Kolhapur Institute of Technology's

COLLEGE OF ENGINEERING, KOLHAPUR (EMPOWERED AUTONOMOUS)

Gokul Shirgaon, Kolhapur

KOLHAPUR INSTITUTE OF TECHNOLOGY'S
COLLEGE OF ENGINEERING KOLHAPUR
(EMPOWERED AUTONOMOUS)

Curriculum Structure
For
B. Tech. Civil Engineering

EMERGING SPECIALIZATION MINOR
(LEAN TECHNOLOGY)

Academic Year 2025-2026

Under Graduate Programme

Approved in BoS on 15.03.2025
Approved in Academic Council on 24.04.2025

Dr. Aditya Khebudkar
H.O.D., Civil Engg. Department
Kolhapur Institute of Technology's
College of Engineering (Autonomous)
Kolhapur

Civil Department

Dean Academics
Kolhapur Institute of Technology's
College of Engineering (Autonomous),
Kolhapur

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Title of the Course:	**PRODUCTIVITY MEASUREMENT SYSTEM**	**L**	**T**	**P**	**Credit**
Course Code:	**UCVMN0541**	**3**	**-**	**-**	**3**

Course Pre-Requisite:

Basic Projects and Management, Lean Concept and Management Approach

Course Description:

Students will be learning about procedures for measuring productivity of resources employed on different projects.

Course Learning Objectives:

This Course will assist students in understanding Productivity of Construction resources.

Course Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	Differentiate between various productivity levels and identify key influencing factors	4	Analyze
CO2	Measure productivity of construction resources	5	Evaluate
CO3	Apply productivity measurement techniques to evaluate performance in construction processes	5	Evaluate
CO4	Devise practices to improve productivity for a specific construction activity	6	Create

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	1	1	1	1	2				1	1
CO2	1	1	1	1	1	1			1	1	2
CO3	2	2		2	2	2	1	1	2	2	2
CO4	2	1		1	2	2	1	1	3	2	2

CO	PSO1	PSO2	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	2	2	3
CO4	2	2	3

Assessments:

Teacher Assessment:

- End Semester Examination (ESE) having 100 marks Assessment is based on Theory End Semester Examination with equal weightage to each unit of the course. Question Paper may include Combination of Multi choice questions and Descriptive nature questions.

Assessment	Marks
ESE	100

Course Contents:

Unit: 1	**CO: 1**	
Production and Productivity: Concept, Units of Measurement, Difference between Production and Productivity, factors Influencing Productivity with reference to project activity, Cost and Time Impact		**10 Hrs.**
Unit: 2 -	**CO: 1**	
Productivity Levels: Levels of Productivity in Projects- Corporate Level, Regional Level, Project Level, Work Package Level, Operational Level & their measurement		**08 Hrs.**
Unit: 3 -	**CO:2**	
Measurement of Productivity: Productivity definition and its measurement for Construction activities, Input & Output measurement for construction items. Level of Efforts, Impact of Productivity measurement on Return on Capital Investment, visualizing activity productivity and production performance. Operational Productivity, Profit, Operational view Vs. System view		**12 Hrs.**
Unit: 4 -	**CO:3, CO: 4**	
Productivity Improvement approach: Planning and Monitoring Levels of Productivity Measurement System, daily, weekly, cumulative performance evaluation, work hour forecast and analysis of trends		**10 Hrs.**

References Books:

1. Modern Construction Lean Project Delivery and integrated Practices (Industrial Innovation) by Lincoln H. Forbes & Syed M. Ahmed.
2. Modern Construction Management by Frank Harris, Ronald Mccaffer
3. Lean in Construction Projects by Tomas Lindhom
4. Lean Construction Management (The Toyota Way) by Shang Gao · Sui Pheng Low

Title of the Course:	**LEAN TOOLS, PRACTICES AND PROJECT AUTOMATION**	**L**	**T**	**P**	**Credit**
Course Code:	**UCVMN0641**	**3**	**-**	**-**	**3**

Course Pre-Requisite:

Basic Projects and Management, Lean Concept and Management Approach, Productivity Measurement System

Course Description:

Students will be learning Lean tools practiced worldwide and developing systems for project automation.

Course Learning Objectives:

This Course will assist students in understanding an tools and practices.

Course Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	Understand lean tools and practices employed by any industry	2	Understand
CO2	Analyze the application of the Last Planner System (LPS) in collaborative planning	4	Analyze
CO3	Evaluate the integration of Lean and BIM for project automation.	5	Evaluate
CO4	Devise systems for performance improvement by construction automation	6	Create

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	1	1			2	1				2
CO2	1	1	1	1	2		1	2	2	2	2
CO3	1	1		2	3	2		2	2	2	1
CO4	2	1	2	2	3	2		2	3	3	1

CO	PSO1	PSO2	PSO3
CO1	2	1	3
CO2	2	1	1
CO3	2	2	1
CO4	3	2	2

Assessments:

Teacher Assessment:

- End Semester Examination (ESE) having 100 marks Assessment is based on Theory End Semester Examination with equal weightage to each unit of the course. Question Paper may include Combination of Multi choice questions and Descriptive nature questions.

Assessment	Marks
ESE	100

Course Contents:

Unit: 1	**CO: 1**	
Collaborative Planning System: Project planning & monitoring, Project control through big room approach, Communication, authentication, collaboration, Document Management & case studies		**06 Hrs.**
Unit: 2 -	**CO:2**	
Last Planner System (LPS): Introduction to Last planner system & its components: Master Schedule, Phase schedules, Weekly schedule, Constraint analysis, Look ahead plan, case studies.		**12 Hrs.**
Unit: 3 -	**CO: 3**	
Lean & Building Information Modelling (BIM): Need for BIM, BIM Workflow, BIM Execution Plan, Introduction to Augmented reality & virtualization, Cloud and real time collaboration, Digital Twin and Facility management, Case studies		**10 Hrs.**
Unit: 4 -	**CO: 4**	
Project Automation: Future Project Site, Introduction to prefabrication and modular techniques, 3D Printing and Additive manufacturing, Mechanization & robotics application, Big Data analytics, Automation strategies & its Impact		**12 Hrs.**

References Books:

1. Modern Construction Lean Project Delivery and integrated Practices (Industrial Innovation) by Lincoln H. Forbes & Syed M. Ahmed.
2. Modern Construction Management by Frank Harris , Ronald Mccaffer
3. Lean in Construction Projects by Tomas Lindhom
4. Lean Construction Management by Shang Gao · Sui Pheng Low