



UNIVERSITY OF
ALBERTA

Department of Civil and Environmental Engineering
School of Mining and Petroleum Engineering

Graduate Studies Handbook

2019–2020

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UNIVERSITY OF ALBERTA

Welcome!

Welcome to the Department of Civil and Environmental Engineering and the School of Mining and Petroleum Engineering at the University of Alberta! You are joining one of the best engineering departments in the Canada to benefit from a true spirit of co-operation between engineering education and industry. The insight and knowledge shared between professors and students has inspired new ideas and resulted in greater research learning opportunities. On behalf of the department we hope your studies will be rewarding and wish you great success in your personal, academic, and professional life.



Natural Resources Engineering Facility (NREF)

1. Introduction

This handbook contains information specific to the graduate programs in the Department of Civil and Environmental Engineering and the School of Mining and Petroleum Engineering. Graduate students must make themselves aware of the contents of the graduate portions of the University of Alberta Calendar (linked below) and the Graduate Program Manual from the Faculty of Graduate Studies and Research (FGSR, also linked below). If there is a discrepancy between the information presented here and that contained in the Calendar, the Calendar takes precedence.

- University of Alberta Calendar: <https://calendar.ualberta.ca/>
- FGSR Graduate Program Manual: <https://www.ualberta.ca/graduate-studies/about/graduate-program-manual>

Graduate students take full responsibility for their own programs. They must ensure that their program satisfies the requirements set out by the FGSR and the Department.

2. Department Information

2.1. Graduate Program Contacts

Graduate Program Advisors

Ms. Emily Chen – 7-217 ICE

Ms. Ellie Kim – 7-209 ICE

Ms. Trina Cattral – 7-215 ICE

Ms. Arlene Figley – 7-211 ICE

cgradvis@ualberta.ca

Dr. Selma Guigard

Associate Chair, Graduate Studies

Office: 7-237 ICE

cive.acgrad@ualberta.ca

Department Address:

Department of Civil and Environmental Engineering

School of Mining and Petroleum Engineering

7-207 Donadeo innovation Centre for Engineering

Edmonton, Alberta

CANADA T6G 1H9

780 492 4235

www.engineering.ualberta.ca/civil

Reception

7-203 ICE

2.2. Research Group Graduate Coordinators

Individual research groups within the Department enjoy a certain level of autonomy in setting their own procedures and degree course requirements. Below is the contact information for the Group Graduate Coordinators.

Construction Engineering and Management

Dr. Ahmed Hammad – 6-308 ICE
ahammad@ualberta.ca

Geotechnical Engineering

Dr. Michael Hendry – 6-226 ICE
hendry@ualberta.ca

Petroleum Engineering

Dr. Japan Trivedi – 6-302 ICE
jtrivedi@ualberta.ca

Transportation Engineering

Dr. Tae J Kwon – 6-285 ICE
tjkwon@ualberta.ca

Environmental Engineering

Dr. Ian Buchanan – 7-271 ICE
ian.buchanan@ualberta.ca

Mining Engineering

Dr. Yashar Pourrahimian – 6-243 ICE
pourrahi@ualberta.ca

Structural Engineering

Dr. Carlos Cruz-Noguez – 7-306 ICE
cruznogu@ualberta.ca

Water Resources Engineering

Dr. Evan Davies – 7-261 ICE
evan.davies@ualberta.ca

2.3. Subdisciplinary Studies Contacts

Biomechanics Engineering

Dr. Samer Adeeb – 7-245 ICE
adeeb@ualberta.ca

Cellulosic NanoMaterials Program

Dr. Yaman Boluk – 7-273 ICE
yaman.boluk@ualberta.ca

Underground Trenchless Construction

Dr. Ali Bayat – 7-243 ICE
abayat@ualberta.ca

Building Engineering Construction

Dr. Yuxiang Chen – 6-257 ICE
ychen5@ualberta.ca

Pavement Engineering

Dr. Ali Bayat – 7-243 ICE
abayat@ualberta.ca

2.4. Desks and Offices

Graduate students will be assigned desks in accordance with the *Civil & Environmental Engineering (CEE) Office Space Policy*. Important points of this policy are outlined below:

- Graduate students in MSc and PhD programs will be assigned desks in accordance with the policy. Graduate students in the MEng program are not eligible for office space in Donadeo ICE and may only be housed in research space.
- Graduate students may be housed in NREF if space is available; otherwise, space is available in designated areas on the 6th floor of Donadeo ICE (6-244, 6-361, 6-362).
- Office space in NREF is managed by research programs. A delegate of these groups is responsible for assigning these offices.

- Office space in Donadeo ICE is managed by the Department. All requests for space are to go through the Administrative Assistant to the Chair.
- If no space is available, all requests for graduate student office space will be added to a waiting list, with priority given to PhD students.

2.5. Building Access and Keys

Some spaces in Donadeo ICE and NREF are only accessible to authorized personnel, either by keys or by a Proximity ONECard.

Office and laboratory keys are available to graduate students with a mandatory \$20.00 refundable deposit. A key requisition form, signed by your supervisor, should be submitted to the receptionist at 7-203 Donadeo ICE. Please allow one full working day for your keys to be issued. Additionally, if you have been assigned office space in the ICE building, please see the receptionist for Proximity ONEcard access information.

