

COURSE INFORMATION

Course Name: Advanced Construction Engineering and Management

Course Code: CIVENG 4CM4

Session Offered: Fall 2022

Calendar Description: Fundamental concepts of advanced tools, techniques, and technologies in construction engineering and management. Topics include; advanced scheduling techniques; computer-aided project management in scheduling; automation and telematics in construction equipment; construction site work and earthwork operations; construction safety; and other advanced technological trends in construction.

Instructor(s): Saiedeh Razavi

Email: razavi@mcmaster.ca

Instructor's Office Hours/Contact: By Appointment

Teaching Assistant(s):

Sahel Eskandar

Email: eskandah@mcmaster.ca

Renuka Mandlik

Email: mandlikr@mcmaster.ca

TA's Office Hours/Contact: By Appointment

Class Schedule Day(s):	Time:	Location:
CIVENG 4CM4-C01: Mo,We,Th	5:30PM - 6:20PM	BSB B135
CIVENG 4CM4-T01: Mo	12:30PM - 2:20PM	PGCLL 124

1. COURSE OBJECTIVES

This course builds on the construction management knowledge developed in CIV ENG 3RR3 (or the equivalent pre-requisite) and combines it with knowledge of innovative technologies, tools, and techniques in modern construction. With new technologies and opportunities, construction managers and executives can make choices that impact the safety, productivity, and sustainability of construction projects.

Therefore, this course aims at introducing the students to advanced technological trends in construction and the opportunities that can help this industry to be safer and more sustainable. Success in achieving the objectives of this course heavily relies on the students' engagement in active learning and self-learning opportunities.

2. COURSE SPECIFIC POLICIES

This is an in-person class, and attendance is expected.

All course-related announcements will be posted on Avenue to learn course webpage.

Unless otherwise specified, all quizzes are due by Mondays at 5:30 PM.

Unless otherwise specified, all software-related assignments have a deadline of one week from the time they are announced.

All course deliverables should be submitted on the course page on Avenue to Learn.

No late assignment or quiz will be accepted. For accommodation of missed work, students can use their MSAF or contact the Faculty of Engineering's Undergraduate Advisor at the Dean's office.

Marks associated with any MSAF accommodated missed work will be distributed on everything else in the course.

This course has two group projects (i.e. the course module, and the modelling project). Groups are self-selecting and self-governing with a firm deadline for group formation (Sep. 19th). Teams are expected to prepare and submit a "Group Contract". Those who will not join any group by the deadline will have to carry out the same projects individually.

Term projects' presentations will be randomly scheduled.

Other projects' specific policies will be provided in the project descriptions.

In-class demonstrations of software tools will be presented. They are intended to provide students with preliminary introductions to the tools and give them a "jump start", not to fully train students on the use of tools. Students will require self-study before they will be able to work effectively with the tools.

Recommended Books (optional)

1. Eastman, Ch., Teicholz, P., Sacks, R., Liston, K., 2018, BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Architects, Engineers, Contractors, and fabricators 3rd, Edition, Wiley & Sons, Inc.
2. D. W. Halpin, 2011, Construction Management, 4th Edition,
3. Hegazy, T., 2002, Computer-Based Construction Project Management, Prentice Hall
4. Nunnally, S.W., 2011, Construction Methods and Management, 8th Edition, Prentice Hall.
5. Peurifoy, R., Schexnayder, C.J., Shapira, A., Schmitt, R., 2010, Construction Planning, Equipment, and Methods, 8th Edition, McGrawHill.

3. SCHEDULE (tentative)

WEEK 1	Wednesday: Introduction to the Course Thursday: A Review of Construction Project Management and CPM	First Lecture on Sep. 7 th No Tutorials in Week 1
WEEK 2	Monday: Role of Technology in Construction Wednesday: Introduction to BIM Thursday: BIM: IFC, LOD, Maturity Levels	

WEEK 3	Monday: Autodesk Revit Wednesday: Resource-Constrained Scheduling & Recourse Levelling Thursday: Recourse Allocation	Sep. 19th , 8 PM, Group Signing Deadline
WEEK 4	Monday: Autodesk Revit Wednesday: Time Cost Trade-off Thursday: Time Cost Trade-off	
WEEK 5	Monday: Autodesk Revit Wednesday: Linear Scheduling Thursday: Linear Scheduling	
WEEK 6 (after the mid-term recess)	Monday: Autodesk Revit Wednesday: Course Module Presentations and discussions Thursday: Linear Scheduling, Uncertainties, Risks, & PERT	Oct. 18th , 8 PM: Course Module (Courseware & presentation) Deadline
WEEK 7	Monday: Autodesk Revit Wednesday: Course Module Presentations and Discussions Thursday: Civil and Site Construction Management & Engineering	
WEEK 8	Monday: Estimating using Revit Wednesday: Course Module Presentations and Discussions Thursday: Earthmoving materials, operations, and technologies	
WEEK 9	Monday: Integrated Project Delivery – Navisworks Wednesday: Course Module Presentations and Discussions Thursday: Site operations and technologies	
WEEK 10	Monday: Integrated Project Delivery – Navisworks Wednesday: Course Module Presentations and Discussions Thursday: Construction Health and Safety	
WEEK 11	Monday: Integrated Project Delivery – Navisworks Wednesday & Thursday: Course Modules Presentations and Discussions	Nov. 25th , 8 PM, Modeling Project Deadline
WEEK 12	Modelling Project Presentations	
WEEK 13	Modelling Project Presentations	
4. ASSESSMENT OF LEARNING		WEIGHT %
Assignments and quizzes		50%
Group Project 1 – Course Module		25%
Group Project 2 – Modeling Project		25%
5. LEARNING OUTCOMES		
<ul style="list-style-type: none"> • Learning: <ul style="list-style-type: none"> ✓ Through the term projects and the course assignments, students will be able to critically evaluate and apply knowledge, methods and skills procured through self-directed and self-identified sources, including those that lie outside the nominal course curriculum. Students are encouraged to consult with construction practitioners to gain a better understanding and to fulfill the requirements of the projects (CEAB Indicator 12.1). • Investigation: 		

