Department of Civil and Environmental Engineering, Carleton University

CIVE 2004A GIS, Surveying, CAD, BIM

Fall 2023

Course Information, Policies and Outline

1. Course Instructor

Dr. Kamal Hossain, PhD, PEng
Associate Professor, Department of Civil and Environmental Engineering
Office: ME-3370
Email: kamal.hossain@carleton.ca

2. Teaching Assistants

Note: Since we have many labs and requirements in each lab and many TAs, things can be confusing, so for lab related questions (if any confusing item), email your question to TA TBD. TBD will serve as a one stop solution. If you still have any questions, then please email to Dr. Hossain.

Lab Section	Date and Time	Format	Section In-Charge	TA Contact
A1	Tue 8:35 am – 11:25 am	In-Person	TBD	
A2	Wed 11:35 am – 2:25 pm	In-Person	TBD	
A3	Thr 8:35 am – 11:25 pm	In-Person		
Support in other course/lab related activities			TBD	

3. Technical and Lab Equipment Support

Mr. Stephen Vickers, Room: Minto 2082, Email: stephen.vickers@carleton.ca Phone: 520-2600x3278

4. Office Hour of Dr. Hossain

Dedicated office time for individual meeting with respect to theoretical class is from 11:00 am – 12:00 pm on TBD. My current plan is that this will be online. A zoom link will be available for this meeting. In addition, I will follow a near open-door policy for this course as I am available most weekdays this semester. If you can not join me in the office hour but want to discuss difficult concepts or any concerns related to this course, please send me a quick email to check my availability. I will reply to your email at the soonest regarding when we can meet. In general, I am available from 9:00 am to 5:00 pm.

5. Course Website and Communication

Carleton D2L will be used for posting some of the course materials and discussions. You are required to **frequently** check the website for updates. You are also required to check your Carleton email account/D2L for e-mails sent to you related to this course.

6. Course Description and Schedule

Introduction: Surveying the existing built and natural environment is the basis for the design of Civil Engineering, which requires understanding of the location of features in three-dimensional space in order to determine their location, orientation, elevation, size and other geometric properties for other points, lines, planes and surfaces defining the elements, components and assemblies that define the Civil works under consideration, such as building structures and foundations, dams, bridges, roads, airports, urban sub-divisions, etc. On a most basic and fundamental level, this requires the measurement of distances, horizontal

and vertical, and angles (also horizontal and vertical) used to determine or calculate basic geometric properties of the basic components and assemblies. Surveying is the art and science of determining the position of points on, below or above the surface of the Earth. It is a science because it uses the basic scientific principles of Mathematics, Physics and Chemistry to assess the conditions under which measurements are taken and it is an art because it relies on established and well-known practices in order to minimize the errors inherent in all measurement operations.

Course objectives: This is a junior course usually taught in the first or second year of a Civil Engineering program. It requires only a basic level of knowledge of trigonometry and algebra and drafting as well as some ability to measure distances and angles. The course is intended to develop student's skills in surveying and graphically representing the existing and future built environment.

Some of the measurements will require the development of basic skills in the use of conventional and traditional tools such as field notes, measuring tapes for triangulation. Furthermore, parts of the course will expose the students to the use and application of digital technologies including total stations, Computer-Aided Drawing, global positioning and geographic information systems. The course requires students to be prepared to carry out analytical calculations, draw and takes notes in the classroom and fieldwork outdoors, sometimes under adverse weather conditions. Adequate clothing and footwear are required for all outdoor exercises. Basic drafting equipment and hand-held calculator are required for classroom lectures and exercises.

Course meeting location and schedule: For class time and location, please visit university website.

7. Course Materials

Text Book: Elementary Surveying: An Introduction to Geomatics. Charles D. Ghilani. 15th Edition. Pearson Inc.

Other References:

- Lecture slides/notes

8. Major Theory Topics

- Introduction to Survey Engineering, Geomatics and Measurements (Ch 1, 2)
- Theories of Errors in Observations (Ch 3)
- Leveling: Theory, Methods and Equipment, Field Procedures and Computations (Ch 4, 5)
- Distance Measurements: Methods, Distance Measurement by Taping and EDM (Ch 6)
- Concepts of Angles, Azimuths and Bearings (Ch 7)
- An Overview of Total Station Instruments (Ch 8)
- An Overview of Traversing and Traverse Computations (Ch 9, 10)
- Adjustment of Measurements by Least Square Methods (Ch 16)
- Construction Surveys, Highway Horizontal Curves, Vertical Curves, Volumes (Ch 23, 24, 25, 26)

The topics above maybe supplemented with other topics from the textbook or additional information. All topics that are covered will be part of the examination.

9. Course Assessment

Assessment Scheme	**Weight**	**Notes**
Midterm Exam	*20%*	*Nov 7. During the class time*
Final Exam	*50%*	
Lab	*30%*	

Expectation: Students are expected to have a basic knowledge of: Mathematics including arithmetic, trigonometry, geometry and calculus.

Calculators: Programmable and non-programmable calculators are OK for exams, field and class work.

