

# **CIV E 601 Analytical Methods for Project Management**

**Fall 2025 - September 03 to December 08**

Class time: Monday 14:00-16:50      Location: BS M-149

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## **Instructor:**

Elyar Pourrahimian, PhD, E.I.T, He/Him

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DICE 7-324

Office Hours: Mondays 10 AM to 12 PM

## **Course Description:**

\*3 (fi ) (either term, 3-0-0) Overview of project management for capital construction projects. Emphasis on analytical methods for project planning and control, based on engineering design, including project breakdown, project network model design, estimating, scheduling, project control, value engineering, and constructability

## **Course synchronous and asynchronous content delivery schedule:**

Synchronous course content delivery

## **Land Acknowledgment:**

The University of Alberta respectfully acknowledges that we are situated on Treaty 6 territory, traditional lands of First Nations and Métis people.

## **TA Information:**

Mohamed Assaf (massaf2@ualberta.ca)

Ahmed Mohamed (ahm3@ualberta.ca)

Office hours: By appointment on Zoom

## **Course Objectives & General Content:**

This course provides the students with comprehensive knowledge, interactive discussions, and lifelong professional skills regarding the major practices of construction project management. The course utilizes the approaches of Module Based Learning (MBL) and Work Integrated Learning (WIL) to provide the students with the most effective learning experience. The course objective is achieved by covering the following three modules:

- Essentials of construction project management.
- Management of project resources, quality and safety.
- Advanced techniques in construction project management.

## Learning Outcomes:

By the end of this course, students should be able to:

1. Understand the concept of Integrated Planning and Control Framework (IPCF) for construction projects.
2. Manage projects' scope, schedule and cost using Work Breakdown Structure (WBS).
3. Apply Building Information Modeling (BIM) to link the project's 3D Model to the scope, schedule and cost.
4. Evaluate project performance using Earned Value Management (EVM).
5. Perform techniques such as Time Cost Tradeoff (TCT) and Quantitative Risk Analysis (QRA).
6. Gain teambuilding and project management experiences through conducting a group-based Term Project.

## Marking Scheme:

Activity	(A)Synchronous	Due/Scheduled	Weight
Assignment 1	Synchronous	Due Oct 06,2025	10%
Assignment 2	Synchronous	Due Oct 27,2025	15%
Assignment 3	Synchronous	Due Nov 24,2025	15%
Achievement Test on Module 1	Synchronous	Due Oct 06,2025	20%
Achievement Test on Module 2	Synchronous	Due Oct 27,2025	20%
Achievement Test on Module 3	Synchronous	Due Nov 24,2025	20%

The Faculty recommended grade point average for a 600 level course is 3.3. Instructors have the leeway to deviate from this average and can assign grades based on their own scheme. All grades are approved by the department chair (or delegate). The office of the Dean has final oversight on all grades.

### Term Work

All term work solutions will be posted no later than the last day of classes. All term work will be returned to students by the final day of classes, with the exception of major term work due in the last week of classes. The latter will be returned by the day of the final examination or the last day of the examination period if there is no final examination in the course as per university policy; instructors will make accommodations to return these term work. It is the responsibility of the student to pick up all their term work at the specified time and place. Any unreturned term work, shall be retained and then shredded six months after the deadline for reappraisal and grade appeals. Final examinations will be kept for one year as required by university guidelines and the Government of Alberta's Freedom of Information and Protection of Privacy Act.

### **Additional Notes**

All three assignments are group work to strengthen the teamwork skills of the students; they are deliverables from the class project as explained in the following paragraph. All assignments will be posted on Canvas. The team lead of each group has to upload each assignment solution to Canvas on the due date using the provided links. The first assignment is worth 10% of the course grade, and each of the next two assignments is worth 15%. Late submissions up to 24 hours will be graded for ½ credit. Due dates of assignments are specified in this course outline and will be shown on Canvas. Late submissions beyond 24 hours will be graded, but no credit will be given.

Students have to form groups of three (including one team lead) to work on assignments. Each group must contain students from diverse backgrounds and years of experience. Each team must choose a group by September 15, 2025. The assigned number to each group will be used on all assignments.

