</td>
<td>Doctoral</td>
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<td>Tsunami Loading of Near-Shoreline Structures</td>
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<td>Bhonde, Devarsh</td>
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<td>Supervised 2014 - 2014</td>
<td>Modelling SMA Reinforced Concrete Shear Walls</td>
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<tr>
<td>Mirzabagheri, Sara</td>
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<td>Repair of Superelastic SMA Reinforced Ductile Shear Wall</td>
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<td>Fan, Jin</td>
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<td>Blast Resistance of Concrete Walls</td>
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<td>Gorga, Rodrigo</td>
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<td>Testing Large-Scale Structural Components</td>
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<td>Undergraduate</td>
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<td>Zahrai, S. Mehti</td>
<td>Res. Associate</td>
<td>Supervised 2013 - 2013</td>
<td>Behaviour of Non-Ductile Reinforced Concrete Frames</td>
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<td>Abdulridha, Alaa</td>
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<td>Performance of Superelastic Shape Memory Alloy Reinforced</td>
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<td>Imbeau, Paul</td>
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<td>Strengthening of Critical Columns against Impact Loading</td>
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<td>Reinbol, Anna Lena</td>
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<tr>
<td>Name</td>
<td>Type of HQP Training and Status</td>
<td>Years Supervised or Co-supervised</td>
<td>Title of Project or Thesis</td>
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<td>Master's (Completed)</td>
<td>Co-supervised 2006 - 2008</td>
<td>Experimental Modeling of Tsunami Hydrodynamic Forces</td>
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</table>

**Personal identification no. (PIN)**: 183848

**Family name**: Palermo

Personal information collected on this form and appendices will be stored in the Personal Information Bank for the appropriate program.
1. MOST SIGNIFICANT CONTRIBUTIONS TO RESEARCH (2008-2013)

1.1. Development of Buildings Codes:
The applicant is one of 3 international members of the American Society of Civil Engineers (ASCE) Tsunami Loads and Effects (TLE) Subcommittee with the task to develop the first stand-alone design provisions (Tsunami Loads and Effects Chapter) for the 2016 edition of the ASCE 7 Standard Minimum Design Loads for Buildings and Other Structures. The 2018 edition of the International Building Code will reference the TLE Chapter.

1.2. Experimental Testing of Concrete Structural Components:
The applicant has conducted significant large-scale testing of reinforced concrete structural components, including: slender reinforced concrete shear walls; non-ductile reinforced concrete frames; and slender reinforced concrete beams. The frames have been used to investigate simple and cost-effective repair and retrofit techniques. The applicant experimentally investigated self-centering concrete structural components using Shape Memory Alloys (SMAs) in concrete beams and performed the first shear wall test incorporating SMA longitudinal reinforcement in the boundary elements.

1.3. Nonlinear Finite Element Modelling of Reinforced Concrete Structures:
The applicant has contributed to nonlinear finite element modelling of reinforced concrete structures and developed constitutive hysteretic models for concrete that were implemented into nonlinear finite element programs (VecTor2, VecTor3, and VecTor5). The applicant collaborated on an FQRNT (Fonds Québécois de la Recherche sur la Nature et les Technologies) project on the seismic strength of buildings braced by shear walls. The applicant recently developed a superelastic SMA hysteretic constitutive model, which was implemented into Program VecTor2. The applicant is currently a member of the American Concrete Institute (ACI) Committee 447 Finite Element Analysis of Reinforced Concrete Structures.

1.4. Seismic Repair and Retrofitting of Concrete Structural Components:
The applicant was a principal researcher with the Canadian Seismic Research Network (CSRN), an NSERC Strategic Network. The mandate of the CSRN was to develop the next-generation methodologies and structural systems to mitigate seismic risk to Canada. The applicant contributed in the area of vulnerability of existing concrete structures and mitigation through cost-effective retrofit techniques. The applicant has also contributed to the development of nonlinear finite element modeling procedures for repaired and/or retrofitted concrete structures. The applicant is currently an associate member of the American Concrete Institute (ACI) Committee 369 Seismic Repair and Rehabilitation.

1.5. Tsunami-Induced Forces on Near-Shore Structures:
The applicant is part of the first Canadian interdisciplinary research team studying tsunami-induced loading and effects on near-shoreline structures. Experimental and numerical research is being conducted at CHC of the National Research Council (NRC) in Ottawa, Canada. This work has resulted in code-applicable tsunami-induced force components and loading combinations. The applicant was invited to co-author three international book chapters and three articles in trade magazines. The applicant was invited by the Canadian Association for Earthquake Engineering to participate in a 10-member field reconnaissance mission to Chile following the February 27, 2010 Chile Earthquake and Tsunami.

2. RESEARCH CONTRIBUTIONS (2008-2013)

2.1. Referred Journal Publications:
Published
J1 Palermo, D., Nistor, I., Saatcioglu, M., and Ghobarah, A., “Impact and Damage to Structures during
the February 27, 2010 Chile Tsunami,” Canadian Journal of Civil Engineering, V. 40, pp. 750-758, 2013.


Submitted


2.2. Other Refereed Publications:

Chapters in Books

B1 Palermo, D., Nistor, I., and Saatcioglu, M. “Tsunami Loads on Infrastructure,” Encyclopedia of


Submitted:

Conference Proceedings


2.3. Non-Refereed Publications:

Trade Journals:


3. OTHER EVIDENCE OF IMPACT AND CONTRIBUTIONS

3.1. Awards:

- 2012 Tsunami Society International Award for Outstanding and Original Contributions to Tsunami Research
- 2011 Outstanding Teaching – University of Ottawa Direct Peer Review of Teaching
- 2011 John V. Marsh Award for Excellence in Teaching, Faculty of Engineering, University of Ottawa
- Nominated for the 2011 American Concrete Institute (ACI) Walter P. Moore, Jr. Faculty Achievement Award
- 2011 Certificate of Appreciation, Canadian Society for Civil Engineering (CSCE), for Chairing and Organizing the 2nd International Conference on Engineering Mechanics and Materials Specialty Conference
Complete this appendix (i) if you are an applicant or co-applicant applying for the first time; (ii) if you need to update information submitted with a previous application; or (iii) if you do not hold an appointment at a Canadian postsecondary institution. For updates, include only the revised information in addition to the date, your name and your PIN.

This information will be used by NSERC primarily to contact applicants and award holders. It may also be used to identify prospective reviewers and committee members, and to generate statistics. It will not be seen or used in the adjudication process.

<table>
<thead>
<tr>
<th>Family name</th>
<th>Given name</th>
<th>Initial(s) of all given names</th>
<th>Personal identification no. (PIN)</th>
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</thead>
<tbody>
<tr>
<td>Palermo</td>
<td>Daniel</td>
<td>D</td>
<td>Valid 183848</td>
</tr>
</tbody>
</table>

Position and complete mailing address if your primary place of employment is not a Canadian postsecondary institution or if your current mailing address is temporary

If address is temporary, indicate:

<table>
<thead>
<tr>
<th>Starting date</th>
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<tbody>
<tr>
<td>2014/10/05</td>
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<th>Leaving date</th>
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<tr>
<th>Telephone number</th>
<th>Facsimile number</th>
<th>E-mail address</th>
</tr>
</thead>
<tbody>
<tr>
<td>(416) 7362100</td>
<td>31324</td>
<td><a href="mailto:dan.palermo@lassonde.yorku.ca">dan.palermo@lassonde.yorku.ca</a></td>
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Give an alternate telephone number only if you can be reached at that number during business hours.

<table>
<thead>
<tr>
<th>Telephone number (alternate)</th>
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<td>Speak</td>
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I wish to receive my correspondence: in English X  in French

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<th>AREA(S) OF EXPERTISE</th>
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<td>Research subject code(s)</td>
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<td>Primary 1100</td>
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<tr>
<td>Secondary 1103</td>
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Provided a maximum of 10 key words that describe your area(s) of expertise. Use commas to separate them. If you have expertise with particular instruments and techniques, specify which one(s).

Reinforced Concrete Structures, Seismic Repair and Retrofitting, Emerging Materials, Shear Walls, Non-Ductile Frames, Large-Scale Experimental Testing, Nonlinear Finite Element Modelling, Constitutive Modeling, Tsunami Loading and Effects, Blast Resistance
NSERC applicants are required to describe their contributions to the training or supervision of highly qualified personnel (HQP) by providing certain details about the individuals they have trained or supervised during the six years prior to their current application. HQP information must be entered on the Personal Data Form (Form 100). This information includes the trainee’s name, type of HQP training (e.g., undergraduate, master’s, technical etc.) and status (completed, in-progress, incomplete), years supervised or co-supervised, title of the project or thesis, and the individual’s present position.

Based on the federal Privacy Act rules governing the collection of personal information, applicants are asked to obtain consent from the individuals they have supervised before providing personal data about them to NSERC. In seeking this consent, the NSERC applicant must inform these individuals what data will be supplied, and assure them that it will only be used by NSERC for the purpose of assessing the applicant’s contribution to HQP training. To reduce seeking consent for multiple applications, applicants will only need to seek consent one time for a six-year period. If the trainee provides consent by e-mail, the response must include confirmation that they have read and agree to the text of the consent form.

When consent cannot be obtained, applicants are asked to not provide names, or other combinations of data, that would identify those supervised. However, they may still provide the type of HQP training and status, years supervised or co-supervised, a general description of the project or thesis, and a general indication of the individual’s present position if known.

An example of entering HQP information on Form 100 (with and without consent):

<table>
<thead>
<tr>
<th>Name</th>
<th>Type of HQP Training and Status</th>
<th>Years Supervised or Co-supervised</th>
<th>Title of Project or Thesis</th>
<th>Present Position</th>
</tr>
</thead>
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<td>Supervised 1994 - 1997</td>
<td>Isotope geochemistry in petroleum engineering</td>
<td>V-P (Research), Earth Analytics Inc., Calgary, Alberta</td>
<td></td>
</tr>
<tr>
<td>(name withheld)</td>
<td>Undergraduate Completed</td>
<td>Supervised 1994 - 1997</td>
<td>Isotope geochemistry</td>
<td>research executive in petroleum industry - western Canada</td>
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Consent Form

<table>
<thead>
<tr>
<th>Name of Trainee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palermo, Daniel D</td>
</tr>
</tbody>
</table>

I hereby allow the above-named applicant to include limited personal data about me in grant applications submitted for consideration to NSERC for the next six years. This limited data will only include my name, type of HQP training and status, years supervised or co-supervised, title of the project or thesis and, to the best of the applicant’s knowledge, my position title and company or organization at the time the application is submitted. I understand that NSERC will protect this data in accordance with the Privacy Act, and that it will only be used in processes that assess the applicant’s contributions to the training of highly qualified personnel (HQP), including confidential peer review.

