

CA3420: LEAN CONSTRUCTION

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Lean Construction

Subject Code

CA - Civil and Architectural Engineering

Course Number

3420

Academic Unit

Architecture and Civil Engineering (CA)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

The construction industry lags far behind the manufacturing industries in performance (e.g., productivity and waste) improvement. The practitioners have been continuously looking for better methods and technologies to improve project

delivery and one of the important initiatives is lean construction. The course aims to provide an understanding of the modern concepts and methods in productivity and production system to improve construction practice with lean construction, as well as other tools and techniques for designing and implementing lean construction on projects. Upon completing this course, student will be able to design and implement lean construction system on projects for performance improvement (e.g., based on empirical study, productivity improvement of up to 30% can be expected with proper design and implementation of lean construction).

Course Intended Learning Outcomes (CILOs)

| CILOs | | Weighting (if DEC-A1 DEC-A2 DEC-A3 app.) | | | |
|-------|--|--|---|---|--|
| 1 | Understand and apply traditional construction productivity improvement measurement techniques | | x | x | |
| 2 | Understand the elementary concepts of production theory relating to lean construction | | x | | |
| 3 | Quantify production theory and tradeoffs for simple systems and apply them qualitatively to the design and operation of projects for lean construction | | x | x | |
| 4 | Understand the incentives for improved performance using lean construction | | x | | |

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

| TLAs | | Brief Description | CILO No. | Hours/week (if applicable) |
|------|---------------------------|---|------------|----------------------------|
| 1 | Lecture | Lectures will teach students the fundamental knowledge and techniques on lean construction. | 1, 2, 3, 4 | |
| 2 | In-class simulation games | Simulation games will be conducted to provide student hands-on experience and help them better understand the lean construction theory. | 2 | |

| | | | | |
|---|--------------|--|---|--|
| 3 | Case Studies | Cases will be used to allow students investigate the practical problem of lean construction. | 4 | |
|---|--------------|--|---|--|

Assessment Tasks / Activities (ATs)

| | ATs | CILO No. | Weighting (%) | Remarks (e.g. Parameter for GenAI use) |
|---|---------------|------------|---------------|--|
| 1 | Assignment | 1, 2, 3, 4 | 25 | |
| 2 | Group Project | 1, 2, 3, 4 | 25 | |

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Additional Information for ATs

To pass a course, a student must obtain minimum marks of 30% in both coursework and examination components, and an overall mark of at least 40%

Assessment Rubrics (AR)**Assessment Task**

Assignment

Criterion

- 1.Understanding of the motivation, current situation, and principles of lean construction in Hong Kong.
- 2.Ability of applying the learnt knowledge to solve a problem

Excellent (A+, A, A-)

Very High/high

Good (B+, B, B-)

Above average

Fair (C+, C, C-)

Average

Marginal (D)

Below Average/low

Failure (F)

Very low

Assessment Task

Group Project

Criterion

- 1.Capability to demonstrate the knowledge of lean construction in the context of a real world case.

2.Capability to demonstrate the critical and discovery thinking in the project.

Excellent (A+, A, A-)

Very High/high

Good (B+, B, B-)

Above average

Fair (C+, C, C-)

Average

Marginal (D)

Below Average/low

Failure (F)

Very low

Assessment Task

Examination

Criterion

Understanding of the fundamental knowledge and process of lean construction.

Excellent (A+, A, A-)

Very High/high

Good (B+, B, B-)

Above average

Fair (C+, C, C-)

Average

Marginal (D)

Below Average/low

Failure (F)

Very low

Part III Other Information

Keyword Syllabus

Productivity Analysis, Supply Chain, Just-in-Time (JIT), Construction Process, Quick Response Manufacturing (QRM), Simulation, Kanban, Integrated Project Delivery, Information and Communication Technology

Reading List

Compulsory Readings

| Title | |
|-------|-----|
| 1 | Nil |

Additional Readings

| Title | |
|--------------|--|
| 1 | W. Hopp and M. Spearman. (2011) Factory Physics. 3rd ed. New York: Irwin/McGraw Hill. |
| 2 | L.H. Forbes and S.M. Ahmed. (2010). Modern Construction: Lean Project Delivery and Integrated Practices (Industrial Innovation Series). 1st ed. New York. CRC Press. |