The course will provide a simple construction project for the student groups to work on. Each group has to make reasonable assumptions to complete the assignments.

The class project focuses on demonstrating the ability to apply classroom learning to a real-world construction project.

### **Calculator Policy**

No calculators are permitted in examinations.

### **Expectations for AI use**

In this course, we commit to AI use guided by ethical and transparent principles. While students are allowed to use advanced automated tools (such as ChatGPT or Dall-E 2) for certain written assignments, it is crucial to adhere to the following guidelines:

Seek prior approval from the instructor for AI use in specific assignments.

When allowed, clearly attribute and cite any AI-generated content in your work, including prompts and AI outputs as part of your academic record. Include an additional reflection component in your assessments, discussing how AI tools contributed to your learning process.

**IMPORTANT:** Please note that AI use is strictly prohibited in assessments and assignments not approved by the instructor. Failure to abide by this guideline may be considered an act of cheating and a violation as outlined in the relevant sections of University of Alberta (November 2022) [Code of Student Behaviour](#).

### **Text and References (Recommended):**

Construction Project Management: a practical guide to field construction management, S. Keoki Sears, Glenn A. Sears, Richard H. Clough

Construction Project Administration, E.R. Fisk & W. Reynolds.

Construction Jobsite Management, R. Mincks William & H. Johnston.

### **Website:**

Canvas

*Did you know that the University of Alberta has various low-to-no-cost services to help students succeed? Visit <http://www.deanofstudents.ualberta.ca/> for information about the academic, wellness, and various other support services available to U of A students. It's never too early or too late to seek help!*

**Tentative Course Outline:**

<b>Date</b>	<b>Week</b>	<b>Class</b>	<b>Assignment</b>
Sep.08	1	<ul style="list-style-type: none"> <li>• <b>1-1) Introduction to Construction Project Management:</b> <ul style="list-style-type: none"> <li>• Project Life Cycle (Stages, Phases and Sub-phases)</li> <li>• Categories of Construction Projects</li> <li>• Integrated Planning &amp; Control Framework (IPCF)</li> </ul> </li> </ul>	
Sep. 15	2	<ul style="list-style-type: none"> <li>• <b>1-2) Scope Definition:</b> <ul style="list-style-type: none"> <li>• Work Breakdown Structure (WBS)</li> <li>• Analytical Approaches to Requirements Prioritization</li> <li>• Introduction to Project Activity Networks</li> <li>• Building Information Modeling (BIM)</li> </ul> </li> </ul>	<b>Submit Group Members &amp; Team Lead</b>
Sep.22	3	<ul style="list-style-type: none"> <li>• <b>1-3) Schedule Baseline:</b> <ul style="list-style-type: none"> <li>• Critical Path Method (CPM)</li> <li>• Activity Dependencies</li> <li>• Linking Project Schedule to BIM Model</li> </ul> </li> </ul>	
Sep.29	4	<ul style="list-style-type: none"> <li>• <b>1-4) Cost Estimating:</b> <ul style="list-style-type: none"> <li>• Estimation Techniques</li> <li>• Regression and Data-Driven Estimation Methods</li> <li>• Sensitivity and Scenario Analysis in Cost Estimating</li> </ul> </li> </ul>	
Oct.06	5	<ul style="list-style-type: none"> <li>• <b>2-1) Project Resources:</b> <ul style="list-style-type: none"> <li>• Labor, Materials &amp; Equipment (LME)</li> <li>• Resources Histograms</li> <li>• Progress S-Curves</li> </ul> </li> </ul>	<b>Achievement Test on Module 1</b> Submit <b>Assignment 1</b>
Oct.13	6	<ul style="list-style-type: none"> <li>• <b>2-2) Quality Management &amp; Safety Management:</b> <ul style="list-style-type: none"> <li>• Quality Assurance &amp; Quality Control (QA &amp; QC)</li> <li>• Health, Safety, Security &amp; Environmental (HSSE)</li> <li>• Quality and Safety Management Systems</li> </ul> </li> </ul>	
Oct.20	7	<ul style="list-style-type: none"> <li>• <b>2-3) Progress Measurement &amp; Performance Evaluation:</b> <ul style="list-style-type: none"> <li>• Schedule Updates</li> <li>• Cost Control</li> <li>• Earned Value Management (EVM)</li> </ul> </li> </ul>	
Oct.27	8	<ul style="list-style-type: none"> <li>• <b>3-1) Project Risk &amp; Uncertainty:</b> <ul style="list-style-type: none"> <li>• Range Estimating</li> <li>• Quantitative Risk Analysis (QRA)</li> <li>• Program Evaluation Review Technique (PERT)</li> <li>• Monte Carlo Risk Analysis for Cost/Schedule.</li> </ul> </li> </ul>	<b>Achievement Test on Module 2</b> Submit <b>Assignment 2</b>
Nov.03	9	<ul style="list-style-type: none"> <li>• <b>3-2) Guest Speaker: Causes of Success and Failure with Examples from Real Projects</b></li> </ul>	
Nov.10	10	<ul style="list-style-type: none"> <li>• <b>Reading week (No classes)</b></li> </ul>	
Nov.17	11	<ul style="list-style-type: none"> <li>• <b>3-3) Advanced Techniques:</b> <ul style="list-style-type: none"> <li>• Time-Cost Trade-Off</li> <li>• Advanced Scheduling Techniques (Line of Balance)</li> <li>• Value Engineering</li> </ul> </li> </ul>	
Nov.24	12	<ul style="list-style-type: none"> <li>• <b>Project Status Reporting and Change Management</b> <ul style="list-style-type: none"> <li>• Analytical Dashboards for Real-Time Reporting.</li> <li>• Change Detection and Impact Analysis Models</li> </ul> </li> </ul>	<b>Achievement Test on Module 3</b> Submit <b>Assignment 3</b>
Dec.01	13	<ul style="list-style-type: none"> <li>• <b>Project Closeout</b></li> </ul>	