Trainee’s signature __________________________ Date ________________

Note: This form must be retained by the applicant and made available to NSERC upon request.

Form 100, Appendix D (2009 W) PROTECTED WHEN COMPLETED Version française disponible
Personal Information

Identification
Professor Jitendrapal Sharma
Correspondence language: English

Language Skills

<table>
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<th>Write</th>
<th>Speak</th>
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</tr>
</tbody>
</table>

Address
The primary address is denoted by (*)

Primary Affiliation (*)
Department of Civil Engineering  
Lassonde School of Engineering  
York University  
4700 Keele Street  
Toronto  
M3J1P3  
Canada, Ontario

Telephone
The primary telephone is denoted by (*)

Work (*)  
1-416-7362100 extension: 31323

Email
The primary email is denoted by (*)

Work (*)  
jit.sharma@lassonde.yorku.ca

Education

Degrees

<table>
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<th>Institution</th>
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<td>Master's Thesis - Civil Engineering - Indian Institute of Technology Kanpur</td>
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<tr>
<td>1987/6</td>
<td>Bachelor's - Civil Engineering - University of Bombay</td>
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Recognitions

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<th>Recognition</th>
<th>Description</th>
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<tbody>
<tr>
<td>2013/8</td>
<td>SES Educator of the Year 2013 - Prize / Award</td>
<td>Saskatoon Engineering Society&lt;br&gt;Description: Annual award given to a member of Association of Professional&lt;br&gt;Engineers and Geoscientists of Saskatchewan (APEGS) by its Saskatoon local chapter.</td>
</tr>
<tr>
<td>2013/3</td>
<td>USSU Teaching Excellence Award 2013 - Prize / Award</td>
<td>University of Saskatchewan&lt;br&gt;Description: Awarded annually to professors based on nomination and subsequent polling by students.</td>
</tr>
</tbody>
</table>

User Profile

Research Specialization Keywords: Computational geomechanics, Geosynthetics, Geotechnical modelling, Ground improvement, Nature-inspired optimization algorithms, Soft clay engineering, Soil reinforcement, Soil-structure interaction, Waste mechanics

Research Disciplines: Civil Engineering

Areas of Research: Geotechnics, Natural Risks

Fields of Application: Construction, Environment, Transport

Employment

Academic Work Experience

<table>
<thead>
<tr>
<th>Year</th>
<th>Position</th>
<th>Institution</th>
<th>Tenure Status</th>
<th>Work Description</th>
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<tbody>
<tr>
<td>2013/7</td>
<td>Professor and Chair - Full-time - Professor</td>
<td>York University - Lassonde School of Engineering - Civil Engineering</td>
<td>Tenure</td>
<td>Providing administrative leadership to a brand-new Civil Engineering department along with contributing significantly in terms of teaching, research and outreach.</td>
</tr>
<tr>
<td>2001/9 - 2013/6</td>
<td>Professor of Geotechnical Engineering - Full-time - Professor</td>
<td>University of Saskatchewan - College of Engineering - Civil and Geological Engineering</td>
<td>Tenure Status: Tenure</td>
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<tr>
<td>2000/7 - 2001/8</td>
<td>Senior Research Fellow - Full-time - Associate Professor</td>
<td>Swiss Federal Institute of Technology (ETH) - Hoenggerberg Campus - Institute for Geotechnical Engineering</td>
<td>Tenure Status: Non Tenure Track</td>
<td></td>
</tr>
<tr>
<td>1997/4 - 2000/6</td>
<td>Assistant Professor - Full-time - Assistant Professor</td>
<td>Nanyang Technological University - Jurong Campus - Civil and Structural Engineering</td>
<td>Tenure Status: Non Tenure Track</td>
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<tr>
<td>1996/8 - 1997/3</td>
<td>University Lecturer - Full-time - Lecturer</td>
<td>Queen Mary, University of London - Mile End Campus - Engineering</td>
<td>Tenure Status: Non Tenure Track</td>
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<tr>
<td>1994/8 - 1996/7</td>
<td>Research Associate - Full-time</td>
<td>University of Cambridge - Engineering</td>
<td>Tenure Status: Non Tenure Track</td>
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</tbody>
</table>
Non-academic Work Experience

1989/4 - 1989/9   Executive Engineer - National Thermal Power Corporation - Civil Engineering Design
Work Description: Geotechnical site investigation; foundation design; design of fly ash containment systems.

Leaves of Absence and Impact on Research

2012-11-01 - 2013-03-31   Other Circumstances - University of Saskatchewan
Absence and Impact Description: In November 2012, while on my second sabbatical leave, I underwent a major abdominal surgery in Saskatoon to fix the on-going health issues that emanated from my 2008-09 illness. The surgery was complete success; however, as a result of it, I could not sit upright for significant periods, which clearly affected my research activities and output. For this reason, I also had to postpone applying for the renewal of my NSERC Discovery Grant last year.

2008-10-01 - 2009-06-30   Other Circumstances - University of Saskatchewan
Absence and Impact Description: I fell severely ill with dengue fever during my sabbatical leave in India and had to cut short my sabbatical leave to return to Saskatoon. Although I did not need to take medical leave, aftereffects of this illness continued well into the next year, as a result of which there was a noticeable drop and subsequent delay in my research output.

Research Funding History

Awarded

2013/7 - 2018/6   Principal Applicant
Department Chair Annual Research Support - Grant

Funding Sources

| 2013/7 - 2018/6 | Start-up Grant 
| York University |
| Total Funding: 200000 |
| Portion of Funding Received: 80000 |
| Funding Competitive?: No |

2013/7 - 2014/6   Principal Applicant
Establishing a geotechnical modelling facility at York University - Grant

Funding Sources

| 2013/7 - 2014/6 | Start-up Grant 
| York University |
| Total Funding: 250000 |
| Portion of Funding Received: 250000 |
| Funding Competitive?: No |

Completed

2009/1 - 2013/6   Principal Applicant
Evaluation of on-going movements at Gardiner Dam - Grant
<table>
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2012/1 - 2013/6

In-lab verification of the performance of in-place inclinometers (IPIs) - Contract

<table>
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<th>Saskatchewan Ministry of Highways and Transportation</th>
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<td>Funding Competitive?: No</td>
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2012/9 - 2013/3

Understanding behaviour of geotextile-encased stone columns using large-scale lab shear tests - Scholarship

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<th>Funding Sources</th>
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<th>GSEP Commonwealth Scholarship</th>
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<td></td>
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<td>Funding Competitive?: Yes</td>
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2011/1 - 2012/12

A framework for analysis of low-factor-of-safety slopes using mobilized strength approach - Scholarship

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2012/5 - 2012/8

Compression of geomaterials with large voids - Scholarship

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2012/5 - 2012/8

Stochastic modelling of constituent variability and its effect on mechanical behaviour of municipal solid waste (MSW) - Fellowship

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2008/4 - 2012/3

Stability of large embankments founded on glaciated soils - Grant
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| **2008/4 - 2012/3** | Discovery Grant  
Natural Sciences and Engineering Research Council of Canada (NSERC)  
Total Funding: 95000  
Portion of Funding Received: 95000  
Funding Competitive?: Yes |  |
| 2010/9 - 2011/3 | Modelling cyclic behaviour of clays using EVP models - Scholarship  
**Funding Sources** |  |
| **2010/9 - 2011/3** | GSEP Commonwealth Scholarship  
Canadian Bureau for International Education  
Total Funding: 10000  
Portion of Funding Received: 10000  
Funding Competitive?: Yes |  |
| 2009/9 - 2010/3 | Nature-inspired algorithms for parameter estimation using inverse analysis - Scholarship  
**Funding Sources** |  |
| **2009/9 - 2010/3** | GSEP Commonwealth Scholarship  
Canadian Bureau for International Education  
Total Funding: 10000  
Portion of Funding Received: 10000  
Funding Competitive?: Yes |  |
| 2007/4 - 2009/12 | Development and assessment of modelling tools for CO2 sequestration - Grant  
**Funding Sources** |  |
| **2007/4 - 2009/12** | IEA GHG Weyburn CO2 Monitoring and Storage Project - Phase 2  
Petroleum Technology Research Centre (PTRC)  
Total Funding: 53862  
Portion of Funding Received: 26931  
Funding Competitive?: Yes |  |

**Principal Applicant**: Christopher Hawkes

## Activities

### Supervisory Activities

**Student/Postdoctoral Supervision**

| 2014/5 - 2014/7 | Haldar, Sumanta - Post-doctorate - IIT Bhubaneswar & York University  
Thesis/Project Title: Reliability-based finite element modelling of cyclic response of monopile foundations  
Present Position: Assistant Professor, IIT Bhubaneswar, India |  |
| Principal Supervisor |  |
| 2014/5 - 2014/7 | Karmakar, Soubhagya - Bachelor's Honours - IIT Bhubaneswar & York University - In Progress  
Student Degree Expected Date: 2015/6  
Thesis/Project Title: Cyclic soil-structure interaction of offshore monopile foundations supporting wind turbines  
Present Position: Undergraduate Student, IIT Bhubaneswar, India |  |