- ✓ Students will be capable of selecting appropriate construction scheduling models and methods and identifying assumptions and constraints in the resources (CEAB Indicator 3.2).
- ✓ Students will be able to estimate outcomes and uncertainties in terms of project duration and cost and determine appropriate equipment or data type to collect (CEAB Indicator 3.3).

- **Team Work:**

- ✓ Through active participation in the course and also term group projects, students will be able to develop and implement processes and methodologies to manage the effectiveness of a team both in terms of the quality of the work produced by the team as well as the interpersonal relationships within the team. This is an important skill that is essential for the success of students in their future careers. (CEAB Indicator 6.2).

6. LABORATORY SAFETY

The Faculty of Engineering is committed to McMaster University's Workplace and Environmental Health and Safety Policy which states: "Students are required by University policy to comply with all University health, safety and environmental programs and policies". It is your responsibility to understand McMaster University's Risk Management system, which is supported by a collection of Risk Management Manuals (RMMs) that contain programs and policies in support of the Risk Management System. The RMMs are available from https://hr.mcmaster.ca/employees/health_safety_well-being/our-safety/risk-management-manuals-rmms/.

It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for specific experiments (see course lab manuals) and the laboratory equipment https://www.eng.mcmaster.ca/sites/default/files/civil_lab_health_and_safety_manual.pdf

Additionally, McMaster University's workplace health and safety guidance related to COVID-19 must always be followed (available from <https://hr.mcmaster.ca/resources/covid19/workplace-health-and-safety-guidance-during-covid-19/>).

7. COMMUNICATIONS

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their "@mcmaster.ca" alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

8. POLICIES

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. **It is your responsibility to understand what constitutes academic dishonesty.**

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the [Academic Integrity Policy](https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/), located at <https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/>.

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

AUTHENTICITY / PLAGIARISM DETECTION

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

ONLINE PROCTORING

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the [Code of Student Rights & Responsibilities](#) (the “Code”). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online.**

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students’ access to these platforms.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact [Student Accessibility Services](#) (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University’s [Academic Accommodation of Students with Disabilities](#) policy.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK

[McMaster Student Absence Form \(MSAF\)](#): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar “Requests for Relief for Missed Academic Term Work”.

Students may request relief for missed work in two ways using the McMaster Student Absence Form (MSAF), Type A and Type B. In both cases, an email notification is sent to the instructor (or designate), and students must follow up with the instructor promptly after the absence (by email, Avenue to Learn, or other communication pathway indicated by the instructor for the course) for the relief to be provided, and while instructors are expected to provide relief, instructors determine the relief that is appropriate for the work and the course.

Type A MSAF is used directly by students through the Mosaic reporting tool for assignments worth <25% and for absences lasting 3 days or fewer. The Type A pathway can only be used once, whether for a first request or subsequent to another Type B request. No documentation is required.

Type B MSAF requires that the student meets with an academic advisor to complete the MSAF request through the Mosaic reporting tool. Type B is used for assignments worth 25% or more and for absences lasting more than three days. Type B will also be used if this is the second or subsequent reported absence. This pathway provides for students missing a significant amount of work to benefit from advising as students are required to seek advice before a Type B MSAF is submitted. No documentation is required for the fall 2022 term and the role of the academic advisor is not to approve the request but to advise the student on the potential impact on their academic success.

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the [RISO](#) policy. Students should submit their request to their Faculty Office **normally within 10 working days** of the beginning of term in which they anticipate a need for accommodation

or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

PROTECTION OF PRIVACY ACT (FIPPA)

The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades, and all other personal information at all times. For example, the submission and return of assignments and the posting of grades must be done in a manner that ensures confidentiality – see <http://www.mcmaster.ca/univsec/fippa/fippa.cfm>.

ANTI-DISCRIMINATION

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer, or the Human Rights Consultant, as soon as possible.

https://www.mcmaster.ca/policy/General/HR/Discrimination_and_Harassment.pdf

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

9. MCMASTER GRADING SCALE

Grade	Equivalent Grade Point	Equivalent Percentages
A+	12	90-100
A	11	85-89
A-	10	80-84
B+	9	77-79
B	8	73-76
B-	7	70-72
C+	6	67-69
C	5	63-66
C-	4	60-62
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	0-49