McMaster University | Civil Engineering

2026-27 COURSE OUTLINE

COURSE INFORMATION

Course Name: Surveying and Measurement: Transportation and Construction

Course Code: CIVENG 2A03

Session Offered: Fall

Calendar Description: 2026

Instructor(s): Jonathan Sukhu

Email: sukhuj@mcmaster.ca

Office Hours/Contact: Reach out via Teams to schedule during the week, or 6:20-7:00 PM on Thursdays in HH302 (immediately after class)

Class Schedule Day(s): 62

Time / Location:

Lecture: Thursday, 4:30 – 6:20 pm, HH302

Lab: L01 – Friday, 8:30 – 11:20 am, ADL (Applied Dynamics Laboratory)

L02 – Friday, 2:30 – 5:20 pm, ADL

L03 – Monday, 1:30 pm – 4:20 pm, ADL

Tutorial: T01 – Wednesday, 2:30 – 4:20 pm, ABB 136

T02 – Wednesday, 2:30 – 4:20 pm, T13 125

1. COURSE OBJECTIVES

This course covers the basic principles of surveying, the principles of distances, elevation and angles; basic error theory in measurement and calculations; traverse calculations; and route surveys, including horizontal and vertical curves, earthwork, and GPS surveying. The lectures will cover the theory underlying construction surveying and experimental measurements, with selected concepts illustrated through lab and tutorial sessions

2. COURSE SPECIFIC POLICIES

1. Class Meeting: The format of this class will be in-person. The lecture will be used to present theoretical/design background and some illustrative examples. Please note that there is not any required textbook. The course notes will contain all necessary information. All lectures and the other course materials will be uploaded to Avenue to Learn (A2L). In case of the absence of the instructor (due to conferences), the lectures will be offered online through MS Teams at the scheduled times.
2. Tutorial Sessions: Two sessions are provided each week to demonstrate additional examples, provide assistance with problem-solving, and for special presentations. Additional content can be discussed during these sessions upon request via email.
3. Lab Sessions: All lab sessions will be in-person. Lab instructions (task descriptions and pre-recorded videos) will be assigned before the lab sessions. The students are required to review the instructions. The students will also be assigned to different groups to complete the lab experiments at the scheduled sessions and prepare the lab reports.

4. Attendance/Participation: **Attendance for lectures is required**. Please join the lectures at the scheduled time and attend the full class period (unless specific circumstances require early release). In-class quizzes will be assigned during the lecture sessions, counting towards final grade. The students are required to follow the lectures to complete the in-class quizzes.
5. Grade Disputes: All grades are considered final and unamendable on the date in which the final grades are posted. A student can file an appeal within 10 working days of this date if the instructor has failed to implement a previously announced grade policy, awarded a grade in what has been determined to be an arbitrary or capricious manner, or violated the University rule or policy. The student should first meet with the instructor to resolve the issue prior to beginning the appeal process.
6. Avenue to Learn: All course materials will be uploaded to Avenue for the students to review. Please check the announcement on Avenue for all course updates.

Suggested textbooks and software:

[1] Anderson. J.M., Surveying: Theory and Practice, 7th Edition, 1998.

[2] Ghiliani, C.D. and Wolf, P.R., Elementary Surveying: An introduction to Geomatics, Person, 14th Edition, 2015.

[3] Kavanagh, B.F., Surveying: Principles and Applications, Prentice-Hall, any edition from 5-10.

[4] AutoCAD 2020, free for students at Autodesk Educational Website: https://www.autodesk.com/education/support.