---

**Activities**

**Supervisory Activities**

**Student/Postdoctoral Supervision**

| 2014/5 - 2014/7 | Haldar, Sumanta - Post-doctorate - IIT Bhubaneswar & York University  
Thesis/Project Title: Reliability-based finite element modelling of cyclic response of monopile foundations  
Present Position: Assistant Professor, IIT Bhubaneswar, India |  |
| Principal Supervisor |  |
| 2014/5 - 2014/7 | Karmakar, Soubhagya - Bachelor's Honours - IIT Bhubaneswar & York University - In Progress  
Student Degree Expected Date: 2015/6  
Thesis/Project Title: Cyclic soil-structure interaction of offshore monopile foundations supporting wind turbines  
Present Position: Undergraduate Student, IIT Bhubaneswar, India |  |
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<tr>
<th>Start Date</th>
<th>End Date</th>
<th>Student Name</th>
<th>Degree</th>
<th>University</th>
<th>Expected Date</th>
<th>Thesis/Project Title</th>
<th>Present Position</th>
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<td>2014/5 - 2014/7</td>
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<td>Mahammad, Ubaid</td>
<td>Bachelor's</td>
<td>IIT Guwahati &amp; York University</td>
<td>In Progress</td>
<td>Large-strain consolidation modelling of slurries in a centrifuge</td>
<td>Undergraduate Student, IIT Guwahati, India</td>
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<tr>
<td>2014/1 - 2015/12</td>
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<td>Al Arafat, Mohammed</td>
<td>Master's Thesis</td>
<td>York University</td>
<td>In Progress</td>
<td>Incorporating climate change effects in geotechnical design</td>
<td>Student Degree Expected Date: 2015/12</td>
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<td>2013/9 - 2015/8</td>
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<td>Jindal, Prateek</td>
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<td>York University</td>
<td>In Progress</td>
<td>Capillarity-induced tensile strength of unsaturated sands</td>
<td>Student Degree Expected Date: 2015/6</td>
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<td>2012/9 - 2014/12</td>
<td>Co-Supervisor</td>
<td>Mohapatra, Sunil</td>
<td>Doctorate</td>
<td>IIT Madras, India</td>
<td>In Progress</td>
<td>Behaviour of geotextile-encased stone columns</td>
<td>Student Degree Expected Date: 2015/12</td>
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<td>Jindal, Prateek</td>
<td>Bachelor's</td>
<td>VIT University, India &amp; University of Saskatchewan</td>
<td>Completed</td>
<td>Tensile strength of moist sands</td>
<td>Student Degree Expected Date: 2015/6</td>
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<td>Wilson, Matthew</td>
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<td>Completed</td>
<td>Lab verification of performance of in-place inclinometers</td>
<td>Student Degree Expected Date: 2014/12</td>
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<td>Anand, Aman</td>
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<td>NIT Warangal, India &amp; University of Saskatchewan</td>
<td>Completed</td>
<td>Natural-fiber-reinforced stabilized soils</td>
<td>Student Degree Expected Date: 2014/12</td>
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<td>Parker, David</td>
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<td>Compression of geomaterials with large voids</td>
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<td>2011/3 - 2011/8</td>
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<td>Mavinakkere, Raghunandan</td>
<td>Doctorate</td>
<td>IIT Bombay, India &amp; University of Saskatchewan</td>
<td>Completed</td>
<td>Use of sand compaction piles for liquefaction mitigation</td>
<td>Student Degree Expected Date: 2015/6</td>
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<td>2011/1 - 2014/12</td>
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<td>Henry, Jasyn</td>
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<td>Soil-structure interaction of foundations and slopes</td>
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<td>Jindal, Prateek</td>
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<td>IIT Guwahati &amp; York University</td>
<td>In Progress</td>
<td>Large-strain consolidation modelling of slurries in a centrifuge</td>
<td>Student Degree Expected Date: 2015/6</td>
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<td>Sun, Jiaxi</td>
<td>Master's Thesis</td>
<td>University of Saskatchewan</td>
<td>In Progress</td>
<td>Effect of surfactants on compaction characteristics of soils</td>
<td>Geotechnical Engineer, Golder Associates, Saskatoon SK</td>
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<td>2011/1 - 2014/12</td>
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<td>Hammerlindl, Adam</td>
<td>Master's Thesis</td>
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<td>In Progress</td>
<td>Lab verification of performance of in-place inclinometers (IPIs)</td>
<td>Lab Coordinator, University of Saskatchewan</td>
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<td>2010/9 - 2012/8</td>
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<td>Bullock, Peter</td>
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<td>University of Saskatchewan</td>
<td>Completed</td>
<td>Design and performance of GFRP steep slopes</td>
<td>Principal Engineer, GeoStabilization International, BC</td>
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<td>2010/9 - 2012/6</td>
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<td>Tadikonda, Venkata Bharat</td>
<td>Post-doctorate</td>
<td>University of Saskatchewan</td>
<td>Thesis/Project Title: Nature-based algorithms for inverse analysis and optimization problems</td>
<td>Assistant Professor, IIT Guwahati, India</td>
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<td>Caughlin, Paul</td>
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<td>University of Saskatchewan</td>
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<td>Analysis of foundations with large overturning moments</td>
<td>Mechanical Engineer, Kova Engineering, Saskatoon</td>
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<td>University of Saskatchewan</td>
<td>Thesis/Project Title: Centrifuge testing of oil sands mature fine tailings</td>
<td>Assistant Professor, IIT Bhubaneswar, India</td>
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<td>IISc Bangalore, India &amp; University of Saskatchewan</td>
<td>Thesis/Project Title: Nature-inspired algorithms for contaminant transport inverse problems</td>
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<td>McAllister, Michael</td>
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<td>University of Saskatchewan</td>
<td>Thesis/Project Title: Consolidation characteristics of mature fine tailings</td>
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<td>IIT Bombay, India &amp; University of Saskatchewan</td>
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<td>Novel methods of plastic limit determination</td>
<td>Asst. General Manager - Bridges, PSL Ltd, Mumbai, India</td>
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<td>Tensile strength and compaction characteristics of unsaturated sands</td>
<td>Geotechnical Engineer, Golder Associates, Saskatoon SK</td>
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<td>Jody Scammell</td>
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<td>Evaluation of on-going movements at Gardiner Dam</td>
<td>Senior Geotechnical Engineer, Water Security Agency Saskatchewan</td>
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<td>2006/9 - 2011/8</td>
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<td>LePoudre, Chad</td>
<td>Master's Thesis</td>
<td>University of Saskatchewan</td>
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<td>Stability of potash tailings piles</td>
<td>VP-Geotech, SNC Lavalin, Saskatoon</td>
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### Administrative Activities

#### Event Administration

<table>
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<tbody>
<tr>
<td><strong>2011-09-01 - 2012-09-28</strong></td>
<td>Member, Technical Committee</td>
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<tr>
<td><strong>2010-09-01 - 2011-10-07</strong></td>
<td>Member, Technical Committee</td>
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<td><strong>2008-09-01 - 2009-10-31</strong></td>
<td>National Coordinator</td>
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<td><strong>2007-09-01 - 2008-10-31</strong></td>
<td>Member, Scientific and Technical Committee</td>
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#### 2012 Canadian Dam Association Conference, Saskatoon - Conference (2012-09-22 / 2012-09-27)


#### 17th International Conference on Soil Mechanics and Geotechnical Engineering, Cairo, Egypt - Conference (2009-10-05 / 2009-10-09)

#### 12th IACMAG Conference, Goa, India - Conference (2008-10-01 / 2008-10-06)
### Editorial Activities

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<th>Position</th>
<th>Journal</th>
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<tr>
<td>2011/1 - 2020/12</td>
<td>Editorial Board Member</td>
<td>Indian Geotechnical Journal - Journal</td>
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<tr>
<td>2006/7 - 2016/6</td>
<td>Associate Editor</td>
<td>Canadian Geotechnical Journal - Journal</td>
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### Advisory Activities

#### Expert Witness Activities

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<td>2011-01-01 - 2011-06-30</td>
<td>Litigation involving a major uranium producing company and a consortium of geotechnical contractors. The parties involved reached out-of-court settlement., Canada, Saskatchewan, Saskatoon. Activity Description: Assessment of geotechnical reports; providing expert opinion on the post-construction compression behaviour of compacted fill; advise on the role of partial freezing on compaction characteristics of silty soils.</td>
</tr>
<tr>
<td>2008-07-01 - 2008-07-31</td>
<td>Litigation involving the council of a small town on Manitoba-Saskatchewan border and a road building contractor, Canada, Manitoba, The Pas. Activity Description: Interpretation of geotechnical reports to establish the cause of road subsidence.</td>
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### Memberships

#### Committee Memberships

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<th>Description</th>
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<tr>
<td>2013/1 - 2016/12</td>
<td>TC 307 Sustainability in Geotechnical Engineering - International Society for Soil Mechanics and Geotechnical Engineering</td>
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<td>2011/1 - 2014/12</td>
<td>TC306 Geo-Engineering Education - International Society for Soil Mechanics and Geotechnical Engineering</td>
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<tr>
<td>2008/1 - 2010/12</td>
<td>Executive Committee, Canadian Geotechnical Society - Canadian Geotechnical Society</td>
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<tr>
<td>2008/1 - 2010/12</td>
<td>Soil Mechanics and Foundation Division - Canadian Geotechnical Society</td>
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<tr>
<td>2006/1 - 2010/8</td>
<td>Development Review Committee - Meewasin Valley Authority</td>
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<td></td>
<td>Description: One of two geotechnical engineering experts on this committee; assessment of new developments proposed in the jurisdiction of Meewasin Valley Authority in terms of geotechnical issues, such as slope stability, erosion, foundation design, etc.</td>
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Other Memberships

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<tbody>
<tr>
<td>2002-01-01 - 2013-12-31</td>
<td>Member Canadian Geotechnical Society</td>
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Contributions

Presentations

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<th>Title</th>
<th>Event/Location</th>
<th>Main Audience</th>
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<th>Keynote?</th>
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Interviews and Media Relations

Broadcast Interviews

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<th>Title/Description</th>
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<tr>
<td>2012-06-23 - 2012-06-23</td>
<td>Landslides affecting houses on banks of South Saskatchewan River - Global News Saskatoon - Global Saskatoon</td>
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Publications

Journal Articles

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<th>Title</th>
<th>Journal/Proceedings</th>
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<tr>
<td>2010/12</td>
<td>Bharat, T.V.* Sharma, J.S., &quot;Inverse modelling in geoenvironmental engineering using a novel particle swarm optimization algorithm&quot;, Lecture Notes in Computer Science, 6234, 448-455</td>
<td>Refereed?: Yes Open Access?: No</td>
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<td>2009/10</td>
<td>Singh, M.K.* Sharma, J.S. Fleming, I.R., &quot;Shear strength testing of intact and recompacted samples of municipal solid waste.&quot;, Canadian Geotechnical Journal, 46(10), 1133-1145</td>
<td>Refereed?: Yes Open Access?: No</td>
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<td>Year</td>
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<tr>
<td>2008/2</td>
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<td>Huang, B.* Sharma, J.S.,</td>
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</table>

**Reports**

2010-01-30 | Sharma, J.S. McAllister, M. Barbour, S.L., | "Hydraulic conductivity of mature fine tailings (MFT) using a high-g bench-top centrifuge", Syncrude Canada Ltd, 25 |

**Conference Publications**

2013/9 | Published | Hammerlinldl, A.* Sharma, J.S., | "Laboratory Study on the Performance of In-Place-Inclinometer" Paper Geo-Montreal 2013 66th Canadian Geotechnical Conference, Canada, Quebec, Montreal, 2013-09-29 | Refereed?: Yes Invited?: No |


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<th>Year/No</th>
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<td>2010/9</td>
<td>Bharat, T.V.* Sharma, J.S., &quot;Inverse modeling of contaminant transport through soil using natural computation&quot; Paper</td>
<td>Geo-Calgary 2010 63rd Canadian Geotechnical Conference, Canada, Alberta, Calgary, 2010-09-12</td>
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<td>2008/9</td>
<td>Sharma, J.S. Barbour, S.L., &quot;Post-graduate training for geotechnical engineers – Is it time for a Professional Master’s?&quot; Paper</td>
<td>61st Canadian Geotechnical Conference, Canada, Alberta, Edmonton, 2008-09-21</td>
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March 27, 2014

Professor Jitendrapal (Jit) Sharma
Chair
Department of Civil Engineering
York University

Dear Sir,

Re: Application for Adjunct Professor in the Department of Civil Engineering

As you will see from the enclosed CV, I have been involved in geotechnical, geological, hydrogeological researches, teaching and consultant works for the past twenty nine years in Canada, Singapore, Hong Kong and China. I have participated in geotechnical, geological and hydrogeological consultants for a wide variety of projects such as high-rise buildings, highways, railways, tunnels, bridges, earth retaining structures, watermains, sewers, land reclamation, etc. My research experience involves numerical modeling and analysis, field instrumentation and monitoring, land reclamation, soil improvement, laboratory and in-situ tests. I have published more than thirty papers in journals and international conferences.

