



CIVE 527 - Renovation & Preservation: Infrastructure

Fall 2023

COURSE SCHEDULE

	Day(s)	Time(s)	Location (Building & Room)
LECTURE	M	2:35 PM – 5:25 PM	ENGTR 2110
TUTORIAL	M	10:35 AM – 12:25 PM	ENGTR 0070

INSTRUCTOR INFORMATION

Name: Andrew Boyd
Office hours:
M 1:00 PM - 2:00 PM
[ENGMD 482]
and/or by appointment

E-mail: andrew.boyd@mcgill.ca
Communication plan:
E-mail is the preferred method of communication for the course.
Virtual meetings can be arranged via Zoom.

TA INFORMATION

	Name	Email	Office hours/Communication Plan
TA1	Rami Ghanem	rami.ghanem@mail.mcgill.ca	During tutorial or e-mail or by appointment
TA2	Cang Xiong	cang.xiong@mail.mcgill.ca	During tutorial or e-mail or by appointment

COURSE DESCRIPTION

Maintenance, rehabilitation, renovation and preservation of infrastructure; infrastructure degradation mechanisms; mechanical, chemical and biological degradation; corrosion of steel; condition surveys and evaluation of buildings and bridges; repair and preservation of materials, techniques and strategies; codes and guidelines; case studies, sustainable development; group project.



LEARNING OUTCOMES

By the end of this course, you will be able to:

LO1: Understand the applicability and implementation of various nondestructive testing techniques for evaluating damage and deterioration in concrete and steel infrastructure.

LO2: Understand the applicability and implementation of various repair approaches for damage and deterioration in concrete infrastructure.

LO3: Design an effective inspection or condition assessment approach for evaluating damage and deterioration in concrete infrastructure.

LO4: Design an effective repair approach for damage and deterioration in concrete infrastructure.

INSTRUCTIONAL METHODS

- Instructional approaches: Lectures, tutorials, group project.
- Course format: The in-person lectures will be the main avenue to transfer fundamental knowledge, while tutorials will be used to provide instruction and guidance on the group project.
- Technologies: All lectures and other handouts will be made available in pdf format on myCourses.
- Lectures will not be recorded.

EXPECTATIONS FOR STUDENT PARTICIPATION

- Students are responsible for all information covered in lectures and tutorial sessions, regardless of whether it appears in the lecture notes or other handouts.
- Students are required to participate in the group project.
- Students should check their email and myCourses at least daily for course updates.

COURSE MATERIALS

Textbook/Readings: There is no required text for this course. Lectures, handouts and any other required information will be made available via website posting on myCourses.



COURSE SCHEDULE

Week/ Date	Lesson Topic & Learning Outcomes (LOs)	Reading #
Sep 11	Introduction, Condition Assessment [LO3, L04]	00, 01
Sep 18	Concrete Properties [LO3, L04]	02
Sep 25	Concrete Durability [LO3, L04]	03
Oct 02	Concrete NDT [LO1, L03, L04]	04, 05
Oct 09	No Class – Fall Reading Break	
Oct 16	Concrete NDT [LO1, L03]	06, 07
Oct 23	Test #1 [LO1]	N/A
Oct 30	Concrete NDT [LO1, L03]	08, 09, 10
Nov 06	Metals, Corrosion Repairs [LO1, LO2, L03, L04]	11, 12
Nov 13	Guest Speaker - Mathieu Verronneau International Concrete Repair Institute	N/A
Nov 20	Service Life Prediction, ASR Repairs [LO2, L04]	13, 14
Nov 27	Crack Repair, FRP Repair [LO2, L04]	15, 16
Dec 04	Project Presentations [LO3, L04]	N/A
TBD	Test #2 [LO2]	N/A



