

# MASTER OF ENGINEERING IN GEOLOGICAL ENGINEERING

## 2020-2021 GUIDE

The M.Eng. in Geological Engineering provides students with a professional development experience that exposes them to new tools in geotechnical engineering and hydrogeology as used in engineering design, with an emphasis on the need to recognize and manage geological variability, uncertainty and geo-risk. These integrate new developments in field techniques targeting better ground characterization and monitoring of ground responses to engineering activities, with advanced numerical modelling to better understand the importance of underlying processes, mechanisms, and interactions that can affect engineering designs. Emphasis in our courses is often placed on case histories and examples taken from industry experience.

Prior to registering for courses, students should consult with their supervisor. Students interested in the Co-Op option should consult with the Program Director. The minimum requirements for completion of the M.Eng. in Geological Engineering program are as follows:

Core Credits	(3)
Constrained Elective Credits	(9)
Unconstrained Elective Credits	(18)
<b>Total Credits</b>	<b>(30)</b>

The following courses are those required and/or suggested for the M.Eng. program. *Note that some classes are only offered in alternative years.* Those in light gray text are tentatively not scheduled for 2020/21. However, this sometimes changes and students are advised to consult with the UBC Calendar to confirm which courses are being offered or not.

CORE PROGRAM (REQUIRED)		CREDITS	TERM
EOSC 598	M.Eng. Graduating Paper	3	1-2

CORE PROGRAM (MUST TAKE MINIMUM OF 9 CREDITS FROM THIS LIST)		CREDITS	TERM
EOSC 429 <sup>1</sup>	Groundwater Contamination	3	2
EOSC 433 <sup>1</sup>	Geological Engineering Practice I - Rock Engineering	3	1
EOSC 434 <sup>1</sup>	Geological Engineering Practice II - Soil Engineering	3	2
EOSC 526	Mechanics of Natural Deformation	3	2
EOSC 529	Topics in Geohazard Risk Management	3	2
EOSC 531	Exploration Methodology	3	2
EOSC 532 <sup>2</sup>	Field Laboratory in Groundwater Hydrology	3	2
EOSC 533	Advanced Groundwater Hydrology	3	1
EOSC 535	Transport Processes in Porous Media	3	2
EOSC 536 <sup>3</sup>	Advanced Rock Engineering	3	1
EOSC 537	Topics in Groundwater Hydrology	3	1
EOSC 540 <sup>4</sup>	Advanced Groundwater Geochemistry	3	1
EOSC 541	Multi-component Reactive Transport Modelling in Groundwater	3	2
EOSC 546	Advanced Field Methods in Earth Science	3	2
EOSC 547	Tunneling and Underground Engineering	3	2
EOSC 562	Mechanics of Earthquakes and Faulting	3	1
EOSC 595 <sup>5</sup>	Directed Studies	3 to 6	1 or 2

<sup>1</sup>A maximum of 6 credits of 300/400 level courses may be counted towards the overall program requirements.

<sup>2</sup>Co-taught with EOSC 428. Not eligible if already taken during undergraduate/graduate degrees.

<sup>3</sup>Co-taught with EOSC 433. Not eligible if already taken during undergraduate/graduate degrees.

<sup>4</sup>Co-taught with EOSC 430. Not eligible if already taken during undergraduate/graduate degrees.

<sup>5</sup>A maximum of 6 credits of Directed Studies may be counted towards the overall program requirements. However, only 3 credits may be counted towards fulfilling the core program requirement, unless approved by the Director.

TECHNICAL ELECTIVES (OTHER COURSES MAY BE APPROVED ON REQUEST)		CREDITS	TERM
EOSC 510	Data Analysis in Atmospheric, Earth and Ocean Sciences	3	2
EOSC 515 <sup>1</sup>	Graduate Seminar Course	1	1
EOSC 525	Magmatic Ore Deposits	3	2
EOSC 528	Advanced Coal Geology	3	2
EOSC 542	Advanced Volcanology	3	1
EOSC 544	Geodynamics	3	2
EOSC 545	Advanced Models in Mineral Deposits	3	2
CIVL 504	Seismicity and Seismic Design Parameters	2	2
CIVL 505	Seismic Response of Structures	3	2
CIVL 520	Construction Planning and Control	3	1
CIVL 522	Project and Construction Economics	3	2
CIVL 523	Project Management for Engineers	3	2
CIVL 524	Legal Aspects of Project and Construction Management	3	1
CIVL 537	Computational Mechanics I	3	1
CIVL 538	Computational Mechanics II	3	2
CIVL 540	Advanced Coastal Engineering	3	2
CIVL 542	Physical Limnology	3	2
CIVL 547	Estuary Hydraulics	2	3
CIVL 559	Advanced Water and Wastewater Treatment Technology	3	1
CIVL 561	Risk and Remediation in Geo-environment	3	2
CIVL 562	Environmental Data Collection and Analysis	3	2
CIVL 570	Soil Mechanics	2	1
CIVL 572	Contaminated Site Investigation and Management	3	2
CIVL 574	Experimental Soil Mechanics	3	2
CIVL 575	Constitutive Models for Soil	2	2
CIVL 579	Geosynthetics	2	1
CIVL 580	Geotechnical Earthquake Engineering	3	1
CIVL 581	Soil Dynamics for Design Practice	3	2
CIVL 597 <sup>1</sup>	Seminar	1	1 & 2
GEOB 503	Topics in Geomorphology and Hydrology	3	2
GEOB 504	Topics in Climate Studies	3	1
GEOB 505	Permafrost	3	2
GEOB 508	Advanced Seminar in Geomorphology	3	1
MINE 504 <sup>2</sup>	Rock Fragmentation	2	2
MINE 505	Advanced Topics in Rock Engineering	3	1
MINE 506	Mining Methods	3	2
MINE 507 <sup>3</sup>	Block Caving Systems	3	2
MINE 541	Environmental Technologies and Issues in Mining	3	1
MINE 552	Mining Geostatistics	3	2
MINE 554	Mine Economics and Finance	3	2
MINE 555	Mining and Society	3	2
MINE 556	Rock Slope Engineering	2	1
MINE 559	Mineral Resource Development and Canadian Aboriginal People	3	1
MINE 598 <sup>1</sup>	Seminar	2	1 or 2