Keys are non-transferable; and are not to be loaned to anyone, including family members. In the event that keys are lost and new ones issued, the deposit will not be refunded when the second set of keys is returned to the office. All keys must be returned upon program completion or termination.

Further information on obtaining your Proximity ONEcard is available on the ONEcard office website at: <http://onecard.ualberta.ca/>

2.6. Personal Information

Students are responsible for the accuracy and validity of their contact information in Bear Tracks (<https://www.beartracks.ualberta.ca/>), including mailing address, email address and telephone number.

International students must submit a copy of their study permit to the Department, as well as to Human Resources

Human Resources
2-60 University Terrace
8303 112 Street NW
Edmonton, Alberta
Canada T6G 1K4

International students should also arrange to obtain a Social Insurance Number (SIN). SINs are required for all graduate students receiving financial assistance.

2.7. Mail Service

For a maximum of three (3) months you may have mail sent to you care of the following address:

(Your Name) c/o
International Centre
172 HUB International
University of Alberta
Edmonton, Alberta
CANADA T6G 2E1

Please make prior arrangements with this service at the International Centre located at 172 HUB Mall.

Personal Mail: Students must direct all personal mail to their home address or post office box. Any personal mail arriving in the main office (7-207 Donadeo ICE) will be labeled with a request to the student to make arrangements to have their mail sent directly to their home address.

Campus Mail: At this time, a Graduate Student Mailbox for Department-specific mail is not available. Department mail for students will be held and you will be contacted via email to come and pick it up.

2.8. E-mail

A Campus Computing ID (CCID) and password are issued to every student applicant upon receipt of their application for admission to the University. An e-mail account is provided for the purposes of communications between the applicant and the University. Note that your CCID is your email username.

Students can access their university email account at <http://www.ualberta.ca/gmail/>.

3. Funding and Financial Support

The Department may provide financial support to graduate students in a variety of ways, such as Graduate Teaching Assistantships (GTAs), Graduate Research Assistantships (GRAs), Graduate Research Assistant Fellowship (GRAF) and scholarships. Please contact your supervisor or Group Graduate Coordinator for information. All students who receive pay from the University must complete the banking information on Bear Tracks.

3.1. Teaching and Research Assistantships

3.1.1. Graduate Teaching Assistantships (GTAs)

GTAs provide support to the undergraduate program. This may be in the form of marking or it may involve assisting in a laboratory or tutorial. Students interested in being a Graduate Teaching Assistant in specific courses should inform their group coordinator.

GTAs are assigned on a term-by-term basis and the number of hours per week ranges from 3 to a maximum of 12. Students cannot receive more than 12 hours combined GTA and GRA. This number reflects the *average* time commitment of the assignment and not the peak time commitment in any one week. It should be noted that while the academic term is thirteen weeks long, a student with a GTA is paid for sixteen weeks of work.

3.1.2. Graduate Research Assistantships (GRAs)

The duties of a Graduate Research Assistant (GRA) are primarily in support of a faculty member's academic research. Such duties may include, but are not limited to: collecting/coding/analyzing data; literature reviews; library research; writing reports; designing conference presentations; and preparing materials for submission to funding agencies. The relationship between the Graduate Assistantship Supervisor and the GRA is an employment relationship. The number of hours per week ranges from 3 to a maximum of 12. Students cannot receive more than 12 hours combined GTA and GRA.

3.1.3. Graduate Research Assistant Fellowships (GRAF)

A Graduate Research Assistant Fellowship (GRAF) is a form of financial assistance provided to graduate students to allow them to focus on their education and training, as it relates to their own thesis or directed research project. The relationship between the Assistantship Supervisor and GRAF is not an

employment relationship. The GRAF is normally funded through restricted funds (supervisor's research grant) and may form part of a funding package to support the graduate student in their graduate studies. The value of the fellowship may vary by discipline and by the requirements of the restricted funds supporting the GRAF. There is a minimum stipend if it is to be considered a fully-funded GRAF.

3.2. Awards and Scholarships

Detailed information of all available scholarships can be found on the FGSR website:

<https://www.ualberta.ca/graduate-studies/awards-and-funding/scholarships>

3.3. Fees

The University of Alberta's fees policies and procedures are stated in the *Fees Payment Guide* section of the Calendar: <https://calendar.ualberta.ca/content.php?catoid=29&navoid=7282>

Information on fees for graduate students is found in the *Graduate Instructional and Non-Instructional Fees* section in the Calendar:

<https://calendar.ualberta.ca/content.php?catoid=29&navoid=7282#graduate-instructional-and-non-instructional-fees>

Individuals seeking fees information should consult these sections or the FGSR website:

<https://www.ualberta.ca/graduate-studies>

4. Program Requirements

All graduate students in the Department must fulfill the program requirements described in this section. As a graduate student in the Department, you are responsible for ensuring that all program requirements are met by the required timelines. If anything is unclear, or if you have questions about any requirements or deadlines, please consult the Graduate Program Advisors.

4.1. Registration

Although students are ultimately responsible for the accuracy and completeness of their own registration, it is the responsibility of the Department and specifically the supervisor and/or supervisory committee to assist the graduate student in planning the student's program (see *Responsibilities Related to Graduate Programs* in the Calendar).