EVALUATION METHODS

Assessment	LO(s)	GA(s)*	Due Date
<p><u>Test #1:</u> Length: Three hours, held during class period Scope: Covers materials from first half of course only. Format: Short answer, no calculations.</p> <p style="text-align: right;">Weight: 40%</p>	LO1	KB	Oct 19
<p><u>Test #2:</u> Length: Three hours, held during exam period Scope: Covers materials from second half of course only (i.e. after Test #1). Format: Short answer, no calculations.</p> <p style="text-align: right;">Weight: 40%</p>	LO2	KB	TBD
<p><u>Project:</u> Format: Group project Approach: Instructions given during tutorials Submission: Five individual components plus final presentation</p> <p style="text-align: right;">Weight 20%</p>	LO3 LO4	IN DE CS	Nov 21

***Graduate Attributes**

Submission Policies:

- Late submissions: Mark = 0
- Acceptable circumstances for extensions: Legitimate and relevant physician's certification.



ACCREDITATION INFORMATION

Canadian Engineering Accreditation Board (CEAB) Curriculum Content

CEAB curriculum category content	Number of AU's	Description
Math	0	Mathematics include appropriate elements of linear algebra, differential and integral calculus, differential equations, probability, statistics, numerical analysis, and discrete mathematics.
Natural science	0	Natural science includes elements of physics and chemistry, as well as life sciences and earth sciences. The subjects are intended to impart an understanding of natural phenomena and relationships through the use of analytical and/or experimental techniques.
Complementary studies	0	Complementary studies include the following areas of study to complement the technical content of the curriculum: engineering economics and project management; the impact of technology on society; subject matter that deals with the arts, humanities and social sciences; management; oral and written communications; health and safety; professionalism, ethics, equity and law; and sustainable development and environmental stewardship.
Engineering science	34.1	Engineering science involves the application of mathematics and natural science to practical problems. They may involve the development of mathematical or numerical techniques, modeling, simulation, and experimental procedures. Such subjects include, among others, applied aspects of strength of materials, fluid mechanics, thermodynamics, electrical and electronic circuits, soil mechanics, automatic control, aerodynamics, transport phenomena, elements of materials science, geoscience, computer science, and environmental science.
Engineering design	11.4	Engineering design integrates mathematics, natural sciences, engineering sciences, and complementary studies in order to develop elements, systems, and processes to meet specific needs. It is a creative, iterative, and open-ended process, subject to constraints which may be governed by standards or legislation to varying degrees depending upon the discipline. These constraints may also relate to economic, health, safety, environmental, societal or other interdisciplinary factors.

Accreditation units (AU's) are defined on an hourly basis for an activity which is granted academic credit and for which the associated number of hours corresponds to the actual contact time: one hour of lecture (corresponding to 50 minutes of activity) = 1 AU; one hour of laboratory or scheduled tutorial = 0.5 AU. Classes of other than the nominal 50-minute duration are treated proportionally. In assessing the time assigned to determine the AU's of various components of the curriculum, the actual instruction time exclusive of final examinations is used.



Graduate Attributes

This course contributes to the acquisition of graduate attributes as follows:

Graduate attribute	KB	PA	IN	DE	ET	IT	CS	PR	IE	EE	EP	LL
Level descriptor	A		A	D			D					

I = Introduced; D = Developed; A = Applied

KB - Knowledge Base for Engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.

PA - Problem Analysis: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions.

IN - Investigation: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions.

DE - Design: An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, economic, environmental, cultural and societal considerations.

ET - Use of Engineering Tools: An ability to create, select, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.

IT - Individual and Team Work: An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.

CS - Communication Skills: An ability to communicate complex engineering concepts within the profession and with society at large. Such abilities include reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.

PR - Professionalism: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.

IE - Impact of Engineering on Society and the Environment: An ability to analyse social and environmental aspects of engineering activities. Such abilities include an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society; the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.

EE - Ethics and Equity: An ability to apply professional ethics, accountability, and equity.

EP - Economics and Project Management: An ability to appropriately incorporate economics and business practices including project, risk and change management into the practice of engineering, and to understand their limitations.

LL - Life-Long Learning: An ability to identify and to address their own educational needs in a changing world, sufficiently to maintain their competence and contribute to the advancement of knowledge.