<sup>1</sup>Seminar courses taken for credit require the approval of the Program Director and are only allowed where a student is 1 or 2 credits short of the degree requirements due to having taken one or two 2-credit courses.

<sup>2</sup>Co-taught with MINE 304. Not eligible if already taken during undergraduate/graduate degrees.

<sup>3</sup>Co-taught with MINE 485. Not eligible if already taken during undergraduate/graduate degrees.

TECHNICAL ELECTIVES - UNDERGRADUATE (MAX. 6 CREDITS ALLOWED AT 300/400 LEVEL)		CREDITS	TERM
EOSC 323	Structural Geology I	3	1
EOSC 328	Field Geology	3	2
EOSC 329	Groundwater Hydrology	3	1
EOSC 330	Principles of Geomorphology	3	1
EOSC 331	Introduction to Mineral Deposits	3	1
EOSC 332	Tectonic Evolution of North America	3	2
EOSC 340	Global Climate Change	3	1 or 2
EOSC 350	Environmental, Geotechnical, and Exploration Geophysics	3	1
EOSC 410	Geoscientific Data Analysis and Empirical Modelling	3	2
EOSC 422	Structural Geology II	3	2
EOSC 424	Advanced Mineral Deposits	3	2
EOSC 430	Aqueous Geochemistry	3	1
EOSC 431	Groundwater Remediation	3	2
EOSC 432	Fossil Fuels	3	2
EOSC 442	Climate Measurement and Analysis	1	1 or 2
EOSC 454	Applied Geophysics	4	2
CIVL 311	Soil Mechanics II	4	1
CIVL 316	Hydrology and Open Channel Flow	4	2
CIVL 407	Environmental Laboratory Analysis	3	1
CIVL 408	Geo-Environmental Engineering	3	2
CIVL 410	Foundation Engineering I	3	1
CIVL 411	Foundation Engineering II	3	2
CIVL 413	Design of Earth Dams and Containment Structures	3	2
CIVL 415	Water Resource Engineering	3	2
CIVL 417	Coastal Engineering	3	2
CIVL 418	Engineering Hydrology	3	1
ENVR 410	Energy, Environment, and Society	3	2
GEOB 305	Introduction to Hydrology	3	2
GEOB 308	Quaternary and Applied Geomorphology	3	2
GEOB 370	Advanced Geographic Information Science	3	1
GEOB 373	Introductory Remote Sensing	3	2
GEOB 405	Fluvial Geomorphology	3	1
GEOB 406	Watershed Geomorphology	3	1
GEOB 408	The Changing Cryosphere	3	1
GEOG 316	Geography of Natural Hazards	3	2
GEOG 319	Environmental Impact Assessment	3	1
IGEN 450	Pipeline Engineering	3	1
IGEN 452	Pipeline Design	3	2
MINE 302	Underground Mining and Design	3	2
MINE 303	Rock Mechanics Fundamentals	4	2
MINE 304	Rock Fragmentation	3	2
MINE 310	Surface Mining and Design	4	1
MINE 403	Rock Mechanics Design	3	2
MINE 404	Mine Management	3	2
MINE 406	Mine Project Valuation and Risk Assessment	3	2
MINE 420	Applied Geostatistics	3	1
MINE 455	Mine Water Management	3	2
MINE 480	Mine Waste Management	3	2
MINE 485	Cave Mining Systems: Design and Planning	3	2
MINE 486	Mining and The Environment	3	2

**ADVICE TO ASSIST YOU WITH REGISTRATION:**

- Please check the UBC Course Calendar for course availability as **some of the listed courses are not offered every year.**
- M.Eng. students are encouraged to take a selection of elective credits that best reflect their professional interests.
- Students must **obtain permission from the host department** for courses they would like to take that are outside EOAS.
- Students may take a **maximum of six (6) credits of 300/400 level Undergraduate Courses.**
- Students may register for a **maximum of six (6) credits** towards **directed studies coursework.**
- Students requiring remedial course work at the 200 level (e.g. EOSC 210 Geology for Engineers) should register to **Audit** these course(s); note that 200 level classes cannot be used for credit towards a graduate level degree.
- All students are individually responsible for ensuring that they meet all requirements for graduation.
- For more information, please visit our website at <http://www.geoeng.ubc.ca/>.