4.2. Appointment of Supervisor(s) for MSc/PhD Students

4.2.1. Supervisor

For students in the MSc and PhD programs, supervisors are assigned at the time of admission. Supervisors are nominated by the Department to the Faculty of Graduate Studies and Research (FGSR) using the *Approval of Supervisor and Supervisory Committee* form.

4.2.2. Supervisor on Leave

If a supervisor's leave exceeds two months, they are required to make adequate provision for supervision of their graduate students during their leave. They must submit a written statement to the Department and to the student, describing arrangements for satisfactory supervision during leave.

4.2.3. Supervisory Committee

The supervisory committee is typically formed no later than the end of first year of the student's program. The Department nominates the supervisory committee on an *Approval of Supervisor and Supervisory Committee* form to the FGSR.

The supervisory committee meets with the graduate student annually to review their program and progress. This annual supervisory committee meeting typically occurs no later than August 31 of a given year.

More information can be found by consulting:

- The *Supervision and Supervisory Committees* section of the University Calendar
- *Areas of Responsibilities Related to Graduate Programs* in the FGSR Graduate Program Manual

4.3. First meeting reports and annual reports

Within one month of beginning their programs, MSc and PhD students must meet with their supervisor(s) and complete the First Meeting report, which is designed to make new students aware of responsibilities, regulations and expectations. Students enrolled in the MEng program should meet with their Group Graduate Coordinator to complete this First Meeting Report.

4.4. Ethics and Academic Integrity Training (ENGG 600)

Ethics and academic integrity training is mandatory for all graduate students at the University of Alberta. All new graduate students are strongly encouraged to register for **ENGG 600 Engineering Ethics and Integrity** in their first semester. ENGG 600 is a one-day workshop offered in September and in January. Students must register for this course on Bear Tracks.

More information on FGSR's academic integrity and ethics training requirements can be found on the FGSR website: <https://www.ualberta.ca/graduate-studies/current-students/academic-requirements/ethics>

4.5. Professional Development (PD) Requirement for Graduate Students

The University of Alberta considers professional development (PD) to be an important component of any graduate student's program of studies and **it is a mandatory requirement for all graduate students.**

The Professional Development (PD) requirement consists of two components:

- 1. Individual Development Plan (IDP) workbook**
- 2. Professional Development activities**

Although it is strongly suggested that students complete the PD Requirement within the first year of their program, **the Department's mandatory deadlines** to complete the PD requirement and submit the necessary PD documents to the Graduate Program Office are the following:

- For MSc students: before scheduling the MSc defense
- For MEng students: before completing the program (and typically before completing the capstone project)
- For PhD students: before scheduling the PhD Candidacy exam

Engineering graduate students must complete the Professional Development (PD) requirement through two virtual courses available through eClass:

3. **ENG GRAD PD 01** – Individual Development Plan (IDP) and four (4) hours of PD activities mandated by the Faculty of Engineering.
4. **ENG GRAD PD 02** – Eight (8) hours of PD activities mandated by FGSR.

Details about the Professional Development Requirement are summarized on the Department of Civil and Environmental website and are described briefly in the following section

4.5.1. Individual Development Plan (IDP)

Details concerning the completion of the IDP can be found on FGSR's Professional Development IDP website: <https://www.ualberta.ca/graduate-studies/professional-development/professional-development-requirement/individual-development-plan>.

As per University Calendar, “All graduate students at the University of Alberta are required to submit an IDP to the department for their program of studies within 12 months of the program's commencement for master's students and within 18 months of the program's commencement for doctoral students. The plan is a career and skills planning document that allows graduate students to consider their future careers in an organized way and to plan their participation in professional development activities in conjunction with their academic activities.”

4.5.2. Professional Development (PD) Activities

The Professional Development Requirement includes the completion of twelve (12) hours of PD activities: four (4) hours mandated by the Faculty of Engineering and eight (8) hours mandated by FGSR.

Faculty of Engineering PD Requirements

The Faculty of Engineering requires four (4) hours of PD activities. A list of acceptable PD activities pre-approved by the Faculty of Engineering is available on the Faculty of Engineering website: <https://www.ualberta.ca/engineering/student-services/academic-support/graduate-studies-professional-development>.

FGSR PD Requirements

FGSR requires eight (8) hours of PD activities. According to FGSR, PD activities fulfil the University of Alberta Professional Development Requirement if they contribute to the acquisition of skills, knowledge or mindset and includes all of the following components:

- Comprise of formal training or active learning with an assessment component (self-assessment, reflection, quiz, write-pair-share, evidence of knowledge application)
- Fall outside of research methods training, capstone project, thesis (or equivalent), and required practicum
- Support the career goals and/or seven skills/competencies identified in the IDP.

Eight hours of Professional Development Activities Guide is available on the FGSR's website: <https://cloudfront.ualberta.ca/-/media/gradstudies/professional-development/pd-resources/2018-08-03-pdopportunititesguide.pdf>.

The following activities do **NOT** fulfil the PD requirements:

- Sessions used towards the Ethics and Academic Integrity Requirement

- Information sessions to highlight resources or programs
- Teaching Assistantships, Research Assistantships
- Presenting a talk or a poster
- Serving as a mentor
- Serving on a board or committee
- Graduate Student Safety Certificate

4.5.3. Completion of PD Requirements and Submission of Forms to the Department

Students must meet the PD requirement through the completion of two virtual courses available through eClass: ENG GRAD PD 01 and ENG GRAD PD 02. Please follow the steps below to meet the PD requirement.

