



**UNIVERSITY
OF ALBERTA**

CIV E 611 Lean Construction Methods and Applications



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Prerequisites: Graduate standing

Class Time: Thursdays from 11:00 am to 1:50 pm

Office Hours: Monday from 11:00 am to 11:50 am and Thursday from 10:00 to 10:50 AM

Class Location: NREF 2-122

Class TA: PhD Student Dana Sobh, dsobh@ualberta.ca

TA Office Hours: By Appointment

Course General Topics

Lean Construction, project development, planning, and control relevant to construction professionals.

Course Description and Objectives

Lean construction is a novel production management approach to designing and building facilities focusing on increasing value to stakeholders while reducing waste. The application of lean is growing fast in the construction industry as more organizations are incorporating it into their overall philosophy and requiring employees to acquire knowledge about lean methods.

In this course, Students will learn about the Toyota production system, the last planner system, value stream mapping, process improvement and many lean prospects. Students will also learn fundamental project management concepts and techniques to define, plan, and execute construction projects. The focus will be on actions that can be taken to meet and sometimes exceed expectations for project time, cost, and quality. The importance of communication and risk management throughout all project stages will be emphasized. Students will also be exposed to software applications that aid project management. Students will be challenged as individuals and as members of a team.

Student Learning Outcomes:

At the end of this course, you will be able to:

- Explain the management principles of Lean Construction
- Map construction processes using value stream mapping
- Measure value in construction process flows
- Propose improvement measures for construction processes
- Explain the basics of Integrated Project Delivery
- Perform advanced location-based management planning assessments
- Demonstrate the understanding of the Last Planner's System for production planning and control.

Delivery Method:

This course will be delivered in an in-person format to increase your engagement, raise your interest, use the latest technological aids, improve teamwork and collaboration, improve writing and communication skills, and learn time management skills.

Required Materials

(L) Liker, J.K. (2004). *The Toyota Way- 14 Management Principles from the World's Greatest Manufacturer*. New York: McGraw Hill.

(R&S) Rother, M., and Shook, J. (2009). *Learning to See- Value Stream mapping to create value and eliminate waste*. Lean Enterprise Institute, Cambridge, MA 02124. Will be provided through the engineering library.

(H) Hendrickson, C., (2008). Project Management for Construction, Version 2.2. Available online at: <http://www.ce.cmu.edu/pmbook/>.

Additional reading material will be available on the e-class course website. You should read assigned sections *in advance* of the designated lecture.

In-class exercises

Some sessions will have **in-class simulation** exercises. The exams will cover lessons learned from these exercises.

Reading Assignments

Each student to submit on the e-class course website

- 1- One thought provoking question from the readings.
- 2- One-page reflection essay. The Guidelines and rubric will be posted. Each student should be ready for in-class discussion of the readings.

Assignments, Exams, Grading

- Assignments are due at the start of class on the set due date.
- For individual assignments, you are expected to develop **your own solution** even if you discuss the problem with other students.
- For group assignments, all members are expected to contribute equally.
- Your participation in class is integral to the learning process.
- Emphasis will be placed on both oral and written communication skills.
- The Guidelines and rubric will be posted on the e-class course website.
- Student performance should be evaluated based on the following criteria:

○	Assignments/class exercises	15%
○	Team project	35%
○	Midterm Exam 1	25%
○	Midterm Exam 2	25%

[e-class course website](#)

The e-class course website will be used to disseminate information. The course syllabus, lecture notes, assignments, selected readings, and grades will be posted online.

General

- **Policy on Plagiarism and/or Cheating:** No Student shall submit the words, ideas, images or data of another person as the student's own in any academic writing, essay, thesis, project, assignment, presentation or poster in a course or program of study. **Assignments with more than 10% plagiarisms will get a zero.**
- **Policy on Make-up Exams: No make-up exams are normally allowed.** However, if you miss an exam, you should provide a valid excuse. If the excuse is deemed reasonable, your final exam will be comprehensive.
- **Attendance and Participation:** Punctuality, class attendance, participation and preparation reflect your professionalism.
- **Cell phones:** Cell phones should be turned off in class. **Cellphones are not allowed in exams.**

Tentative Course Schedule

Wk	Topic	Reading	Online Activities Due
1 6/J	Introduction to Production System Design		- Airplane game
2 13/J	Introduction to lean theory	Reading: Liker, <i>The Toyota Way</i> , Chs. 1-7, selected readings, pp. 1-84	Submit a question from the reading to a Q/A forum Submit a reflection paragraph
3 20/J	Theory of Production	Reading: Best & de Valence, Ch. 14, 16 p. Ballard, PhD thesis, Ch. 2, 16 p.	Submit a question from the reading Submit a reflection paragraph
4 27/J	Process Improvement	Reading: Liker, Ch. 8-14, selected readings, pp. 85-168	TOC discussion Forum Submit a question from the reading
5 03/F	Value Stream Mapping	Rother & Shook, <i>Learning to See</i> . selected readings.	Submit a question from the reading Submit a reflection paragraph
6 10/F	Production Control: The Last Planner system	Reading: Hamzeh, PhD thesis, Ch. 5. How to write a Research paper?	Submit a question from the reading Submit a reflection paragraph
7 24/F	Project Definition/ Lean Design	Whelton & Ballard, "Wicked Problems in Project Definition" Ballard, "Positive vs. Negative Iteration in Design"	Submit a question from the reading Submit a reflection paragraph
8 03/M	Lean Project Delivery, Integrated Project Delivery, Target Value Design Midterm exam 1	Matthews, "Integrated Project Delivery" Lichtig, "The Integrated Agreement for Lean Project Delivery"	Submit a question from the reading IPD Online Forum
9 10/M	Integrated Project Delivery, Target Value Design	On E-class	
10 17/M	Choosing by Advantages CBA	On E-class	
11 24/M	Building Information Modeling BIM and Lean processes	On E-class	
12 31/M	Lean applications in Project Planning: <i>Location based Management</i>	On E-class	
13 07/A	Project Presentations		
	Midterm exam 2 TBD		