## University and faculty policies



### Respect and professionalism



The Faculty of Engineering is committed to fostering and protecting an equitable, inclusive, and respectful work and study environment in line with University of Alberta policies and professional engineering industry standards.

The faculty prepares students to uphold industry standards to become a Professional Engineer (P.Eng). Therefore, respect, professionalism, and accountability must be upheld within the Faculty of Engineering and the University of Alberta.

### Academic integrity and student conduct

The University of Alberta is committed to the highest standards of academic integrity and honesty, as well as maintaining a learning environment that fosters the safety, security, and the inherent dignity of each member of the community, ensuring students conduct themselves accordingly. Students are expected to be familiar with the standards of academic honesty and appropriate student conduct, and to uphold the policies of the University in this respect.

Students are particularly urged to familiarize themselves with the provisions of the [Student Academic Integrity Policy](#) and the [Student Conduct Policy](#), and avoid any behaviour that could

potentially result in suspicions of academic misconduct (e.g., cheating, plagiarism, misrepresentation of facts, participation in an offence) and non-academic misconduct (e.g., discrimination, harassment, physical assault). Academic and non-academic misconduct are taken very seriously and can result in suspension or expulsion from the University.

All students are expected to consult the [Academic Integrity website](#) for clarification on the various academic offences. All forms of academic dishonesty are unacceptable at the University. Unfamiliarity of the rules, procrastination or personal pressures are not acceptable excuses for committing an offence. Listen to your instructor, be a good person, ask for help when you need it, and do your own work – this will lead you toward a path to success. Any academic integrity concern in this course will be reported to the College of Natural and Applied Sciences. Suspected cases of non-academic misconduct will be reported to the Dean of Students. The College, the Faculty, and the Dean of Students are committed to student rights and responsibilities, and adhere to due process and administrative fairness, as outlined in the [Student Academic Integrity Policy](#) and the [Student Conduct Policy](#). Please refer to the policy websites for details on inappropriate behaviours and possible sanctions.