Step 1: Complete ENGG GRAD PD 01 requirement – Individual Development Plan (IDP workbook) and 4 hours of PD activities as mandated by the Faculty of Engineering.

- ✓ Please self-enroll in the virtual course [ENG GRAD PD 01: IDP and 4hrs Engineering PD](#).
- ✓ Please complete [Individual Development Plan \(IDP workbook\)](#).
- ✓ Please complete 4 hours of PD activities mandated by the Faculty of Engineering and fill out the [ENG GRAD PD01 Completion Form](#), available on the Department website.

Step 2: Complete ENGG GRAD PD 02 requirement – 8 hours of PD activities as mandated by FGSR.

- ✓ Please self-enroll in the virtual course [ENG GRAD PD 02: 8 hrs PD for FGSR](#)
- ✓ Please complete 8 hours of PD activities mandated by FGSR and fill out the [ENG GRAD PD02 Completion Form](#), available on the Department website.

Step 3: Submit the PD documents to your Supervisor (for MSc and PhD) or the Group Coordinator (for MEng).

The following documents and forms must be submitted to your Supervisor or the Group Coordinator:

- ✓ **Individual Development Plan (IDP workbook)**
- ✓ **ENG GRAD PD 01 Completion Form**
- ✓ **ENG GRAD PD 02 Completion Form**
- ✓ **Proof of all PD activities you have completed** (e.g., certificate of completion, confirmation of attendance, etc.). ***Note:** The Department prefers an email confirmation of attendance or completion as a proof since FGSR is no longer signing the paper copy of the Declaration of Attendance. For PD sessions/workshops no email confirmation is given, we still accept a paper copy of the [Department's Declaration of Attendance](#) (available on the Department website) as proof of attendance or completion.

Step 4: Submit all completed and signed documents and forms to the Graduate Program Office for the Graduate Associate Chair's approval.

Once the ENG GRAD PD 01 and 02 forms are signed off by the Graduate Associate Chair, The Graduate Program Office will send you a scanned copy of the forms and you would have to upload them to the eClass.

Additional details and helpful links to forms and PD sessions are provided on the Department website. Please note the following important information:

- It is student's responsibility to identify available PD sessions/workshops and accumulate PD hours. The Department is NOT designating students to attend a certain session/workshop for the PD requirement. Graduate students often receive email communications on available PD opportunities from FGSR, Faculty of Engineering, the department, etc.
- The Department grants a maximum of 2 hours towards an online session/workshop and a maximum of 4 hours towards an in-person session/workshop.
- If students are unsure whether a session/workshop will be considered towards PD hours, students should check with the department BEFORE attending.
- The following activities do NOT fulfil the PD requirements:
 - Sessions used towards the Ethics and Academic Integrity Requirement
 - Information sessions to highlight resources or programs
 - Teaching Assistantship, Research Assistantship
 - Previous and/or current work experience (full-time, part-time, internship)
 - Conferences or workshops related to research methods training, capstone project, thesis, and course work
 - Presenting a talk or a poster
 - Serving as a mentor
 - Serving on a board or committee
 - Graduate Student Safety Certificate
- The Department has the authority to determine whether a session/workshop is acceptable as the PD requirement for our students. Each department has different criteria in accepting and recognizing the PD requirement and a sessions/workshop accepted as PD by one department may not be accepted by another department.

4.6. Degrees offered

The Department offers MEng, MSc and PhD degrees in eight research disciplines and five subdisciplines. The specific course requirements for each degree and for each discipline or subdiscipline area are outlined in Section 5.

4.6.1. Doctor of Philosophy (PhD)

The PhD is a research-based degree with a minimum period of residence of two full-time academic years at the University of Alberta. The two years need not be consecutive. The residency requirement provides students with significant contact with the University of Alberta through time spent on campus and through interactions with faculty members and other graduate students. It educates the student to be an independent researcher and scholar in an academic discipline, through coursework, seminar participation, teaching, faculty interaction and faculty-directed research.

The course requirements for the PhD vary by research discipline (Section 5); however, all graduate students must complete ENGG 600 and the Faculty of Engineering Professional Development requirements.

All PhD candidates must prepare and defend a thesis of high calibre on an approved topic.

4.6.1.1. PhD Candidacy Examination

Normally within two years and not less than six months prior to final examination. The Department sets the date for the examination and recommends the examining committee to the FGSR. All program requirements, other than the thesis, must be completed within 36 months of the commencement of a student's program.

Five (5) weeks prior to the examination, the Department submits a Notice and Approval of Doctoral Candidacy Examining Committee & Examination Date form to the FGSR.

After a successful examination, the Department submits a Report of Completion of Candidacy form to FGSR. If not successful, the Department recommends the best course of action to FGSR.

4.6.1.2. PhD Final Oral Examination

Prior to setting examination dates and before the thesis is sent to the external examiner, all supervisory committee members declare in writing to the supervisor that the thesis is adequate to proceed to the final oral examination.