Drafting: All course work (class, field, exams, etc) requires clean and legible hand writing and drafting. A basic, in-expensive, drafting (geometry) kit is recommended. AutoCAD, CADopia, or similar are useful for the class course, home-work but normally not available or acceptable for exams.

Class/Field Notes: Students are expected to keep very good and legible study, lecture and field notes. These notes can be used during exams and may include any material written by the student into the notebook Good hand-sketches are OK. Use of drafting equipment is expected. Surveying handbook is needed for recording field notes during field survey.

Equipment compliance: Although AutoCAD will be available at the computer lab facilities available for this course, students are expected to have an operational version of AutoCAD Civil 3d for some courses, homework, for students, this software can be obtained freely from http://students.autodesk.com, you will need to sign up with your Carleton student ID, this software will be used during several class sessions. Furthermore, electronic surveying instruments will be available for lab courses, students are expected to sign-out and sign-in this equipment, they should treated with care and return in good condition.

Lectures: Students are expected to read the textbook sections corresponding to each lecture in preparation for each class, as well as, to consult culearn for available material for each session. Students are expected to take notes while studying course materials before, during and after class.

Assignments: Students are expected to download, read and familiarize themselves with materials related to assignments, including field and classroom exercises. Punctuality and attendance to the full session is expected. For field (outdoor) exercises students meet in the lobby of the Bell Theatre (Minto Building) where attendance will be taken – contact your TA for meeting location as meeting location can vary based on the lab type. Two students from each lab group may need go to surveying equipment room, where they will pick-up the required equipment for their group. For in-class (indoor) exercises students need to bring drafting equipment, notebook, portable computer (when indicated) and calculator and proceed to the designated classroom as per university classroom schedule.

Midterm Exam

Midterm exam will be administered during the semester. If you miss mid-term exam because of unavoidable circumstances, the weight of the maybe be added to the Final Exam only. However, there has to be a documented, genuine and reasonable cause for missing an exam, without which accommodations will not be made. Any request for re-evaluation or grade change must be made within one week from the day the graded quiz is returned, and after that no such requests will be accepted**.** Midterm exam may cover both the qualitative and quantitative questions covered in class/labs/fields.

10. Guest Lecture

During the delivery of the course, professional(s)/researcher(s) from the subject/field of study maybe invited to the class. Students are required to attend those classes as well, since exams may include questions from those lectures.

11. Classroom Etiquette and Class Attendance

Behaviour that limits another student's ability to learn or that disrupts the instructor's ability to deliver material will not be permitted. You must be polite, professional, and attentive in class, and must not exhibit any disruptive behavior in or out of class. In the event of disruptions caused by students, the instructor/TA reserves the right to discontinue lectures and/or prohibit the disruptive students from attending classes. Examples of disruptions are loud conversation, whispering during lectures, replying to instructor's questions or comments with the intention to gain undue attention or to disrupt class proceedings, disrespectful or threatening behavior, physical or verbal abuse, and showing disdainful or intolerant attitude. Use of electronic devices including cell phones, mobile devices, gaming devices, pagers, transmitters, computers, etc., is prohibited inside the classroom and during examinations. You may use a laptop computer or tablet for writing notes from the class provided the activity does not disturb your neighbors.

Important Notes on Class Attendance: You are strongly recommended to attend all classes and instruction sessions. Certain information given in class, e.g., information about the format of examination questions or about the important examination topics, will not be given outside class or posted on course website. Therefore, you may miss certain important information if you do not attend classes. You must arrive in time -- if you arrive late, the instructor and teaching assistants may ask you to leave. If you consistently arrive late, then you may be barred from attending all the remaining sessions.

Notes on Absences: This course follows the topics required by the curriculum at a very fast pace. Every lecture presents a new topic, and each new topic is based on the previous; missing a single class may have a serious impact on your academic performance. If you are absent from class, due to illness or a personal or family emergency, it is recommended that you review the material missed as soon as possible; consult with your fellow students, your TA/Instructor, and try to "catch-up" on the topic(s) missed. Anticipated and/or documented absences due to health reasons or important commitments should be brought to the attention of the instructor. Undocumented absences will result in a mark of zero assigned to the course component missed. For duly justified and documented absences please consult the instructor for adjustment of marks.

Documenting your absence using current university policy or practice. In case of illness, in general, you need to consult a doctor within 24 hours of the onset of the conditions leading to your absence. Have your physician fill the form: http://www2.carleton.ca/health/doctors-notes/
If your absence is due to a personal emergency please document it in detail, as much as possible, including tickets, visas or passport entries, if travel is involved. You may also wish to include affidavits from coaches, witnesses, religious officials, police reports, etc, as appropriate. If you know in advance of your absence, please contact the instructor early with information on dates and nature of your absence.

Missing the final exam will automatically result in a grade of ABS which is a failing grade. If you miss the final exam you must contact the Registrar's Office and follow the guidelines described in http://www2.carleton.ca/registrar/special-requests/deferral/
Upon assessment of your documentation, the Registrar's Office, in consultation with the Office of the Associate Dean of Engineering (MC 3091, 613-520-4067) might grant you the opportunity to write a make-up exam, called a deferred exam written in February for Fall Term courses.

