

BMEE309L	Lean Manufacturing	L	T	P	C
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Pre-requisite	NIL	Syllabus version			
		1.0			
Course Objectives					
1. To provide practical level understanding of the key elements of lean production systems. 2. To impart knowledge on systematic approach for implementing value stream mapping. 3. To inculcate the practice of operational excellence through Toyota's way.					
Course Outcomes					
At the end of the course, the student will be able to					
1. Identify key requirements and concepts in lean production system. 2. Apply the stability and standardized work systems. 3. Demonstrate the JIT and Jidoka and implement Lean culture. 4. Map the value chain, predict the value addition and apply the value stream. 5. Implement the 14 principles of Toyota's operational excellence.					
Module:1	Lean Production System	5 hours			
Birth of lean production: Types of production systems-Craft Production-Mass Production-Ford System, Growing Dysfunction, Birth of lean production, Virtue of necessity, Lean revolution at Toyota. Lean production system: Why lean production? Systems and Systems thinking, Basic image of lean production, Customer focus, Muda, Mura, Muri.					
Module:2	Stability and Standardized work	7 hours			
Stability: Standards in lean system, 5S system, Total Productive Maintenance. Standardized work: Lean thinking, Why standardized work? Elements of standardized work, Charts Used to Define Standardized Work, Manpower reduction, Overall efficiency versus Individual efficiency, Standardized Work and Kaizen, Common layouts.					
Module:3	Just-in-Time Production	7 hours			
Why JIT, Principles of JIT, JIT system, Kanban, Kanban rules, Expanded role of conveyance, Production levelling, Three types of pull systems, Value stream mapping. Jidoka Concept: Development of Jidoka concept, Why Jidoka, Poka-Yoke, Inspection systems and zone control, using Poka-Yokes and Implementing Jidoka					
Module:4	Involvement, Hoshin planning, and Culture	6 hours			
Involvement: Why involvement? Terrible waste of humanity, Activities supporting involvement, Kaizen circle activity, Practical kaizen training, Suggestion programs. Hoshin planning: What is planning? Why plan? Problems with planning, Hoshin planning, Hoshin planning system, Four phases of hoshin planning. The culture of Lean Production: What is lean culture? How does lean culture feel?					
Module:5	Value Stream Management Process	6 hours			
Why Use Value Stream Management? Attributes of Value Stream Management, Commit to Lean: Management Push or Worker Pull? Key Management Activities, Invest in Your People, Short-Term Pains and Long-Term Gains, Implementing Lean Transforms a Business Culture, Commitment checklist. Choose the Value Stream: What Is a Value Stream? Selecting Value Streams for Improvement, Additional Considerations for Value Stream Selection. Learn about Lean: Training and Doing, Key Concepts of Lean, Three Stages of Lean Application, Identify Non-Lean Conditions					
Module:6	Value Stream Mapping	6 hours			
Map the Current State: Value Stream Mapping, How to Map the Current State, Case Study. Identify Lean Metrics: Fundamentals, Steps for Identifying Lean Metrics, Premiere Manufacturing Case Study, Help Identify Wastes, Lean Manufacturing Assessment. Map the Future State: Focus on three stages - Customer demand - Continuous flow - Leveling.					

Create and Implement Kaizen Plans: Value Stream “Kaizen” Events, Planning Recap, Prepare for Implementation, Recommendations.			
Module:7	The world-class power of the Toyota way		6 hours
The Toyota Way: using operational excellence as a Strategic Weapon, A storied history: How Toyota became the World’s Best Manufacturer, 14 principles of Toyota way (Part 1 Philosophy: long-term systems thinking; Part 2 Process: struggle to flow value to each customer; Part 3 People: respect, challenge, and grow your people and partners toward a vision of excellence; Part 4 Problem Solving: think and act scientifically to improve toward a desired future, Part 5 Conclusion: Be thoughtful and evolve your enterprise).			
Module:8	Contemporary Issues		2 hours
		Total Lecture hours:	45 hours
Text Books			
1.	Pascal Dennis, Lean Production Simplified: A Plain-Language Guide to the World's Most Powerful Production System, 2015, Third Edition, CRC Press-Taylor & Francis, UK.		
2.	Don Tapping, Tom Luyster and Tom Shuker, Value Stream Management: Eight Steps to Planning, Mapping, and Sustaining Lean Improvements, Productivity Press, New York, 2002		
3.	Jeffrey K. Liker, The Toyota Way: 14 management principles from the world’s greatest manufacturer, 2021, Second edition, McGraw-Hill Edition.		
Reference Books			
1.	Masaaki Imai, Gemba Kaizen: A Commonsense, Low-Cost Approach to Management, 1997, McGraw-Hill.		
2.	James P. Womack and Daniel T. Jones, Lean Thinking: Banish Waste & Create Wealth in Your Corporation, 2001, Revised Edition, Simon & Shuster.		
3.	Mike Rother, Learning to See: Value Stream Mapping to Create Value & Eliminate MUDA, 2003, Lean Enterprise Institute.		
4.	Jeffrey K Liker and David Meier, The Toyota Way Field Book: A Practical Guide for Implementing Toyota’s 4Ps, 2006, Tata McGraw-Hill Edition.		
5.	John Allen, Charles Robinson and David Stewart, Lean Manufacturing: A Plant Floor Guide, 2001, Society of Manufacturing Engineers, Michigan.		
6.	Mike Rother, “Toyota Kata: Managing People for Improvement, Adaptiveness, and Superior Results”, 2010, Tata McGraw-Hill Edition.		
Mode of Evaluation: CAT, Written assignment, Quiz, FAT			
Recommended by Board of Studies		09-03-2022	
Approved by Academic Council		No. 65	Date 17-03-2022