

Course number and name	END 445 / Lean Production Systems
Credits, contact hours, categorization of credits	3 credits / 42 hours / Engineering topic
Instructor or course coordinator	Ufuk CEBECİ
Text book and other supplemental materials	<ul style="list-style-type: none"> • Baudin, M. (2004). Lean Logistics: The Nuts and Bolts of Delivering Materials and Goods, Productivity Press, New York. • Black, J.T. & Hunter, S.L. (2003). Lean Manufacturing Systems and Cell Design, Society of Manufacturing Engineers. • Gross, J.M. & Mcinnis, K.R. (2003) Kanban Made Simple, American Management Association. • Hirano, H. (1995). Pillars of the Visual Workplace: the sourcebook for 5S Implementation. Translated by Bruce Talbot. Portland: Productivity Press. • McIntosh, R.I., Culley, S.J., Mileham, A.R., Owen, G.A. (2001). Improving changeover performance [electronic resource]: a strategy for becoming a lean, responsive manufacturer. Oxford; Boston: Butterworth-Heinemann. • Monden, Y. (1993) Toyota Production System, An Integrated Approach to Just-In-Time, Industrial Engineering and Management Press. • Nicholas, J.M. (1998). Competitive Manufacturing Management. Irwin/McGraw-Hill. • Ohno, T. (1988). Toyota Production System: Beyond Large Scale Production. Productivity Press. • Tapping, D., Luyster, T., Shuker, T. (2003). Value stream management for the lean office: 8 steps to planning, mapping, and sustaining lean improvements in administrative areas. New York: Productivity Press.

Course information	
Content	Introduce lean thinking and lean manufacturing and provide knowledge and skills required to design a waste-free effective production system.
Prerequisites	None
Type	Selected elective

Course learning outcomes
<p>Students who pass the course will:</p> <ol style="list-style-type: none"> I. design a Just-in-Time management system, II. apply various techniques of waste elimination in a production system, III. sketch a value-stream map of a system, IV. perform production smoothing, V. comprehend the link between production lead time and inventory costs.

Student outcomes	Level of contribution
SO1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	High
SO2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	Partial
SO3. An ability to communicate effectively with a range of audiences.	Partial
SO4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	Partial
SO5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	High
SO6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	Partial
SO7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	High

Week	Topics	Learning outcome(s)
1	Methodology of Just-in-Time Production Management; Types of Wastes (Muda) and Techniques of Eliminating "Muda" in Production Systems	I, II
2	Industrial Housekeeping (5S), Visual Workplace and A3 Thinking	I, II
3	Set-up Analysis and Reduction & Total Productive Maintenance (TPM)	I, II
4	Push, Pull and Hybrid Production Control Systems; Paper Airplane Exercise	III, IV
5	Types of Kanbans, Kanban System Design and Applications	III, IV
6	Value Stream Mapping and Management	VI
7	Value Stream Mapping Application	V
8	Production Lead Times and Inventory Costs	I, VI
9	Production Smoothing and Mixed Model Assembly Line Scheduling	I, VI
10	Lean Supply Chain Management	I, VI
11	Lean Logistics Application within the Factories	I, II, III, IV, VI
12	Supply Chain Game	I, II, III, IV, VI
13	Project Presentations – 1	I, II
14	Project Presentations – 2	I, II