Timeline:

- 3 months prior to examination, the supervisor nominates an external examiner and proposes a date for the examination and the composition of the rest of the examining committee.
- 2 months prior to examination, the Department nominates an external examiner to the FGSR and completes a Request to Invite External Reader or Examiner for Final Doctoral Oral Examination form. The Department invites the external examiner.
- 5 weeks prior to examination: The Department recommends examining committee members to the FGSR using a Notice and Approval of Doctoral Final Oral Examining Committee & Examination Date form. The Department notifies examiners (including the external examiners) of the date, and supplies a copy of the thesis to them. **No additional revised copies of the thesis should be sent to the committee or external examiner prior to the defense.**
- Shortly after the examination, the Department advises the FGSR of the committee's decision on a Thesis Approval / Program Completion form.
- Within six (6) months of Final Oral examination, the student must submit their thesis for review and approval by the FGSR.

4.6.2. Master of Science (MSc)

The MSc is a research-based master's degree with no residency requirement. The course requirements for the MSc vary by research discipline (Section 5); however, all graduate students must complete ENGG 600 and the Faculty of Engineering Professional Development requirements.

All MSc students must defend the thesis before a panel of three or more academic staff members, including the thesis supervisor.

The time required to complete the MSc program will vary according to the previous training of the student and the nature of the research undertaken. However, two years is normally the minimum time required, with a maximum of four years to complete the program (from the date of first registration).

4.6.3. Final Oral Examination

The Department receives information from the supervisor a minimum of 5 weeks prior to the exam, recommends examining committee members to FGSR using a Notice and Approval of a Master's Final Oral Examining Committee & Examination Date form, notifies examiners of the date, and supplies a copy of the thesis to them.

Shortly after the examination, the Department advises the FGSR of the examining committee's decision, on the Thesis Approval / Program Completion form.

Within six (6) months of examination, the student must submit their thesis for review and approval by the Faculty of Graduate Studies and Research.

4.6.4. Master of Engineering (MEng)

The MEng is a non-thesis, course-based master's degree with no residency requirement. The MEng program can be completed in a minimum of twelve months, up to the maximum time of four years from the date of first registration.

The MEng requires completion of eight graduate courses and a Research Project (900 level), as well as ENGG 600 and the Faculty of Engineering Professional Development requirements. The research project is the work-equivalent of one course (approximately 160 hours of work). The research project is not defended and needs only the approval of the supervisor and department Associate Chair of Graduate Studies.

MEng students must make arrangements with a professor in the proposed project area to act as a supervisor for their research project.

MEng students must be registered in Research Project (900-level) in the term they complete their research project. It is the student's responsibility to submit their research project well in advance of the end of the term to ensure that the project supervisor has enough time to evaluate the report. Research Project (900-level) is restricted to students in course-based master's programs.

5. Course Requirements

The following sections outline the course requirements for each of the degree options and different discipline areas offered in the Department of Civil and Environmental Engineering.

Students must maintain a GPA of at least 2.7 to remain in the MSc and MEng program, or 3.0 in the PhD program.

Students must seek approval from the Department to take courses offered by other departments, and not listed in the program course requirements.

5.1. Construction Engineering and Management

Degree	Course Credits
Master of Engineering	8 courses (4 core - CIVE 601, 602, 603, 608 - plus a minimum of 2 electives from CIVE 605, 606, 607, 654, and any engineering courses numbered higher than 600 with prior approval of the Department to give a total of 8 courses). Plus a research project (CIVE 900).
Master of Science	6 graduate courses (5 core - CIVE 601, 602, 603, 606, 608, plus 1 elective). Plus thesis.
Doctor of Philosophy	9 courses beyond the bachelor's degree (5 core - CIVE 601, 602, 603, 606, 608, plus 4 electives). Plus thesis.

5.2. Environmental Engineering and Environmental Science

Degree	Course Credits
Master of Engineering	8 courses related to the Environmental Engineering discipline (including at least 4 of the following courses: CIVE 526, 620, 622, 623, 624, 628, 657). Plus a research project. All courses must be approved by the student's Environmental Engineering & Science Group Graduate Coordinator.
Master of Science in Environmental Engineering	6 courses (including at least 3 of the following courses: CIVE 526, 620, 622, 623, 624, 628, 657). All courses must be approved by the supervisor. Plus thesis
Master of Science in Environmental Science	6 courses (including at least 3 of the following courses: CIVE 526, 620, 622, 623, 624, 628, 657). All courses must be approved by the supervisor. Plus thesis
Doctor of Philosophy in Environmental Engineering	10 graduate courses beyond the bachelor's degree. At least 3 of the following courses: CIVE 526, 620, 622, 623, 624, 628, 657. Plus thesis
Doctor of Philosophy in Environmental Science	10 graduate courses beyond the bachelor's degree. At least 3 of the following courses: CIVE 526, 620, 622, 623, 624, 628, 657. Plus thesis

5.3. Geoenvironmental Engineering

Degree	Course Credits
Master of Engineering	8 courses (5 core CIVE 680, 681, 682, 683, 695). Students are required to attend all of the laboratory and seminar components of these courses. Plus three electives related to the GeoEnvironmental Engineering discipline. All courses must be approved by the Group Graduate Coordinator. Plus a research project (CIVE 900).
Master of Science	6 courses (5 core CIVE 680, 681, 682, 683, 695). Students are required to attend all of the laboratory and seminar components of these courses. Plus one elective approved by the supervisor. Plus thesis.
Doctor of Philosophy	5 core courses (5 core CIVE 680, 681, 682, 683, 695) plus electives related to the Geo Env Eng discipline as directed by the supervisor and supervisory committee. Students are required to attend all of the laboratory and seminar components of these courses. Students may obtain an exemption for core courses from the course instructor which must be approved by the Department. Plus thesis.