Mapping Table

Learning Outcome		CEAB Curriculum Content Category AUs	Graduate Attribute Indicators	Evaluations
1	NDT Techniques	Engineering Science: 16.0	KB.8	Test #1
2	Repair Approaches	Engineering Science: 12.0	KB.8	Test #2
3	Condition Assessment	Engineering Science: 6.1 Engineering Design: 2.4	IN.1, IN.2, IN.3 DE.3 CS.3	Project
4	Repair Plan	Engineering Design: 9.0	DE.3 CS.3	Project

WELLNESS RESOURCES FOR ENGINEERING STUDENTS

- [Engineering Faculty Local Wellness Advisor \(LWA\)](#)
 - LWA booking page: www.mcgill.ca/lwa
- **keep.meSAFE:** free, unlimited, 24/7 access to mental health counselling service, offered to all McGill students. Download the MySSP app for [Apple iOS](#) or [Android](#) or call 1.844.451.9700 (for students in Canada and US). For Study Abroad Students call 1.416.380.6578. Learn more on [SSMU's website](#).
- [Contact](#) the [Student Wellness Hub](#): range of health services to support student's physical and mental health
- **MESC** [myCourses page](#): Wellness resources updated weekly



MCGILL POLICY STATEMENTS

Language of Submission

“In accord with McGill University’s [Charter of Students’ Rights](#), students in this course have the right to submit in English or in French any written work that is to be graded. This does not apply to courses in which acquiring proficiency in a language is one of the objectives.” (Approved by Senate on 21 January 2009)

« Conformément à [la Charte des droits de l’étudiant](#) de l’Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté, sauf dans le cas des cours dont l’un des objets est la maîtrise d’une langue. »

Academic Integrity

“McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the [Code of Student Conduct and Disciplinary Procedures](#)” (Approved by Senate on 29 January 2003)

« L’université McGill attache une haute importance à l’honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l’on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l’étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le [guide pour l’honnêteté académique de McGill](#)). »

University Assessment Policy: “The [University Student Assessment Policy](#) exists to ensure fair and equitable academic assessment for all students and to protect students from excessive workloads. All students and instructors are encouraged to review this Policy, which addresses multiple aspects and methods of student assessment, e.g. the timing of evaluation due dates and weighting of final examinations.”

Text Matching Software: “Work submitted for evaluation as part of this course may be checked with text matching software within myCourses.”

Course Materials: “© Instructor-generated course materials (e.g., handouts, notes, summaries, exam questions) are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor. Note that infringements of [copyright](#) can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.”



Respectful Communication: “The University is committed to maintaining teaching and learning spaces that are respectful and inclusive for all. To this end, offensive, violent, or harmful language may be cause for disciplinary action.”

Learning Environment: “As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the [Office for Students with Disabilities](#), 514-398-6009.”

Mental Health Support: “Many students may face mental health challenges that can impact not only their academic success but also their ability to thrive in our campus community. Please reach out for support when you need it; many [resources](#) are available on-campus, off-campus and online.”

Support Services: “If you have difficulty affording food or if you lack a safe and stable place to live and believe that this may affect your performance in this course, I encourage you to contact the [Dean of Students](#) who can connect you with support services. If you feel comfortable doing so, please let me know as well, so we can discuss how I can best support your learning.” [adapted from [Goldrick-Rab, 2017](#)]

End-of-Course Evaluations: “[End-of-course evaluations](#) are one of the ways that McGill works towards maintaining and improving the quality of courses and the student’s learning experience. You will be notified by e-mail when the evaluations are available. Please note that a minimum number of responses must be received for results to be available to students.”

Extraordinary Circumstances: “In the event of extraordinary circumstances beyond the University’s control, the content and/or evaluation scheme in this course is subject to change.”

Academic Issues: Additional policies governing academic issues which affect students can be found in the [McGill Charter of Students’ Rights](#).

Sustainability: McGill has policies on sustainability, paper use, and other initiatives to promote a culture of sustainability at McGill. (See the [Office of Sustainability](#).)