As an adjunct professor, I can contribute my knowledge in the teaching and researching in the areas of geotechnical, geological, and hydrogeological engineering for graduate and undergraduate students, recommend research topics and develop courses for graduate and undergraduate students, give seminars to graduate students, and help the university in the application of research funding.

If you need to reach me, feel free to call me any time of day on my cell phone at 647-388-0532 or send me by email lcao@splconsultants.ca or clfcao@msn.com

Yours sincerely,

Laifa Cao, Ph.D., P.Eng.

Enclosure – Laifa Cao’s CV
LAIFA CAO, Ph.D., P.Eng.
Adjunct Professor, Department of Civil Engineering, Ryerson University, Canada
Associate Member, Yeates School of Graduate Studies, Ryerson University, Canada
Principal, Senior Engineer, SPL Consultants Limited, Canada
Cell phone: 647-388-0532; Email: lcao@splconsultants.ca; clfcao@msn.com

EDUCATION:

Ph.D. (Geotechnical), Nanyang Technological University, Singapore, 1998
M. Eng. (Hydrogeology and Engineering Geology), Tongji University, Shanghai, China, 1990
B.Eng. (Hydrogeology and Engineering Geology), Hefei University of Technology, China, 1985

AFFILIATIONS:

Member of Association of Profession Engineers of Ontario, Canada
Member of Canadian Geotechnical Society, Canada
Executive Member of Soil Mechanics and Foundation Division, Canadian Geotechnical Society
Member of International Society of Soil Mechanics and Foundation Engineering
Editorial Board Member of Journal of Civil Engineering and Architecture, USA
Reviewer of Journal of Materials in Civil Engineering, ASCE, USA

SUMMARY:

During the past seventeen years as a practising geotechnical engineer and twelve years as a geotechnical researcher, Dr. Cao has participated in geology, geotechnical and hydrogeological studies and designs for a wide variety of projects. These projects included:

- Watermains, feeder mains, forcemains and sewers
- Buildings, well houses and water treatment plants, marine structures and dams
- Reclamation and ground improvement, waste disposal sites
- Highway, railroad and road bridges, roadways and highways
- Rock and soil tunnels, slopes and retaining walls

Typically, projects included planning geology, geotechnical and hydrogeological investigations, evaluation of field and laboratory test data and file monitoring results, development of geotechnical parameters, preparation of geotechnical/hydrogeological reports, numerical modelling and analysis, design of geotechnical structures, tunnelling, foundations and pavements, and application for permit to take water.

TEACHING CAPACITY AND EXPERIENCE:

Undergraduate Course CVL434: Geotechnical Properties of Soils in Winter 2014, Ryerson University
Presentations of research seminars and lectures for graduate/undergraduate students, Ryerson University
Paper presentations in CGS Conferences and International Conferences

RECENT RESEARCH PROJECT

Statistical correlations between SPT-N values and soil parameters, supported by NSERC
CAREER SUMMARY:

SPL Consultants Limited – Vaughan, ON, Canada
Senior Geotechnical Specialist, Principal (2010 to present)

Coffey Geotechnics (formerly Geo-Canada Ltd) – Toronto, ON, Canada
Senior Geotechnical/Hydrogeological Engineer (2005 to 2010)

YWL Engineering Pte Ltd - Singapore
Manager of Geotechnical Department, Senior Geotechnical/Civil Engineer (2001 to 2005)

Nanyang Technological University - Singapore
Research Fellow in Geotechnical Engineering (1999 to 2001)
Specialist in numerical analysis, field instrumentation, land reclamation, soil improvement, laboratory tests and in-situ tests.

Hyundai Engineering and Construction Co. Ltd - Singapore
Geotechnical Engineer (1996 to 1999)

Nanyang Technological University - Singapore
Research Scholar/Teaching Assistance in Geotechnical Engineering (1994 to 1996)

Tongji University - China
Lecturer in Geotechnical Engineering (1990 to 1994)
Research Assistance in Geotechnical Engineering (1987 to 1990)

Hefei Architecture & Design Institute – China
Deputy Manager of Geotechnical Department (1985 to 1987)

SELECTED PUBLICATIONS:


March 24, 2013

Prof. Jit Sharma  
Chair, Department of Civil Engineering  
York University

Re: Application for Adjunct Professor: Civil Engineering, York University

Dear Prof. Sharma:

I am applying for the position of Adjunct Professor in Civil Engineering Department at York University. I am eager to be a part of your highly successful and dedicated team.

With more than 20 years of academic and industry experience in engineering, planning and management, which includes over 8 years of experience in senior industry positions, I believe that I am a suitable candidate for this position. My qualifications as indicated below are supporting my candidateship:

- Currently teaching Capstone Design Course at the University of Toronto.
- Doctor of Philosophy (Ph.D.) in Civil Engineering from prestigious Royal Military College of Canada.
- Master’s Degree in Structural Engineering in addition to the Master’s degree in Transportation Engineering from Carleton University.
- Industry experience of over 20 years in transportation planning and civil engineering fields including construction, design, structural engineering, transportation engineering, traffic operations, land use development and planning.
- Post Graduate Diploma in Management and Professional Diploma in Transportation Modeling and Simulation from MIT, Boston.
- Registered Professional Engineer in Ontario and a member of the Institute of Transportation Engineers, Ontario Traffic Council and Transport Association of Canada.
- Co-author of Engineer Field Manual that is widely used by Canadian Forces in worldwide Peace Operations in planning, design and construction of roads and accompanying infra-structures that support roads, bridges and culverts.

The attached resume provides further details on my work experiences, education and skills. I would be pleased to discuss my credentials and suitability for this position.

Thank you.

Yours Sincerely,

Sabbir Saiyed, Ph.D., P.Eng.
Sabbir Saiyed, Ph.D., P.Eng.

66 Leisure Lane
Richmond Hill, ON L4C 4X1
Email: sabbir.saiyed2@gmail.com

Visionary Leader, Planner and Professional Engineer

Dynamic, innovative and results driven professional engineer, planner, researcher and a teacher with 20 years of solid experience and blended background in planning, engineering and management. Excellent problem solving skills and strong orientation in public and client service satisfaction. Unique combination of education background, strong interpersonal skills, leadership and management experience. Proven ability to teach, manage and lead projects from planning through execution and completion. Areas of strength and expertise include but not limited to the following:

- Transportation
- Environment
- Infrastructures
- Structural Engineering
- Urban/Rural Planning
- Project Management
- Construction
- Material Technology
- Design
- Transit
- Municipal Services
- Assets Management

TEACHING & RESEARCH EXPERIENCES

Sessional Instructor, University of Toronto, Ontario 2013- Present
Teaching at prestigious Civil Engineering Faculty at University of Toronto. Researched ways to teach effectively and training next generation of Engineers and Planners.
- Currently teaching Capstone Design Course to Final Year Civil Engineering students
- Preparing course outline, evaluation of assignments and its supervision
- Supervising students and providing them feedback on their design projects
- Engaged in various research projects at University of Toronto.

Thesis/Project Advisor, Carleton/University of Toronto 2000 - Present
- Voluntarily served as a Thesis and Project Advisor to students in Civil Engineering, Planning, Transportation and Traffic Engineering.
- Hired Co-op students every year and provided them valuable professional job training, coaching and job experience.
- Co-supervised Master’s projects with University Professor.
- Provided practical guidance to students on their thesis or projects utilizing extensive field experience.
- Assisted in improving urban transportation and traffic safety and efficiency by employing latest technologies and methods.
Research Associate, Royal Military College of Canada 2000-2010
Undertook transportation and traffic engineering research studies in Canada’s most prestigious, unique and advanced military research institute. Reviewed technical manuals and reports for planning, design, construction, maintenance of roads and airfield pavements. Researched ways to improve urban traffic by employing latest technologies and methods.
- Prepared Engineer Field Manual, currently used by Canadian Military Forces worldwide for construction of roads and airfield pavements.
- Developed Dynamic Traffic Simulation Models for Royal Military College.
- Completed advanced courses in simulation and modeling at advanced research facilities.
- Pursued Ph.D. thesis research at RMC with extensive field data from Peel Region.

Teaching Assistant, Carleton University, Ottawa, ON 1997-1999
Led tutorial sessions and graded assignments for engineering courses for engineering students. Assisted students in solving complex engineering problems.
- Awarded Carleton University scholarship in Engineering.
- Taught strength of materials and engineering mechanics.

PROFESSIONAL INDUSTRY EXPERIENCES

Manager, Transportation System Planning, Region of Peel, ON 2009-Present
Managing several transportation planning studies and projects in Ontario’s second largest municipality. Reviewing Official Plan policies, Official Plan Amendments, Secondary Plans and studies to prepare strategic update. Represented Peel Region at multi-jurisdictional meetings/committees in Greater Toronto Area.
- Leading update of Peel Region Long Range Transportation Plan.
- Managing and leading transportation planning projects such as goods movement, development of transportation forecasting models, simulations, etc.
- Managing and providing support for OMB Hearings e.g. ROPA 26, ROPA 16, etc.
- Assisting Environmental Assessments Studies for the Region of Peel.
- Participating in several Corporate Committees and in Strategic Business Plan exercise.
- Successfully hiring, training and supervising Principal Planners, Planners and students.