5.4. Geotechnical Engineering

Degree	Course Credits
Master of Engineering	8 courses (7 core CIVE 664, 680, 681, 683, 690, 695, 697). Students are required to attend all of the laboratory and seminar components of these courses. Plus one elective approved by the Group Graduate Coordinator. Plus a research project (CIVE 900).
Master of Science	8 courses (7 core CIVE 664, 680, 681, 683, 690, 695, 697). Students are required to attend all of the laboratory and seminar components of these courses. Plus one elective approved by the supervisor. Plus thesis.
Doctor of Philosophy	10 to 12 courses beyond a bachelor's degree (7 core CIVE 664, 680, 681, 683, 690, 695, 697). Students are required to attend all of the laboratory and seminar components of these courses. Students may obtain an exemption for core courses if they have obtained credit for a comparable course for a previous graduate degree. Plus thesis.

5.5. Geotechnical Engineering (Petroleum Geomechanics Stream)

The Petroleum Geomechanics streams is specifically designed for students entering into a graduate program in Geotechnical Engineering with either a BSc in Petroleum Engineering (for an MSc program) or an MSc in Petroleum Engineering (for a PhD program).

Degree*	Course Credits
Master of Engineering (PG)	8 courses (7 core CIV E 664, 680, 697, 695, 698, 481, 683). Students are required to attend all of the laboratory and seminar components of these courses. Plus one elective approved by the Group Graduate Coordinator. Plus a research project (CIVE 900).
Master of Science (PG)	8 courses (7 core CIV E 664, 680, 697, 695, 698, 481, 683). Students are required to attend all of the laboratory and seminar components of these courses. Plus thesis. Plus one elective approved by the supervisor from the following list: GEOPH 620 (Rock Physics) MINE 612 (Principle of Geostatistics) IPG 510 (Rock Properties, Petrophysics, Well Log Analysis) One of: PETE 630 (Petroleum Reservoir Engineering) PETE 664 (Advanced Drilling Engineering) PETE 650 (Thermal Recovery) PETE 679 (Reservoir Simulator Development)

<p>Doctor of Philosophy (PG)</p>	<p>10 to 12 courses beyond a bachelor’s degree (7 core CIV E 664, 680, 697, 695, 698, 481, 683). Students are required to attend all of the laboratory and seminar components of these courses. Students may obtain an exemption for core courses if they have obtained credit for a comparable course for a previous graduate degree. Plus thesis.</p> <p>Electives to fulfill course requirements can be selected from the following list:</p> <p>GEOPH 620 (Rock Physics)</p> <p>MINE 612 (Principle of Geostatistics)</p> <p>IPG 510 (Rock Properties, Petrophysics, Well Log Analysis)</p> <p>One of: PETE 630 (Petroleum Reservoir Engineering)</p> <p> PETE 664 (Advanced Drilling Engineering)</p> <p> PETE 650 (Thermal Recovery)</p> <p> PETE 679 (Reservoir Simulator Development)</p>
<p>* (PG) denotes Petroleum Geomechanics stream</p>	

5.6. Mining Engineering

Degree	Course Credits
<p>Master of Engineering</p>	<p>8 courses. Plus a research project (MIN E 900).</p> <p>May require more courses when undergraduate background is deficient. To be determined at the start of the program by the Mining Engineering Group Graduate Coordinator.</p>
<p>Master of Science</p>	<p>6 courses. Plus thesis.</p> <p>May require more courses when undergraduate background is deficient. To be determined at the start of the program by the supervisor.</p>
<p>Doctor of Philosophy</p>	<p>Courses determined on a case-by-case basis, and approved by the supervisor and department, depending on student’s background. Plus thesis.</p>

5.7. Petroleum Engineering

Degree	Course Credits
Master of Engineering	<p>8 graduate courses total: minimum 5 PET E (Excluding PET E 709)</p> <p>Plus a research project (PET E 900). 4 core courses required (PET E 630, PET E 631, PET E 664 and either PET E 636 or PET E 649).</p>
Master of Science	<p>6 graduate courses. Plus thesis. 4 core courses required (PET E 630, PET E 631, PET E 664, and either PET E 636 or PET E 649).</p> <p>Students with a non-engineering degree will be required to take 3 undergraduate courses from the following list: (PET E 364, PET E 366, PET E 373 and PET E 471). Course requirements for students holding an engineering degree other than petroleum engineering will be decided upon consultation with the supervisor.</p> <p>MSc candidate must give one mandatory public presentation about their research results prior to the defense.</p>
Doctor of Philosophy	<p>Course requirements are determined on a case-by-case basis depending on the student's background. In general students are required to complete 10 graduate courses beyond a bachelor degree including 4 core courses (PET E 630, PET E 631, PET E 664 and either PET E 636 or PET E 649).</p> <p>Students with a Master degree in petroleum engineering from the U of A are required to take at least 4 additional graduate courses.</p> <p>Students with a Master degree in petroleum engineering from other universities are required to take at least 5 additional graduate courses.</p> <p>Students without a Master degree in petroleum engineering are required to take 10 graduate courses including 4 Petroleum Engineering core courses (PET E 630, PET E 631, PET E 664 and either PET E 636 or PET E 649). A maximum of 2 graduate courses may be exempted by the petroleum group coordinator based on graduate courses taken before entering the PhD program in petroleum engineering and a grade equivalent to A- or higher.</p> <p>A research thesis is required in all cases. PhD candidate must give one mandatory public presentation about their research prior to defense.</p> <p>PhD students may take Special Topics courses during the program, but the Special Topics course cannot be counted as part of the minimum number of courses that should be taken by the PhD students</p>