The College of Natural and Applied Sciences (CNAS) has created an [Academic Integrity for CNAS Students](#) eClass site. Students can self-enroll and review the various resources provided, including the importance of academic integrity, examples of academic misconduct & possible sanctions, and the academic misconduct & appeal process. Students can also complete assessments to test their knowledge and earn a completion certificate.

*"Integrity is doing the right thing, even when no one is watching."* – C.S. Lewis

The Faculty of Engineering expects an environment free of harassment, discrimination, and bullying. We encourage you to talk to the [Office of Safe Disclosure and Human Rights](#) about experiences, questions, or concerns. Additional resources and support for students are attached below.

Engineering students studying in the province of Alberta must also follow the [Code of Ethics](#) set by the Association of Professional Engineers and Geoscientists of Alberta (APEGA).

Course outline policies, course requirements, evaluation and grading information can be found in the [University Calendar](#).



## Safety during learning activities



In all Faculty of Engineering courses, labs, seminars or other learning activities, safety is of paramount importance. In some cases, laboratory work in a program requires high standards for risk management to keep potential hazards safely under control.

Anyone found to be unable to function safely in the class, lab, seminar or other learning activity may be asked to leave or be removed for their and the safety of other participants and instructors in alignment with the [Student Academic Integrity Policy](#) and [Student Conduct Policy](#). As members, or prospective members, of the engineering profession, it is your responsibility to identify and inform the proper authorities of unsafe work.

## Audio and video recording



Audio or video recording, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan.

Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

Only those items specifically authorized by the instructor may be brought into the exam facility. Students must not bring any unauthorized electronic device into an examination room, including cell phones or other devices.

# Student services and support

## Health & Wellness Support

### Counselling and Clinical Services

Free, short-term, appointment-based counselling and psychiatric services. Also offers drop-in workshops. Book an initial consultation. Visit [uab.ca/CCS](http://uab.ca/CCS) to learn more.

### Wellness Supports Social Workers

Free one-on-one support for students in the areas of housing, finances, academics, personal wellness, life skill development, family dynamics, system navigation, and any area of life where there is a desire to invite change. Visit [uab.ca/wellness](http://uab.ca/wellness) to learn more.

### Sexual Assault Centre

Free, anonymous, and confidential drop-in counselling. Visit [uab.ca/UASAC](http://uab.ca/UASAC) to learn more.

### The Office of Safe Disclosure & Human Rights (OSDHR)

The OSDHR advises confidentially on sensitive issues you may not feel comfortable solving on your own. Contact the OSDHR if you want to get help or to make a report while keeping your privacy. Visit [uab.ca/OSDHR](http://uab.ca/OSDHR) to learn more.

### HIAR (Helping Individuals at Risk)

If you're worried about someone, contact HIAR, who can help assess risk and connect individuals to support. Learn more at [uab.ca/HIAR](http://uab.ca/HIAR).

### Immediate External Supports

Health Link Alberta: 811  
Suicide Crisis Helpline: 988





## Academic support



### Academic Success Centre

Access to a variety of services to maximize your academic success. Learn more at [uab.ca/ASC](http://uab.ca/ASC).



### Accessibility Resources

Connects students with disabilities to accommodations. Learn more at [uab.ca/Access](http://uab.ca/Access) under accommodations + accessibility.



### Decima Robinson Support Centre

Academic support for 100- or 200-level introductory calculus, linear algebra and statistics courses. Visit [uab.ca/DSC](http://uab.ca/DSC) to learn more.



### Engineering Student Success Centre

The Faculty of Engineering provides drop-in tutoring for first-year courses. Visit [uab.ca/ESSC](http://uab.ca/ESSC) to learn more.



### Office of the Student Ombuds

Call for complex problems and conflict mediation. Learn more at [uab.ca/ombuds](http://uab.ca/ombuds).

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## Financial support



### **Student Service Centre**

For awards and other funding support. Learn more at [uab.ca/ask](https://uab.ca/ask).



### **Campus Food Bank**

The Campus Food Bank Society is an independent charity supporting University of Alberta students, faculty, staff, and alumni for up to five years. For additional information visit their website at [campusfoodbank.com](https://campusfoodbank.com).