Program Manager - Transit, Regional Municipality of York, ON 2008-2009
Managed and planned York Region Transit Services to 9 urban and rural municipalities in York Region with a population of 1 million. Led Service Planning section and directing service planners. Responsible for all aspects of transit planning, development review and advising senior management. Represented York Region Transit at multi-jurisdictional meetings and committees in Greater Toronto Area.
- Led and developed Annual Service Plan for York Region Transit.
• Managed and co-led business intelligence study for York Region Transit.
• Reviewed several transportation studies for development plans and applications.
• Participated in subway and Rapid Transit Plan, studies and projects.
• Participated in several Corporate Committees and in Strategic Business Plan exercise.
• Responsible for hiring, training and supervising service planners and students.

Manager of Transportation Engineering, City of Markham, ON  2007-2008
Managed several transportation planning, engineering and traffic studies and projects at 4th largest municipality with a population approaching 300,000 in Greater Toronto Area. Led transportation department and directed professional engineering, planning and technical staff. Responsible for all aspects of transportation, budgeting and advising senior management. Representing Markham at multi-jurisdictional meetings and committees in Greater Toronto Area.
• Led and developed Transportation Master Plan for Markham.
• Managed and led transportation planning projects such as bicycle/pedestrian planning, development of transportation and traffic forecasting models, traffic engineering, safety and transit studies, etc.
• Responsible for maintaining and operating traffic signal systems.
• Reviewed several transportation studies for development plans and applications.
• Reviewed several plans & agreements such as Cornell and West Cathedral Plan.
• Supervised School Crossing Guard and Safe Streets Strategy Program.
• Installed several Traffic Calming measures and led public consultations.
• Supervised capital and operations budget of approximately 6 million dollars.
• Responsible for hiring, training and supervising professional engineers, planners, technicians and students.

Principal Transportation Planner, Region of Peel, ON  2003-2007
Managed several transportation planning studies and projects in Ontario’s second largest municipality. Reviewed Official Plan policies, Official Plan Amendments, Secondary Plans and studies to prepare strategic update. Represented Peel Region at multi-jurisdictional meetings and committees in Greater Toronto Area.
• Developed Peel Region Long Range Transportation Plan.
• Managed and led transportation planning projects such as bicycle/pedestrian planning, development of traffic forecasting models, GO Transit, MTO travel time study, etc.
• Reviewed several transportation studies for development plans and applications.
• Managed and provided support for OMB Hearings e.g. ROPA 25, ROPA 16, etc.
• Conducted Environmental Assessments Studies for the Region of Peel.
• Participated in several Corporate Committees and in Strategic Business Plan exercise.
• Provided leadership and support to Safe and Active Routes to School Committee.
• Led GTA Cordon Count Group to coordinate count program in GTA.
• Successfully hired, trained and supervised Planners, Junior Planners and students.
Transportation Planner, Region of Peel, Brampton, ON  2000-2003
Assisted several planning and transportation studies. Developed & maintained Regional travel demand forecasting model and assisted in conducting several transportation studies.

- Provided strategic direction to the policy development and prepared reports to Council.
- Assisted in preparing 10 Year Capital Plan and York-Peel Transportation Study.
- Assisted in undertaking major Development Charges Study in Peel Region.
- Organized transportation component of Public Open House for Official Plan Amendment.
- Participated in development of award winning Internal Communication Strategies for the Planning Department.

Planning/Research Assistant, Region of Ottawa-Carleton, ON  1998-1999
Assisted major transportation planning and forecasting studies in Canada’s National Capital Region. Reviewed Official Plan Policies and assisted in developing Transportation Master Plan. Reviewed, assessed and prepared comprehensive technical reports.

- Prepared landuse and traffic forecasts for the Region of Ottawa-Carleton.
- Developed modal split model and auto vehicle occupancy model.
- Analyzed Cordon Count Data and TRANS Survey data.
- Assisted in conducting Urban Goods Movement Survey in National Capital Region.

Deputy Director, ONGC, Federal Government Corporation, India  1995-1996
Facilitated all aspects of planning, design and construction of roads and laying of oil & gas pipelines in Oil and Natural Gas Corporation (ONGC). Assisted environmental assessments and feasibility studies for roads and pipelines. Acquired lands and Right of Way for roads, oil and gas pipelines and installations under Federal Government act.

- Directed and supervised 9 technical and administrative staff.
- Provided leadership in coordinating work of several government and private agencies.
- Conducted land acquisitions and compensations public hearings.
- Managed financial payments and implemented budgeting measures.

Project Director, Regional Projects, Gujarat State, India  1993-1995
Managed and oversaw the planning, design, construction and maintenance of roads, buildings and other civil engineering infra-structures and community programs. Led, supervised and managed multiple teams of county professional, consultants and contractors. Undertook several community oriented infrastructure projects. Developed and monitored budget.

- Supervised staff of more than 400 technical, accounting and administrative cadres.
• Spearheaded $6 million community oriented transportation and infrastructures projects.
• Fostered staff training, development and growth; reduced employee turnover.

**Junior Civil Engineer, Department of Telecommunications, India 1990-1993**
Planned, designed and constructed roads, buildings, sewers and other civil engineering structures. Prepared development proposals, terms of reference, tenders and administered contracts. Supervised construction works, managed inventory and carried out regular maintenance of civil engineering infrastructure.
• Spearheaded construction of multi-million engineering infrastructures including roads.
• Supervised constructions staff of over 100 and coordinated projects of several engineering contractors and consulting firms.

**EDUCATION**

Ph.D. (Civil Engineering), Royal Military College, Kingston, ON, 2010.
M.Eng. (Civil Engineering), Carleton University, Ottawa, ON, 1999.
Post Graduate Diploma in Management, Indira Gandhi National University, India, 1996.
M.Eng. (Civil Engineering), M.S. University, Baroda, India, 1989.
B.Eng. (Civil Engineering), M.S. University, Baroda, India, 1987.

**ADVANCED CERTIFICATE PROGRAMS**
• Professional Diploma in Transportation Networks and Modeling, MIT, Boston, USA, 2007.
• Advanced Program in Public Administration, Public Administration Institute, India, 1994.
• Advanced Program in Civil Engineering - Planning and Construction, India, 1992.

**SELECTED PROFESSIONAL COURSES/PROGRAMS**
• Leadership Development Program, Region of Peel, 2010.
• Management and Leadership Development Courses, Franklin Covey Centre, USA, 2009.
• Seven Habits of Highly Effective People, Franklin Covey Centre, USA, 2008.
• Team Building and Conflict Resolution Course, Town of Markham, 2007.
• Think on Your Feet Course, City of Toronto, 2007.
• Advanced Corporate Project Management Course, Region of Peel, 2006
• Flexible Thinking, Region of Peel, 2005.
• Competent Leadership Development Course, Toastmasters, 2005.
• Dealing with Conflict, Region of Peel, 2005.
• Advanced Leadership Development Program, Region of Peel, 2004
• Critical Thinking - Management Course, Region of Peel, 2003.
• Report Writing for Managers, Region of Peel, 2002.
SKILLS

COMPUTER SKILLS
- Transportation engineering software packages such as EMME, INTEGRATION, Transyt-7F, TransCAD, HCS, Synchro and Sim-Traffic.
- GIS software – Arcview, IDRISI and EPPL7.
- Statistical packages such as SPSS and TSP.
- Microsoft Word, Excel, Access, Power point and MS Outlook.

PERSONAL SKILLS
- Ability to supervise and manage complex and sensitive projects.
- Ability to prepare excellent technical reports, proposals and financial reports.
- Excellent planning and organizational skills to ensure smooth administration.
- Extensive problem solving and time management skills.
- Excellent written and oral communication skills.
- Ability to work with confidence, initiative and dedication both independently and in a team.

SELECTED TECHNICAL PAPERS, REPORTS AND PRESENTATIONS

BOOKS/MANUALS

REFERRED PAPERS
7. Saiyed, S. and Stewart, J. A., *An Integration of Transportation Planning and Landuse*
Planning, Canadian Institute of Transportation Engineers Annual Meeting, Moncton, New Brunswick, 2004.


CONFERENCE PRESENTATIONS AND TECHNICAL REPORTS


SELECTED MAJOR PROJECTS AND STUDIES

1. Regional Road Characterization Study, Region of Peel, 2014.
11. Active Transportation Master Plan, Region of Peel, 2006.
15. Region of Peel Travel Demand Forecasting Model, Region of Peel, 2000-2004.

PROFESSIONAL AFFILIATIONS

- Association of Professional Engineers, Ontario.
- Transportation Association of Canada (TAC), Ottawa.
- Institute of Transportation Engineers, Washington DC, USA.
- Ontario Traffic Council, Ontario
- Southern Ontario Gateway Council, Ontario.
- Supply Chain and Logistics, Toronto, Ontario.

REFERENCES AVAILABLE UPON REQUEST
Appendix F

Department of Civil Engineering, York University

Calendar Description: MASc and PhD Programs in Civil Engineering

The Graduate Program in Civil Engineering offers courses and opportunities for advanced studies and research leading to the degrees of Master of Applied Science (MASc) and Doctor of Philosophy (PhD) in Civil Engineering. Both the MASc and PhD programs focus on the following major sub-disciplines of Civil Engineering: Environmental Engineering; Geotechnical Engineering; Geo-environmental Engineering; Structural Engineering; Transportation Engineering; and, Water Resources Engineering.

Master of Applied Science (MASc) Program

[Please refer to the program’s supplemental calendar for more detailed information about the program requirements.]

Admissions Requirements

Graduates with a bachelor’s degree (BASc, BEng or equivalent) in Civil Engineering (or a closely-related discipline) with at least a B average in the last two years of the bachelor’s degree program, may be admitted as candidates for the MASc program in Civil Engineering. The following are the minimum English Language test scores (if required): TOEFL 233/577 or YELT 4.

Degree Requirements

Candidates for the MASc degree in Civil Engineering must enroll in and successfully complete five graduate-level three-credit courses and two mandatory zero-credit courses (GS/ENG 6000 Engineering Ethics and GS/CIVL 6000 Graduate Seminar Series in Civil Engineering) to satisfy the breadth and the depth requirements, conduct a significant body of research and write and successfully defend a master’s thesis based on the conducted research. Of the five graduate-level three-credit courses, no more than two courses can be Directed Reading courses.

Time Requirements

Students are expected to complete all of their MASc degree requirements in no more than 12 terms (4 years) of registration as a full-time or part-time master’s student, as per the registration policies of the Faculty of Graduate Studies (FGS), including the requirement of continuous registration.

Doctor of Philosophy (PhD) Program

[Please refer to the program’s supplemental calendar for more detailed information about the program requirements.]

Admissions Requirements

Applicants must have a bachelor’s (BASc, BEng or equivalent) and a master’s (MASc, MEng or equivalent) degree in Civil Engineering (or a closely-related discipline) with at least a B average in the coursework for the master’s degree. The following are the minimum English Language test scores (if required): TOEFL 233/577 or YELT 4.