5.8. Structural Engineering

Degree	Course Credits
Master of Engineering	8 courses (5 core – CIVE660, 661, 665, 670, 672), all from the Structural Engineering program unless approved by the Group Graduate Coordinator. Plus a research project (CivE900).
Master of Science	6 courses (3 core – CIVE 660, 665, 670 or 672), all from the Structural Engineering program. Plus thesis.
Doctor of Philosophy	Course requirements determined on a case-by-case basis depending on the student's background. 12 graduate courses beyond a bachelor's degree and at least 4 beyond a Master's degree (5 core – CIVE660, 661, 664, 665, and either 670, 672 or equivalent from Master's degree), with at least 6 of the courses being taken at the University of Alberta, at least 8 in structural engineering, and at least 1 from a field other than, but related to, structural engineering (requires approval). Plus thesis.

5.9. Transportation Engineering

Degree	Course Credits
Master of Engineering	8 graduate courses consisting of the 2 core transportation courses (CIVE 612, 614) and 4 other transportation courses. The remaining two courses may consist of any combination of transportation courses, other courses in the CEE department, or courses within the Faculty of Engineering which must be pre-approved by the transportation Group Graduate Coordinator. Plus a research project (CIVE900).
Master of Science	6 graduate courses consisting of the 2 core transportation courses (CIVE 612, 614) and two other transportation courses. The remaining two courses may consist of any combination of transportation courses, or other courses outside the transportation group (including the department, Faculty of Engineering, or other faculties which must be pre-approved by the transportation group coordinator). Plus thesis.
Doctor of Philosophy	Course requirements determined on a case-by-case basis depending on the student's background. 10 graduate courses beyond a bachelor's degree and at least 4 beyond a Master's degree (including 2 core transportation courses CIVE 612, 614 or equivalent from Master's degree). Plus thesis.

5.10. Water Resources Engineering

Degree	Course Credits
Master of Engineering	8 courses. Plus a research project (Civ E 900). Water resources engineering (WRE) students must take a minimum of 4 of their 8 courses from the WRE course list.
Master of Science	6 courses. Plus thesis. WRE students must take a minimum of 4 of their 6 courses from the WRE course list.
Doctor of Philosophy	6 courses typically, although requirements are determined on a case by- case basis depending on the student's background. Plus thesis. WRE students must take a minimum of 8 courses beyond the bachelor's degree, with a minimum of 4 courses from the WRE course list.

5.11. Course Requirements for Subdisciplinary Studies with Degree in Civil and Environmental Engineering

5.11.1. Biomechanics Engineering Program

Admission into the MEng and MSc programs in Biomechanics Engineering with Degree in Civil and Environmental Engineering requires an undergraduate BSc degree from Biomedical, Civil, Environmental, Mechanical, or Electrical Engineering from a recognized institution.

Admission in the PhD program in Biomechanics Engineering with Degree in Civil and Environmental Engineering requires an MSc degree from Biomedical, Civil, Environmental, Mechanical, or Electrical Engineering from a recognized institution.

Degree	Course Credits
Master of Engineering	8 courses – required and elective courses will be determined and approved by the Department on a case by case basis, plus research project (CIVE 900).
Master of Science	6 graduate courses - required and elective courses will be determined by the supervisor and approved by the Department on a case by case basis depending on student's background, plus research project approved by the Supervisor, plus thesis.
Doctor of Philosophy	Minimum 10 graduate courses after Bachelor degree - course requirement will be determined by the supervisor and approved by the Department on a case by case basis depending on student's background, plus thesis.

5.11.2. Building Engineering Program

Admission into the MEng and MSc program in Building Engineering with Degree in Civil and Environmental Engineering requires an undergraduate BSc degree from Civil, Environmental, Chemical, Mechanical, Petroleum Engineering, or Architecture from a recognized institution.

Admission in the PhD program in Building Engineering with Degree in Civil and Environmental Engineering requires a MSc degree from Civil, Environmental, Chemical, Mechanical, Petroleum Engineering, or Architecture from a recognized institution.

NOTE: The Buildings Engineering program is undergoing changes. Revisions to course requirements may occur for 2019-2020 academic year. Courses must be approved by the supervisor and the Associate Chair, Graduate Studies.