3. SCHEDULE (TENATIVE)

Week No. (DD-MM-YY)	*Lecture Schedule (HH 302)*	*Tutorial Schedule*	*Lab Schedule (ADL)*	*Assessments Due*
Week 1 (10-09-26)	Course Introduction, Introduction to Surveying and History	-	-	Introductory Bio **In-Class Quiz (Weekly, every class)**
Week 2 (17-09-26)	Measurement Basics: Accuracy and Types of Error	Lab Introduction: Requirements and Safety	Lab 1: Estimation and Taping	Homework 1
Week 3 (24-09-26)	Horizontal Distance Measurement: Taping, Odometers and Error Correction	AutoCAD Session I	-	Homework 2
Week 4 (01-10-26)	Vertical Distance Measurement: Levelling	AutoCAD Session II	Lab 2: Levelling Lab 3: Traverse See Lab Schedule on A2L; lab date is dependent on group number	Homework 3 Lab 1
Week 5 (08-10-26)	Advanced Measurement: Angling and Directions	Homework Review (HW# 1 thru 4) / Midterm Q&A		Homework 4
Reading Week (15-10-26)	*Reading Week: No Classes, Labs, Tutorials*			
Week 6 (22-10-26)	Advanced Measurement: Traverse Introduction, Layout Curves and Traverse Computation	**Midterm: WEDNESDAY OCTOBER 21, 2:30 - 4:30 PM**	-	Mid-term Feedback Lab 2 / 3
Week 7 (29-10-26)	Topography: Triangulation and Electronic Distance Measurement (EDM)	Midterm Review	Lab 4: Topographical Survey with Total Station Lab 5: Horizontal Curve with GPS	Homework 5 Lab 2 / 3
Week 8 (05-11-26)	Traverse Computation: Area of Land, Omitted Measurements, and Irregular Boundaries	AutoCAD Session III	See Lab Schedule on A2L; lab date is dependent on group number	Homework 6
Week 9 (13-11-26)	Route Surveying: Horizontal Curves, Curve Calculation, Cross-Section, and Volume Calculations	Homework Review (HW# 5, 6)	-	Lab 4 / 5
Week 10 (20-11-26)		None	-	Homework 7 Lab 4 / 5
Week 11 (27-11-26)	Route Surveying: Compound Curves, Intersections, Vertical Curves, and Earthworks	TBD	-	Homework 8
Week 12 (03-12-26)		Homework Review (HW# 7, 8)	-	
Week 13 (10-12-26)	**Final Exam Review, Final Exam Date TBD**		-	End-of-Term Feedback

4. ASSESSMENT OF LEARNING	WEIGHT %
Introductory Post / Bio, Mid-Term and End-of-Term Feedback	2%
Homework	10%
Midterm Exam	25%
Lab Practices	16%
Weekly In-Class Quizzes	12%
Final Exam	35%

5. LEARNING OUTCOMES

An ability to complete a topographic survey using state-of-the-art equipment and develop a map of the area surveyed using state-of-the-art mapping software
Linkage to CEAB graduate attribute(s) : 3.3, 5.1 and 5.2

An ability to quantify the error from a field survey, whether a surveying a closed traverse or an elevation survey.
Linkage to CEAB graduate attribute(s): 3.3 and 5.1

An ability to assess which points are appropriate to survey for well-defined topographic mapping.
Linkage to CEAB graduate attribute(s): 3.3

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/).

The safety requirements for ADL are listed below. Students not abiding by these safety requirements will be given one warning. Second offences will result in the student being asked to vacate the laboratory and receiving a grade of zero for that particular lab.

- Hard hats, and safety glasses must be worn at all times. Green patch safety boots are optional, such that students supply their own safety boots. Hard hats and safety-glasses are available in the lab. Prescription eye-glasses are only considered as safety glasses if they have side shields.
- Maintain a safe distance from the universal tester while the sample is being loaded.

• No one will create a situation that could compromise or jeopardize the safety of themselves or anyone else in the lab. Obey all instructions given to you by the Teaching Assistant and/or lab technical staff.
• No running is allowed

During the outdoor Surveying experiments:
• Watch for vehicular traffic
• Do not touch parked vehicles
• Carry surveying instruments in their case, by the handle
• Do not carry more than you can handle
• Total Stations measure distances by firing a low power infra-red laser into a reflector and back to the instrument. Although the laser is not powerful enough to cause damage, do not fire the laser into anyone's eyes
• Surveying Instruments are expensive - be careful
• The lab is held outside in all weather conditions - dress accordingly
• The lab will be postponed in the event of lightning.
• For labs being done in the area of the helipad: If a helicopter is landing or taking off from the helipad you must place the instruments and tools on the ground and move directly away from the helipad. No one should be within 100m of the helipad while the helicopter rotors are turning. The down wash from the helicopter can throw debris a long distance. Once the rotors have stopped turning or the helicopter has left the area, you may return to continue the lab.

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*, 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.

USE OF ARTIFICAL INTELLIGENCE (AI)

In June 2023 McMaster launched an initial set of Provisional Guidelines on the Use of Generative AI in Teaching and Learning. These Provisional Guidelines were updated further in August 2024 and then used throughout the academic year. After a further year of teaching and learning with generative AI, these Provisional Guidelines require some revision. These revisions were informed by feedback from faculty, students and staff and were written and endorsed by the Expert Panel on AI in Teaching and Learning and the AI Advisory Committee.

They are intended to guide both educators and students in understanding and interacting with generative AI in teaching and learning contexts. Staff may wish to consult the Provisional Guidelines on the Use of Generative AI in Operational Excellence.

Students may use generative AI in this course in accordance with the guidelines outlined for each assessment, and so long as the use of generative AI is referenced and cited following citation instructions given in the syllabus. Use of generative AI outside assessment guidelines or without citation will constitute academic dishonesty. It is the student's responsibility to be clear on the limitations for use for each assessment and to be clear on the expectations for citation and reference and to do so appropriately.

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, 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 an 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 request 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.

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