Degree Requirements

Candidates for the PhD degree must complete at least three graduate-level three-credit courses and two mandatory zero-credit courses (GS/ENG 6000 Engineering Ethics and GS/CIVL 6000...
Graduate Seminar Series in Civil Engineering) to satisfy the breadth and the depth requirements, pass a PhD Comprehensive Examination, write and successfully defend a PhD Research Proposal, conduct a significant body of original research and write and successfully defend a PhD Thesis based on the conducted original research. Of the three graduate-level three-credit courses, no more than two courses can be Directed Reading courses.

Time Requirements
Students are expected to complete all of their PhD degree requirements in no more than 18 terms (6 years) of registration as a full-time or part-time master’s student, as per the registration policies of the Faculty of Graduate Studies (FGS), including the requirement of continuous registration.
Appendix G

Department of Civil Engineering, York University
Letters of Support: MASc and PhD Programs in Civil Engineering
TO: Jit Sharma, Chair, Department of Civil Engineering
FROM: Janusz Kozinski, Dean, Lassonde School of Engineering
SUBJECT: Graduate Programs in Civil Engineering
DATE: February 12, 2015

I offer support for the proposed new graduate program in Civil Engineering concerning master’s and doctoral study. These new programs play an important role in the series of new programs that the Lassonde School of Engineering will be introducing under its transformative plans for engineering at York. It represents a natural next step for the Department of Civil Engineering.

I was pleased to read Dr. Balachandar and Dr. Vanapalli’s supportive review of the graduate program proposal in Civil Engineering. I appreciate their comments about the structure and modular nature of the curriculum, indicating that Lassonde’s programming represents a “model for others to emulate” and is “probably the first of its kind to be introduced in Canada.” Also, reviewers highlighted the flexibility our programs offer to students while providing a “unique methodology to assess” the aligned learning outcomes with degree level expectations. Feedback arising from collegial discussion within the School has been incorporated into the proposal.

The program development was informed by a careful planning phase, involving consultations with internal colleagues, external consultants, as well as by benchmarking against leading Civil Engineering programs in Canada and the US. The initiative is aligned with the strategic directions of the Lassonde School of Engineering and the University. Our strategic planning envisions a multi-phase development for Engineering at York, in which Civil Engineering plays a role similar to that of our other Departments. The proposal is also aligned with the principal goals of the most recent University Academic Plan and the Provostial White Paper, which call for the expansion of the scope of the University’s teaching and research activities in the areas of engineering and applied science.

The resources for the new graduate program in Civil Engineering have been developed in the context of the larger planning exercise for the expansion of Engineering at York. The academic financial resources and planning processes will be subject to a very stringent planning and accountability framework, as would be expected with any project of the magnitude and size as envisioned for the Lassonde School of Engineering.

Plans for faculty complement and enrollment growth have been developed to strike the essential balance between professional and academic standards, with the average student-to-faculty ratios aligning with comparable programs of similar size. Resources for relevant administrative, technical and student support staff have already been built into the School plans and will be allocated by the Dean’s Office as the new programs will grow. I clarified matters related to teaching contributions by faculty members in the Department in a separate note sent to the Chair.

In conclusion, I offer strong support for the introduction of master’s and doctoral programs in Civil Engineering into the Lassonde School of Engineering.

Cc: S. Pagiatakis
Memorandum

To: Rebecca Pillai Riddell, Chair, Senate APPRC
From: Rhonda Lenton, Provost
Date: February 25, 2015
Subject: Proposal for Graduate Programs in Civil Engineering

I have reviewed the proposal for the establishment of graduate programs (an MASc and a PhD) in Civil Engineering in the Lassonde School of Engineering; and am writing to express my support for this proposal, which includes the reviewers’ report and a letter from the Dean.

This proposal is fully consistent with LSE’s plans for development of its programming as set out in proposals for its establishment, as well as with institutional priorities (as described in the UAP, the White Paper, the Strategic Research Plan, and York’s SMA document) in relation to growing graduate programs and enrolments, research intensification, and enhancing our comprehensiveness through expansion of the sciences and engineering. It also aligns with provincial objectives in regards to graduate expansion and the innovation agenda. The proposal clearly sets out how the graduate program has been designed to promote LSE’s emphasis on the “Renaissance Engineer”, as well as to produce graduates who are well prepared to address changes in the engineering profession and the evolving needs of society. Thus, it focuses on three themes: infrastructure, resilience, and sustainability; and develops a range of technical, professional and more general skills such as communication and entrepreneurship. I am pleased that the reviewers have commented positively on the graduate program’s distinctive modular curriculum design, which supports students’ progress through the program and promotes flexibility in program delivery.

Since its launch in 2012, LSE has been implementing plans for growth and program development, and the current proposal for graduate programs builds on a strong undergraduate program in Civil Engineering. The introduction of the graduate programs is expected to strengthen the research intensity of the department, attract high quality students to the department, and provide a source of teaching assistants for the undergraduate program. Projections are for an initial intake of 8 MASc students and 4 PhD students in 2015, growing to about 80 FTE MASc students and 40 FTE PhD students at steady state. The reviewers
have cautioned about the need to ensure sufficient funding support for graduate students, given the competitive environment for research grants and scholarships.

LSE has plans in place to increase the faculty-and staff complement as enrolments in the department increase. The department now has 6 faculty members, and 3 additional searches are currently under way with the expectation that appointments will be made for July 2015. The reviewers comment on the appropriateness of these plans and indicate that the planned complement of 9 tenure stream faculty (plus 2 adjunct professors) will be sufficient to initiate the programs. The plan is to increase the faculty complement to a total of 23 by 2021 as the programs continue to develop. It is my expectation that the Faculty will work closely with the Provost’s office to ensure that enrolment (at both undergraduate and graduate levels) and appointment plans are carefully aligned and financially responsible. Administrative and technical support will be provided through a combination of Faculty resources and department/program-based resources. Teaching and laboratory space will be available with the opening of the new Bergeron Centre for Engineering Excellence.

I am happy to record my support for this proposal.

Cc: Dean J. Kozinski
    C. Underhill for ASCP
Dr. Janusz Kozinski  
Dean, Lassonde School of Engineering  
150B Atkinson Building  
York University

February 25, 2015

Dear Dr. Kozinski,

Re: Graduate-level Course offering to Civil Engineering Department

It is with great pleasure that I provide this Letter of Support for graduate courses to be offered by the Faculty of Science to graduate students of the Civil Engineering Department and other Lassonde School of Engineering graduate students in accordance with their graduate degree requirements.

From the New Program Brief of the Master of Applied Science (MASc) and Doctor of Philosophy (PhD) Degrees in Civil Engineering, it is evident that the Civil Engineering profession deals with all aspects of the built and natural environment. With the expansion of urban development, pressures on natural resources cause severe demands on infrastructure, water, and energy consumption and transportation. Combined with the effects of the harsh environmental conditions on structures and soils, and the need to manage and control the consequences of man-made activities and natural hazards, the scope of the civil engineering profession has been evolving rapidly to be able to deal with the emerging challenges that are closely linked to climate, environment, economics, humanities, business, effective management and entrepreneurship.

It is critical for engineering students to gain a sound understanding of the ways in which the fields of science and engineering interact. It is very encouraging to see the strong partnership between the two sister Faculties as science and engineering go together. In addition to the proposed civil engineering core courses, the Department of Civil Engineering has identified six existing graduate courses that are currently offered by the Department of Mathematics and Statistics, which could be of immense interest and benefit to MASc and PhD students in Civil Engineering students. These courses are as follows:

- GS/MATH 6602 Stochastic Processes
- GS/MATH 6605 Probability Theory
- GS/MATH 6630 Applied Statistics 1
- GS/MATH 6631 Applied Statistics 2
- GS/MATH 6635 Introduction to Bayesian Statistics
- GS/MATH 6652 Numerical Solutions to Differential Equations
With regard to the courses’ impact on our Faculty resources, I am happy to see that an agreement has been reached between the Lassonde School of Engineering and Faculty of Science stipulating that the funds necessary to deliver the courses shall be provided by the Lassonde School of Engineering, according to the principles of service course delivery and the upcoming new Shared Accountability & Resource Planning (SHARP) budget system. In order to minimize the impact on faculty resources, the individual Science course instructors may deliver multiple learning modules if and when required, thus mitigating the total number of course instructors.

We believe that the above courses represent a remarkable effort to strengthen our partnership, whereby the Faculty of Science will be able to assist, through the provision of knowledge and expertise, with the Lassonde School of Engineering’s vision of providing an innovative and interdisciplinary engineering education to its students. We share this vision and we enthusiastically support the effort by making available to Lassonde Students the courses listed above.

Should you have any questions or require any clarification, please feel free to contact Dr. Juris Steprâns (Chair, Department of Mathematics and Statistics) in the Faculty of Science, or Professor Jit Sharma, Chair Civil Engineering Department at the Lassonde School of Engineering.

Sincerely,

Ray Jayawardhana
Dean, Faculty of Science

cc:  Juris Steprâns, Chair, Department of Mathematics & Statistics
February 23, 2015

Dr. Janusz Kozinski  
Dean, Lassonde School of Engineering  
150B Atkinson Building  
York University  
4700 Keele Street  
Toronto, Ontario, M3J 1P3  

Dear Dean Kozinski,

Re: Graduate-level Environmental Studies Courses

It is with great pleasure that I provide this Letter of Support for graduate courses to be offered by the Faculty of Environmental Studies to graduate students of the Civil Engineering Department, and other Lassonde School of Engineering graduate students in accordance with their degree requirements.

From the New Program Brief of the of the Master of Applied Science (MASc) and Doctor of Philosophy (PhD) Degrees in Civil Engineering it is evident that the Civil Engineering profession deals with all aspects of the built and natural environment. With the expansion of urban development, pressures on natural resources placed by an ever increasing urban population cause severe demands on infrastructure, water use and reclamation, energy consumption and transportation loads. Combined with the effects of the harsh environmental conditions on structures and soils, and the need to control the consequences of man-made activities (for example, Canada’s oil sands) and natural hazards, the scope of the civil engineering profession has been evolving rapidly to be able to deal with the emerging challenges that are closely linked to environmental concerns.