Degree	Course Credits
Master of Engineering	8 courses (2 core- CIVE 779A, and one of either CIV E 779C, CIV E 709, or CIV E 605, plus 3 electives from the following list: CIV E 601, 602, 603, 606, 608, 654, 665, 674 and 676, and 779D, and 3 more electives from the following list: CIV E 631, ECE 560, ENG M 508, 516, 540, 558, 641, 643, 646, MEC E 539, 569, 639, 643, 667, and MGTC 501, plus a research project (CIVE 900). To be approved by group coordinator and department.
Master of Science	6 courses (2 core- CIV E 779A, and one of either CIV E 779C, CIV E 709, or CIV E 605, plus 3 electives from the following list: CIV E 603, 606, 631,636, 654, 665, 674 and 676, 779D, 779E, ECE 560, ENG M 508, 516, 540, 558, 607, 641, 643, 646, 665, MEC E 539, 563, 569, 639, 643, 663, 667, 668, 671, 673, 692, and MGTC 501, and 1 graduate level course of the student's choosing). To be approved by supervisor and department. Plus thesis.
Doctor of Philosophy	9 courses beyond a bachelor's degree (2 core- CIV E 779A, and one of either CIV E 779C, CIV E 709, or CIV E 605, plus 6 electives from the following list: CIV E 603, 606, 631,636, 654, 665, 674 and 676, 779D, 779E, ECE 560, ENG M 508, 516, 540, 558, 607, 641, 643, 646, 665, MEC E 539, 563, 569, 639, 643, 663, 667, 668, 671, 673, 692, and MGTC 501, and 1 graduate level course of the student's choosing). To be approved by supervisor and department. Plus thesis. Courses taken in a previous Masters level studies from a recognized institution may be accredited, on a case-by-case basis.

5.11.3. Cellulosic NanoMaterials Program

Admission into the MSc program in Cellulosic NanoMaterials with Degree in Civil and Environmental Engineering requires an undergraduate BSc degree from Civil, Environmental, Chemical, Mechanical, Petroleum or Textile Engineering from a recognized institution.

Admission in the PhD program in Cellulosic NanoMaterials with Degree in Civil and Environmental Engineering requires a MSc degree from Civil, Environmental, Chemical, Mechanical, Petroleum or Textile Engineering from a recognized institution.

Degree	Course Credits
Master of Engineering	8 courses – (4- core chosen from the following list) and 4 other approved by group coordinator. Core courses can be selected from: CH E 512, 611, 617; CIV E 622, 631; MEC E 633, 637, 662, 682.
Master of Science	6 courses (4 – core chosen from the following list) and 2 other approved by the Supervisor, plus thesis. Core courses can be selected from: CH E 512, 611, 617; CIV E 622, 631; MEC E 633, 637, 662, 682.
Doctor of Philosophy	Course requirements determined on a case-by-case basis depending on student's background. Normally a minimum of 12 graduate courses beyond a bachelor's degree and at least 4 beyond a Master's degree, with a least 6 of the courses being taken at the University of Alberta (4 of the courses shall be selected from the list above plus 2 others), plus thesis.

5.11.4. Pavement Engineering Program

Admission into the MSc program in Pavement Engineering with Degree in Civil and Environmental Engineering requires an undergraduate BSc degree from Civil, Environmental, Construction, Mechanical, or Petroleum Engineering from a recognized institution.

Admission in the PhD program in Pavement Engineering with Degree in Civil and Environmental Engineering requires an MSc degree from Civil, Environmental, Construction, Mechanical, or Petroleum Engineering from a recognized institution.

Degree	Course Credits
Master of Engineering	8 courses (2 core from the following list: CIVE 601, 602, 619, 664, 680, 681, 799, 690, 695 and 697) and 6 other approved by the Department, plus research project (CIVE 900).
Master of Science	6 courses (2 core from the following list: CIVE 601, 602, 619, 664, 680, 681, 799, 690, 695 and 697) and 4 other approved by the Supervisor. Plus thesis.
Doctor of Philosophy	Course requirements determined on a case-by-case basis depending on the student's background. Minimum 9 graduate courses beyond a bachelor's degree (2 core from the following list: CIVE 601, 602, 619, 664, 680, 681, 799, 690, 695 and 697). Plus thesis. Courses will be approved by supervisor in the first term.

5.11.5. Underground Trenchless Construction Program

Admission into the MSc program in Underground Trenchless Construction with Degree in Civil and Environmental Engineering requires an undergraduate BSc degree from Civil, Environmental, Construction, Mechanical, or Petroleum Engineering from a recognized institution.

Admission in the PhD program in Underground Trenchless Construction with Degree in Civil and Environmental Engineering requires an MSc degree from Civil, Environmental, Construction, Mechanical, or Petroleum Engineering from a recognized institution.

Degree	Course Credits
Master of Engineering	8 courses (3 core- CIVE 609, and two other courses from the following list – CIVE 601, 602, 664, 680, 681, 799, 690, 695 and 697) and 5 other approved by the Department, plus research project (CIVE 900).
Master of Science	6 graduate courses (3 core – CIVE 609, and two other courses from the following list - CIVE 601, 602, 664, 680, 681, 690, 695 and 697) and three other courses approved by the Supervisor. Plus thesis.
Doctor of Philosophy	Course requirements determined on a case-by-case basis by the supervisor or supervisory committee depending on the student's background. Minimum 9 graduate courses beyond a bachelor's degree (3 core – CIVE 601, 602,609, and two other courses from the following list – CIVE 664, 680, 681, 690, 695 and 697). Plus thesis.