12. Grading Policy

- If you miss an assessment activity (e.g., midterm/lab works) because of unavoidable circumstances, a reasonable accommodation may be made based on university practices. For example, the weight of the missed midterm maybe added to the Final Exam or other reasonable option maybe sought. You have to **inform the instructor and provide supporting documents within a week** of missing the activity.
- Students are required to complete the course work on an individual basis unless specifically stated otherwise. However, discussion and consultation between students is encouraged.
- **Lab/field attendance is mandatory, and signature of the students maybe randomly collected during the labs. If you miss any lab/field activity for any unavoidable reason, you have to arrange with teaching assistant/lab technician/instructor to do the lab/field activity and submit evidence(s). You will get zero mark for the missing activity(s).**
- You should properly understand the lab/field works. Final exam may include question(s) from the lab/field activities.
- The instructor determines the content and establishes the grading rules for all assignments, quizzes, final exam, labs/projects/poster/presentation/class activity, etc. The teaching assistant may grade parts of exams involved in the course. When determining a student's final grade in the course, the instructor will examine the record of each individual student's achievement; the final grade may be adjusted to take into account the compassionate circumstances and the student's general pattern of achievement in the course.
- Students are required to collect the marked exam papers or assignments on the day when they are delivered to class. If you miss any class; check with your classmate(s) and make arrangement with

your classmate or with a teaching team member to get the marked paper on the same day but by latest within the following week. After that, the teaching team is not responsible for any missed marked paper.

13. Co-op Interviews

I am aware that co-op/internship interviews often take place at times that conflict with this course meeting. It is expected that a student should not schedule an interview that conflicts with a quiz.

14. Lab Safety

Students are expected to demonstrate awareness of, and personal accountability for, safe laboratory conduct. Appropriate personal protective equipment (PPE) must be worn (e.g. steel-toed shoes, safety glasses, etc.) and safe work practices must be followed as indicated for individual laboratories, materials and equipment. Students will immediately report any concerns regarding safety to the teaching assistant, staff technologist, and professor.

15. Academic Integrity and Professional Conduct

Students are expected to attend all lectures and tutorials; participate in class; and to observe standards of behavior expected in a university environment and in the profession of engineering. Unless otherwise indicated by the instructor, all work submitted for evaluation must be the result of the students' individual efforts without advice or answers obtained from other sources. Cheating of any kind is a serious instructional offense subject to sanctions that may include: failure in the course, suspension from your degree program, and in some cases expulsion from the university. Please consult the university undergraduate calendar for definitions and penalties in https://carleton.ca/registrar/academic-integrity/

16. Accommodation

"The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). Requests made within two weeks will be reviewed on a case-by-case basis. After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (www.carleton.ca/pmc) for the deadline to request accommodations for the formally scheduled exam (if applicable). "

17. Theory Class Schedule (Tentative)

Lecture Week	Topic	Chapter/Reference
Week 1	Introduction of Teaching Team, Students, Course Outline, Plan, Policy	NA
Week 2	Introduction to Survey Engineering, Geomatics and Measurements	Ch1, 2
Week 3	Distance Measurements: Methods, Distance Measurement by Taping and EDM	Ch6
Week 4	Leveling: Theory, Methods and Equipment, Field Procedures and Computations	Ch4,5
Week 5	Concepts of Angles, Azimuths and Bearings, An Overview of Total Station Instruments	Ch7, 8
Week 6	An Overview of Traversing and Traverse Computation	Ch9, 10
Week 7	An Overview of Traversing and Traverse	Ch9, 10

	Computation	
Week 8	Fall Break	
Week 9	Theory of Errors	Ch3
Week 10	Adjustment of Measurements by Least Square Methods	Ch16
Week 11	Construction Surveys, Highway Horizontal Curves, Vertical Curves, Volumes	Ch23,24,25, 26
Week 12	Construction Surveys, Highway Horizontal Curves, Vertical Curves, Volumes	Ch23,24,25, 26
*No lecture on government or university holidays * Any change will be discussed in class before implementation		

18. Lab Schedule (Tentative)

Lab Week	Lab Assignment	Topic	Type	Comment
Week 1	Assignment 0	No lab		
Week 2	Assignment 1	Anthropometrics and Triangulation	Field	
Week 3	Assignment 2	Leveling-Part I: Basics	Field	
Week 4	Assignment 3	Leveling-Part II: Loop Leveling	Field	
Week 5	Assignment 4	AutoCAD-Part I: Basics	Lab	
Week 6	Assignment 5	AutoCAD-Part II: Developing building plan	Lab	
Week 7	Assignment 6	GIS-Part I: Basics	Lab	
Week 8		No lab during Fall break		
Week 9	Assignment 7	GIS-Part II: GIS based mapping	Lab	
Week 10	Assignment 8	Total Station-Part I, Basics and measurement techniques	Field	
Week 11	Assignment 9	Total Station-Part II, Measurement and drawing	Field	
Week 12	Assignment 10	BIM, GPS	Lab	