COURSE INFORMATION

Course Name: ADVANCED CONSTRUCTION ENGINEERING AND MANAGEMENT

Course Code: CIV ENG 4CM4

Session Offered: Fall 2021

Calendar Description: This course covers 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 earth work operations; construction safety; and other advanced technological trends in construction. Guest lectures, computer labs, and/or audiovisual materials will supplement the materials of the course.

Instructor(s):

Sahel Eskandar   **Email:** eskandah@mcmaster.ca

Instructor's Office Hours/Contact: Fridays 1PM-2PM /Microsoft Teams

Class Schedule Day(s):	Time:	Location:
CIVENG 4CM4-C01	MoWe 11:30AM - 12:20PM	Microsoft Teams
	Fr 2:30PM - 3:20PM	
CIVENG 4CM4-T01	Mo 2:30PM - 4:20PM	BSB 241 / BSB 249

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 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

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

Unless otherwise specified, all quizzes have a deadline in 24 hours from the start of the class time in which the quiz is announced.

Unless otherwise specified, all software-related assignments have a deadline in 1 week from the start of the class time in which the assignment is announced.

All course deliverables should be submitted on Avenue to learn course webpage.

No late assignment or quiz will be accepted.

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. course module, and modeling project). Groups of 3-4 members are self-selecting and self-governing with a firm deadline for group formation (TBA on Avenue). 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. Presentations can be pre-recorded and presented synchronously by a subset of the group members.

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 Friday: Role of Technology in Construction	First Lecture on Sep. 8th No Tutorials in Week 1
WEEK 2	Monday: Introduction to BIM Wednesday: Introduction to BIM Friday: Introduction to Autodesk Revit	
WEEK 3	Monday: Resource-Constrained Scheduling & Resource Leveling Wednesday: Microsoft Project Friday: Autodesk Revit	
WEEK 4	Monday: Resource Allocation Wednesday: Uncertainties, Risks, PERT Friday: Autodesk Revit	
WEEK 5	Monday: Time-Cost Trade-off Wednesday: Line of Balance Friday: Autodesk Revit	
WEEK 6	Monday: Line of Balance Wednesday: Line of Balance Friday: Autodesk Revit	Course Modules (Courseware & presentation) Due on Oct. 20th, 8PM
WEEK 7 (After Mid-term Recess)	Monday: Construction Health and Safety Wednesday: Couse Modules by Student Groups Friday: Autodesk Revit	

WEEK 8	Monday: Civil and Site Construction Management & Engineering Wednesday: Couse Modules by Student Groups Friday: Integrated Project Delivery using Navisworks	
WEEK 9	Monday: Earthmoving materials, operations, and technologies Wednesday: Couse Modules by Student Groups Friday: Integrated Project Delivery using Navisworks	
WEEK 10	Monday: Site operations and technologies Wednesday: Couse Modules by Student Groups Friday: Couse Modules by Student Groups	
WEEK 11	Monday: Site operations and technologies Wednesday: Couse Modules by Student Groups Friday: Couse Modules by Student Groups	Modeling Project Due on Nov. 26th, 8PM
WEEK 12	Modeling Project Presentations	
WEEK 13	Modeling Project Presentations	Last lecture on Dec. 8th

4. ASSESSMENT OF LEARNING	WEIGHT %
Assignments and quizzes	50%
Group Project 1 – Course Module	25%
Group Project 2 – Modeling Project	25%

5. LEARNING OUTCOMES

· Learning:
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 model and methods and identify 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).

· Teamwork:
Through active participation in the course and 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 inter-personal 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. 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.

7. 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*, 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".

The McMaster Student Absence Form is a self-reporting tool for **Undergraduate Students** to report absences that last up to 5 days and provides the ability to request accommodation for any missed academic work. Please note, this tool cannot be used during any final examination period. You may submit a maximum of 1 Academic Work Missed requests per term. It is **your** responsibility to follow up with your Instructor immediately regarding the nature of the accommodation. If you are absent more than 5 days or exceed 1 request per term you **must** visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation. This form should be filled out immediately when you are about to return to class after your absence.

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
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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.

8. 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