It is critical for engineering students to gain a sound understanding of the ways in which the fields of engineering and environmental studies interact. It is with utmost pleasure to see the strong potential of partnership between the two Faculties in the area of environmental concerns. In addition to the proposed civil engineering core courses, the Department of Civil Engineering has identified seven existing graduate courses that are offered by our Faculty, which could be of potential interest to MASc and PhD students in Civil Engineering. These courses are as follows:

- GS/ENV 6124 Urban-Regional Planning
- GS/ENV 6128 Transportation Planning
- GS/ENV 6191 Management Practices for Sustainable Businesses
- GS/ENV 6164 Environmental Law
- GS/ENV 5178 Environmental Policy
- GS/ENV 5113 Business Strategies for Sustainability
With regard to the course's impact on our Faculty resources, I am happy to see that an agreement has been reached between the Lassonde School of Engineering and Faculty of Environmental Studies stipulating that the funds necessary to deliver the course shall be provided by the Lassonde School of Engineering, according to the principles of service course delivery and the upcoming new Shared Accountability & Resource Planning (SHARP) budget system. In order to minimize the impact on faculty resources, the individual course instructors may deliver multiple learning modules if and when required thus, mitigating the total number of course instructors.

As outlined in the New Program Brief, all necessary consultations have been carried out with the relevant York University library personnel, and arrangements shall be made to carry the relevant course materials at the Lassonde School of Engineering's library.

We believe that the above courses represent a remarkable effort to encourage inter-faculty synergy, whereby the Faculty of Environmental Studies will be able to assist, through the provision of knowledge and expertise, with the Lassonde School of Engineering's vision of providing an innovative and interdisciplinary engineering education to its students. We share this vision and we enthusiastically support the effort by making available to Lassonde Students the courses listed above.

Should you have any questions or require any clarification, please feel free to contact Dr. Ravi de Costa at the Faculty of Environmental Studies, or Professor Jit Sharma, Chair Civil Engineering Department at the Lassonde School of Engineering.

Sincerely,

Noël Sturgeon
Dean
Memorandum

To: Dean Janusz Kozinski, Lassonde School of Engineering
Date: January 9, 2015
From: Don Hunt, University Registrar
Subject: Proposal for a Master of Science (MASc) and Doctoral of Philosophy (PhD) in Civil Engineering

I am writing in response to the proposal as noted above. The Registrar’s Office supports a Master of Science (MASc) and Doctoral of Philosophy (PhD) in Civil Engineering with the following commentary:

- It is highly recommended that calendar copy be included in the proposal
- The verbiage "Students enrolled in the MASC degree program in Civil Engineering must have completed a BA in Civil Engineering (or a discipline closely related to Civil Engineering)." used in Section 4.1.1 MASc Degree Requirements pertains to Admissions Requirements rather than Degree Requirements and as such should be detailed in the Admissions Requirements section.

At this time, there may still be some operational challenges to be addressed; however we look forward to working collaboratively through any implementation issues not foreseen in the review of this proposal.

Thank you for the opportunity to review and comment.

Don Hunt
York University
University Registrar
phone: 416-736-2100 ext 70704
fax: 416-650-8124
Partners in Student Success
Memorandum

To: Dr. Jit Sharma, Chair, Department of Civil Engineering, Dr. Spiros Pagiatakis, Assoc. Dean, Research & Graduate Studies Lassonde School of Engineering

From: Catherine Davidson, Interim University Librarian

Date: December 8, 2014

Subject: Library Support for Proposed Graduate Program in Civil Engineering

York University Libraries have a record of providing strong library services and collections to support research and academic studies at York University. In keeping with this tradition, the Libraries are actively engaged in working with faculty to identify and purchase seminal resources – databases, monographs, reference works, and journals – for the discipline’s curriculum, and to develop programming within the Libraries to support engineering students. In addition, the Libraries will continue to work with faculty to expand the breadth and depth of the collections to support high-level research in the field of civil engineering. The Libraries have historically focused on building resources pertaining to climate change and to sustainable development, two sub-disciplines identified as strong foci for this new program.

Building collections and programming for new disciplines and expanding areas of research intensity provides a valuable opportunity for the Libraries and subject area faculty to work collaboratively. The Libraries welcome this opportunity and look forward to this continued work and to making York’s program in Civil Engineering one of the best in Canada.

cc: Sarah Shujah, Science Librarian
    Ilo Maimets, Head, Steacie Science & Engineering Library
    Adam Taves, Acting Associate University Librarian, Collections and Research
INTRODUCTION

This statement of library support for the proposed Civil Engineering Master of Applied Science (MASc) and Doctor of Philosophy (PhD) Program has been prepared in accordance with the guidelines outlined in the Quality Assurance Framework as set out by the Ontario Universities Council on Quality Assurance. It describes the level of support currently provided by York University Libraries for the MASc and PhD courses offered by the Department on the Keele campus. The Libraries offer support for Science & Engineering programs through collections, instructional services, research assistance, access to knowledge resources, supporting research dissemination and providing adaptive services.

The Civil Engineering graduate programs offers a range of subdisciplines that shape the needs of society. The areas identified for the focus of the Civil Engineering Department at Lassonde are: (a) Infrastructure Lifecycle Management, Maintenance and Rehabilitation; (b) Design for Climate-change-driven Extreme Events; and (c) Sustainable Development. The research themes are meant to fit into the emerging Renaissance Engineer™ paradigm hence, students will encompass superb engineering, a sense of the arts to enhance creativity, design and innovation, and graduate with an entrepreneurship mindset. Furthermore, the program plans to be accredited by the Canadian Engineering Accreditation Board (CAEB). Research areas of interest include above-ground infrastructure, such as roads, bridges, buildings, etc.; buried infrastructure, such as water distribution networks, sewers, commuter tunnels, etc.; developing business economics of infrastructure rehabilitation and replacement, including lifecycle assessment and costing; assessing remaining serviceable life of a structure, retrofitting and rehabilitation of aging infrastructure, effects of environmental and user-controlled factors on various construction materials (e.g. concrete, steel, wood, masonry, etc.); performance of civil infrastructure during extreme loading events, develop novel materials and construction technologies; developing technologies for construction using recycled and renewable materials, construction over marginal-quality
land such closed municipal landfills and degrading permafrost, post-mining
rehabilitation of landscape (e.g. innovative cover systems, rapid consolidation of mine
tailings, etc), rejuvenation of groundwater and surface water resources using micro- and
meso-scale topographical alterations (e.g. by constructing micro dams out of naturally-
available materials), among other areas.

COLLECTIONS SUPPORT

The multidisciplinary nature of the Civil Engineering program draws strength from the
collective knowledge of subject liaison librarians:

- School of Engineering
  - John Dupuis; Sarah Shujah
- Department of Science and Technology Studies
  - John Dupuis; Sarah Shujah
- Environmental Studies
  - Dana Craig
- School of Law
  - Louis Mirando
- School of Business
  - Sophie Bury; Xuemei Li
- School of Public Policy and Administration
  - Dany Savard
- Department of Languages
  - Peggy Warran
- Department of Mathematics & Statistics
  - Rajiv Nariani
- Department of Chemistry
  - Jacqueline Keller-Vanerkoooy
- Department of Computer Science & Engineering
  - John Dupuis; Sarah Shujah
- Department of Physics & Astronomy
  - Jacqueline Keller-Vanerkoooy

Subject liaison librarians and the Libraries’ collections support the teaching and learning
needs of the faculty as well as the students enrolled in undergraduate and graduate
programs in these areas.

Formats

The Libraries’ collection comprises print, electronic, audio-visual, and microform
resources in the form of monographs, journals, reference materials, films, videos, DVDs,
government documents and statistics. Digital / electronic resources can be accessed
from all libraries, York University labs and offices and off-campus through the York
Libraries’ web site.

Location of Resources

The print materials for core courses are located primarily at the Steacie Science &
Engineering Library. This includes resources on earthquake engineering, transportation
and road safety engineering, standards for civil engineering, geotechnical modeling,
environmental bioengineering processes, hydrogeology, and and many other relevant
areas. The library also supports research and study across various different related
science and engineering disciplines like physics, astronomy, chemistry, mathematics,
statistics and mechanical engineering. Scott Library will have resources for
environment, languages, public policy and some areas of science and technology
studies. Osgoode library will have material pertaining to law and policy. Similar, Bronfman Library will contain materials related to entrepreneurship and commercialization of product designs. The Libraries also purchases French language resources, and these are primarily located at the Frost Library located on the Glendon campus.

Reference materials

Print and digital specialized encyclopaedias, dictionaries, glossaries, handbooks, directories and bibliographies are available in the Libraries collections and as online resources.

Print & electronic books (e-books)

Monographs are purchased through our vendors, YBP and Coutts, although other sources of new titles are also used. Searches are also conducted in WorldCat to locate titles of relevance and interest. Librarians with subject specialties and liaison responsibilities in various departments including Environment, Business, Law, Science and Technology Studies, Mathematics & Statistics, Chemistry, Physics & Astronomy and Computer Science & Engineering provide collective input. Comprehensive approval plans are extensively supplemented by individual orders gleaned from reviewing journals, faculty publishing trends, vendor notification programs, publisher catalogues and faculty and graduate student requests.

We have acquired a number of e-book packages from different publishers under consortia agreements as well as a significant number of e-book packages that are unique to York University. These can be accessed by the York academic community via the Libraries’ catalogue.

Included are the e-books from SpringerLink, IEEE, SPIE, Safari Books Online, Synthesis Engineering Books, Knovel, Books24x7 and Oxford Scholarship Online.

Standards

The York Libraries has a small but hopefully soon growing collection of Standards associated with Civil Engineering. Currently, our standards collection relies on resources available through our subscription with IEEE. Future standards recommended for the library to acquire include ASTM, ISO, ACI and ASCE. Expected resources we will be obtaining for the Civil program are:
Civil

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<tr>
<td>ICE Proceedings</td>
</tr>
<tr>
<td>ICE eBooks (1451 Books) - Complete</td>
</tr>
<tr>
<td>ICE Archive (OCUL) - journals and proceedings</td>
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<tr>
<td>ASCE (including archived materials)</td>
</tr>
<tr>
<td>ASCE eBooks and Standards</td>
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<tr>
<td>ASCE Proceedings</td>
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<tr>
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<tr>
<td>BSI</td>
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<tr>
<td>Vadose Zone Journal</td>
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<tr>
<td>Journal of the Transportation Research Board (TRB)</td>
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<tr>
<td>Various handbooks</td>
</tr>
</tbody>
</table>

**Journals (including e-journals)**

Given the interdisciplinary aspect of the programs involved in this review, the journal collections are especially important and currency is emphasised. Online subscriptions are maintained for all significant periodicals, and back runs are acquired if available. The demand for periodicals, particularly online journals is increasingly fulfilled through our involvement and memberships in consortia. The Libraries take full advantage of these consortia purchases which provide online access to large sets of academic e-journals. York University’s membership in two key consortia – the Ontario Council of University Libraries (OCUL) and the Canada Research Knowledge Network (CRKN) has afforded the York community to a wealth of electronic resources. Many journals are also made available directly from publishers’ websites.

**Relevant Databases & Indexes**

The primary databases and indexes of relevance include IEEE Xplore, Compendex, INSPEC, Geo Ref, Environment Complete, Business Source Premier, Web of Knowledge, Scopus but there are many others that address the multidisciplinary aspects of this program. In addition the library computers provide access to software and applications including ArcGIS, Matlab, SPSS, SAS, ORTEP, WinGX, R, R Studio and ChemSketch.

The following is a list of databases subscribed to by the York Libraries that are useful across the various science and engineering disciplines: [http://researchguides.library.yorku.ca/eng](http://researchguides.library.yorku.ca/eng) and [http://www.library.yorku.ca/subjects/science](http://www.library.yorku.ca/subjects/science)
Most databases possess the capability to link to full-text journal articles, should the Library subscribe to the parent journals. These databases are also compatible with link resolver technology / SFX so that users can request document delivery (ILL) in case we do not subscribe to the journal.

Theses & Dissertations

Access to theses and dissertations is made possible through ProQuest Theses & Dissertations database which provides full-text access to North American and European dissertations. International theses can be located through the Networked Digital Library of Theses and Dissertations (NDLTD) and other portals. Theses that are not available full-text can be requested through interlibrary loan (ILL).

Government Documents

York University Libraries are a repository for the Government of Canada documents, and therefore the Libraries automatically receive materials produced and disseminated by federal government organizations through the Depository Services Program. Provincial documents from the Province of Quebec and the Province of Ontario are also collected in both campus libraries. A subject guide to locating government publications can be found here: http://researchguides.library.yorku.ca/governmentpublications

SUPPORTING TEACHING, LEARNING & RESEARCH SERVICES

Research Dissemination through Open Access Initiatives

York University Libraries have been generous in supporting Open Access and encourage submissions by faculty and graduate students to OA journals. York University Libraries have directed a part of their collections funds to support publishing endeavours by paying the Article Processing Charges for select OA publishers. Some of the supported publishers include BioMed Central, Hindawi, and Public Library of Science (PLoS). Faculty are invited to deposit their papers for publication in YorkSpace (http://pi.library.yorku.ca/dspace/), York’s institutional digital repository. The non-exclusive archiving of research in York’s digital repository lends an institutional presence and increases York University’s scholarly profile while protecting their work for future use.

For more information and to answer questions about Scholarly and Open Access Publishing, please see the website at: http://researchguides.library.yorku.ca/open_access
LIBRARY SERVICES & SPACES

Specialized Liaison Librarians

Library support for these graduate programs will be provided primarily at the Steacie Science & Engineering Library with additional support from the Bronfman Business Library, Scott Library, and Osgoode Law Library. Liaison librarians assist students and faculty with literature research, writing skills by providing in-class workshops and developing research and course guides. Librarians also help to manage and organize the research literature using citation management programs, such as Zotero, Mendeley, and Refworks.

Science and engineering students and faculty can get reference help during reference hours in person, via e-mail, by telephone, and through the Steacie Science & Engineering Library Chat Reference Service. In addition, the libraries provide research help by email, phone and by chat using our Ask Chat with a librarian that has extensive hours during the week and on weekends.

Intercampus Borrowing

Because some of the library collections extend over two campuses, the Library provides an intercampus borrowing system at no charge. Students can submit a request online to have library materials delivered from one campus to the other by the following business day. Students can also use a free shuttle service to travel between campuses.

Interlibrary Loans/Resource Sharing and Off-Campus Resources

Undergraduate and graduate students and faculty have access to the collections of other university libraries through the interlibrary loan system called RACER (Rapid Access to Collections by Electronic Requesting). York University Libraries subsidize interlibrary loans for students and faculty who may borrow monographs through RACER at no cost. Additionally, undergraduate students can receive free up to 25 journal articles in any single year and faculty may receive 50 journal articles every year through RACER. There is no limit to RACER requests (journal articles) for graduate students.

All libraries in Ontario, except the University of Toronto, support a direct borrowing program that allows students and faculty to borrow materials when visiting other Ontario university libraries. Many Canadian Universities support reciprocal borrowing by graduate students and faculty.

Managing Research Results

All faculty and students have access to RefWorks, a web-based citation management program, to store and format citations to books, journal articles and other scholarly
resources. Though keep in mind the library is in process of evaluating the subscription to Refworks and is possibly looking for an effective replacement. The software is provided free-of-charge under a site license agreement paid for by the Library. Furthermore, EndNote Web, another citation management program is also available through Web of Knowledge. At this point, select librarians provide support for the latter product.

Many liaison librarians also provide support in the use of two free web-based citation management systems: Zotero, an open source citation management system, and Mendeley, which also offers an institutional edition.

Last, Dataverse is an online platform for management of research data provided by OCUL, the consortia of Ontario academic libraries. Researchers and students can create and manage their own records by depositing data, providing text descriptions of studies, and can determine their own access conditions to metadata. For further information please see the website guide for Dataverse at http://guides.scholarsportal.info/dataverse for assistance in setting up a Dataverse research data management account.

Scholarly Publishing Services

York University Libraries provide an electronic journal hosting service for York-affiliated journals. This service is called York Digital Journals (YDJ). York University uses Open Journal Systems (OJS), an open source software platform developed by the. The YDJ team is happy to work with York community members to create new journals or migrate existing journals to an online environment. The libraries will provide training and troubleshooting help with the OJS software, as well as advice to ensure maximum exposure.

YorkSpace is York University’s digital library of research outputs. It is a platform that enables York community members to post, organize and preserve their research online in an institutional context. It showcases the scholarship of the York University community through the use of a special standards-based software platform that collects usage statistics and promotes visibility on the web. Science and Engineering does have a few key research papers on space elevators stored in YorkSpace which can be discovered using Google.

LIBRARY INSTRUCTIONAL SUPPORT FOR ACADEMIC LITERACIES

Information Literacy is an essential component of students' education. Without the skills to find, retrieve, evaluate and use information, students cannot participate fully in a university environment or in their disciplinary culture. Critical engagement with information is an integral component of scholarly discourse and fundamental when involving students in teaching and learning. Subject librarians align information literacy (IL) instruction with the Association of College and Research Libraries (ACRL) Information
Literacy Framework for Higher Education that uses six threshold concepts for the development of information literacy pedagogy. You can read more the Framework at: http://acrl.ala.org/ilstandards/

There are also Information Literacy standards specifically for science and engineering: http://www.ala.org/acrl/standards/infolitscitech

York University Libraries has a very active IL program supporting both undergraduate and graduate students. Traditionally, individual faculty members have made arrangements with librarians to lead course-specific workshops in a library lab or in the classroom; and this option continues. However, increasingly, programs at York University are developing curriculum-integrated approaches to IL.

This is a process whereby IL instruction and principles are embedded throughout an entire degree program by a progressive incremental building of IL skills. More students are reached if IL instruction is embedded strategically at critical junctures throughout the program as a scaffold learning approach.

If this were implemented in Civil Engineering, the assigned librarians would be available to work with faculty members and curriculum committees to:
- articulate learning objectives related to this program
- decipher how learning outcomes and IL threshold concepts might be mapped strategically into the courses
- provide help with resources in interdisciplinary databases and writing resources which would hone discipline-specific learning and comprehension skills.

Assignments can be collaboratively designed by faculty and librarians to assess the learning outcomes that address both the disciplinary content and the research process. Checks can also be built in at each level to ensure that previously acquired skills and knowledge are retained, utilized and developed to a more sophisticated level. Please note that in addition to face-to-face instruction, instruction is increasingly tailored to assignments and program needs by means of online learning tools to support blended learning and flipped classroom style teaching.

Reference and Supplemental Support

Supplemental point-of-need assistance is available to students with assignments and research in the library through reference service, library promoted chat tools, e-mail, telephone and face-to-face consultations. Online tutorials and short video-streamed seminars are available on the library homepage. York Libraries website hosts graduate student support information and assistance through SPARK – Students Paper and Academic Research Kit that will support writing, research and reading skills, as well as TA support material. In addition, graduate students are encouraged to attend one or more themed workshops offered by librarians, learning skills counsellors and writing
specialists in the Learning Commons at Scott library and other workshops that may be featured through Faculty of Graduate Studies (FGS). They are timed to match the evolving needs of students as the year progresses.

Scott Library Learning Commons

The Scott Library Learning Commons brings together librarians, writing specialists, learning specialists and career advisors into single, student-friendly space where students are welcome to drop-in for personal assistance with all aspects of the researching and writing processes. Librarians can assist with choosing or refining appropriate research topics, identifying and evaluating the best scholarly materials on the topic, improving reading and note-taking skills, developing a thesis statement, preparing an outline and learning to edit the essay and formatting a bibliography.

A variety of services for differently abled students is available by arrangement with Library Accessibility Services (LAS) located in Scott Library. LAS staff provide transcription services for required readings in alternate formats and retrieving of items from the library stacks. The libraries also provide help with using adaptive technology located in the library.

CONCLUSION

Looking ahead, there are gaps that will need to be filled in the library's collection and services as Civil Engineering and the other new programs grow in the Lassonde School of Engineering. In addition, the potential needs of these upcoming programs will become apparent as corresponding curriculum is developed, new faculty is appointed and an understanding of their research interests is established. These gaps include: meeting needs for new journals and ebooks as teaching and research needs become clear; providing access to standards information beyond what is in IEEE, such as the American Society for Testing and Materials (ASTM); adding seating space to the Steacie Library and hiring a dedicated engineering librarian.

Overall, Library support for the various programs in the Civil Engineering program at York University is solid. This support stems from collaborations between the Libraries and faculty members and the student community. York University Libraries look forward to maintaining this important working relationship as York’s Engineering programs continue their plans for growth and diversification, as new programs and courses are introduced and new faculty are appointed.
### APPENDIX 1: LIBRARY STATISTICS (From 2012-13 York University Libraries Annual Report)

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<tr>
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<tbody>
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<tr>
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<tr>
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<td>581</td>
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## APPENDIX 1: LIBRARY STATISTICS

### ITEMS SHELVED

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### COLLECTION GROWTH

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*354 maps withdrawn in 11-12

### DIGITAL COLLECTIONS @ York

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## APPENDIX 1: LIBRARY STATISTICS

### RESOURCE SHARING

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### REFERENCE SERVICES

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### APPENDIX 1: LIBRARY STATISTICS

#### LIBRARY INSTRUCTION

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#### LIBRARY ACCESSIBILITY SERVICES

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#### Turnstile Count

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