

Education level	MASTER PROGRAM
Department	INDUSTRIAL ENGINEERING
University	INSTITUT TEKNOLOGI SEPULUH NOPEMBER

1. LEARNING OUTCOMES OF MASTER'S DEGREE

Department Learning Outcomes		
Working skill	1.1	To be able to formulate problem in industrial system, either micro, meso or macro, to propose alternative solution, and to evaluate in multi discipline or inter-discipline perspective to achieve the best alternative of recommendation in the extent of efficiency, effectivity, and sustainable environment as well.
Knowledge to cope with	2.1	To comprehend and innovatively to perform theoretical improvement in Industrial Engineering discipline by focusing on system approach to design, improve and install an integrated system including man, material, machine, information, energy and other resources.
Managerial skill	3.1	To be able to manage research and development activities in industrial engineering discipline based on academic norms fairly and responsibly and to be able to communicate ideas and research results effectively both in Bahasa Indonesia and English in order to achieve national and international recognition.
Attitude and conduct	4.1	To be able to manage his/herself and to behave professionally in working environment.
	4.2	To be able to communicate ideas systematically, both oral or written in Bahasa Indonesia or English.
	4.3	To be able to cooperate in team proportionally in accordance to working demand.
	4.4	To have sensitivity to environmental and sustainability issues and to accommodate those issues in performing analysis, design, and decision making.
	4.5	To be able to be creative and innovative in some aspects of living, especially to those with relation to his/her profession.

Department's Learning Outcome in Detail		
Working Skill	1.1.1	To be able to include other discipline, skill, and modern technique needed into problem solving or integrated system design in service or manufacturing industry.
	1.1.2	To be able to control the design process of integrated system in service or manufacturing adaptive-industry.
	1.1.3	To be able to provide integrated system development in service and manufacturing industry in more efficient and effective way.
	1.1.4	To be able to formulate new ideas in technology development for integrated system in service and manufacturing industry.
	1.1.5	To be able to deepen and widen the theory in system engineering for in service and manufacturing industry in order to contribute original and reliable research independently.
	1.1.6	To be able to record and communicate research result and design to contribute theoretically and acknowledged by experts in national and international level.
	1.1.7	To be able to propose alternative solution to specific problem in industry, either in micro, meso, or macro level and to evaluate alternative solution to get the best recommendation in the perspective of efficiency, effectivity, and environmental sustainability as well.

Knowledge to cope with	2.1.1	To comprehend basic quantitative science, especially mathematics and statistics.
	2.1.2	To comprehend basic engineering to support industrial engineering knowledge.
	2.1.3	To comprehend basic management and economics.
	2.1.4	To comprehend in detail industrial engineering knowledge.
	2.1.5	To comprehend system theory (including analysis, design, dynamics, engineering, methodology and system control) and application of up-to-dated engineering mathematics.
	2.1.6	To comprehend methods and techniques needed to analyze and design integrated system in in service and manufacturing industry.
	2.1.7	To comprehend inter-discipline contextual and recent approach in designing integrated system in service and manufacturing industry.
Managerial Skill	3.1.1	To be able to work in cross-functional organization or inter-organization level in business and supply chain network.
	3.1.2	To be able to plan, execute, and to control that plan in the situation of limited resources.
	3.1.3	To be able to make a decision or to give direction in decision making correctly based on data and information.
	3.1.4	To be able to report the group's work outcome to be used as information for higher organizational level or other authorized body.
Attitude and conduct	4.1.1	To be able to manage his/herself and to behave professionally in working environment.
	4.1.2	To be able to work in team proportionally in accordance with working demand.
	4.1.3	To be able to communicate his/her idea systematically both oral and written in Bahasa Indonesia and English.
	4.1.4	To be sensitive to environmental and sustainability issues and to accommodate those issues in analysis, design, and decision making.
	4.1.5	To be able to be creative and innovative in some aspects of living, especially to those with relation to his/her profession.

2. COURSE LIST CURRICULUM

COMPULSORY COURSE FOR EACH CONCENTRATION

N o.	Code	Course	Credit
SEMESTER I (All Concentration)			
1	TI142301	Advanced Industrial Statistics	2
2	TI142302	Advanced Operational Research	3
3	TI142303	Cost and Investment Management	2
4	TI142304	Advanced Production Planning and Control	3
Credit Subtotal			10
SEMESTER I (Operation and Supply Chain Engineering Concentration)			
1	TI142301	Advanced Industrial Statistics	2
2	TI142302	Advanced Operational Research	3
3	TI142303	Cost and Investment Management	2
4	TI142304	Advanced Production Planning and Control	3
5	TI 142311	Advanced Manufacturing System	3
Credit Subtotal			13
Bridging program in semester 1 and 2 (all concentration) for students whose undergraduate program were not Industrial Engineering			
1	-	Engineering Economics	3
2	-	Facility Planning (for QMM concentration) or Manufacturing System for other than QMM concentration)	3 atau 4
SEMESTER II			
QUALITY AND MANUFACTURING MANAGEMENT CONCENTRATION			
1	TI 142311	Advanced Manufacturing System	3
2	TI142312	Quality Engineering	3
3	TI142305	Research Methodology	2
4	TI14241X	Elective Course 1	2
Credit subtotal			10
INDUSTRIAL SYSTEM OPTIMIZATION CONCENTRATION			
1	TI142321	Engineering Optimization	3
2	TI142322	System Dynamics	3
3	TI142305	Research Methodology	2
4	TI14242X	Elective Course 1	2
Credit subtotal			10
LOGISTICS AND SUPPLY CHAIN MANAGEMENT CONCENTRATION			
1	TI142331	Supply Chain Engineering	3
2	TI142332	Transportation & Distribution System Design	3
3	TI142305	Research Methodology	2
4	TI14243X	Elective Course 1	2
Credit subtotal			10
INDUSTRIAL ERGONOMICS AND SAFETY CONCENTRATION			
1	TI142341	Applied Ergonomics	3
2	TI142342	Human Factors in Product Design And Development	3

3	TI142305	Research Methodology	2
4	TI14244X	Elective Course 1	2
Credit subtotal			10
ENGINEERING MANAGEMENT CONCENTRATION			
1	TI142351	Project Management	3
2	TI142352	Product Development and Commercialization	3
3	TI142305	Research Methodology	2
4	TI14245X	Elective Course 1	2
Credit Subtotal			10
OPERATIONS AND SUPPLY CHAIN ENGINEERING CONCENTRATION			
1	TI142331	Supply Chain Engineering	3
2	TI142312	Quality Engineering	3
3	TI142334	Contemporary Logistics	2
4	TI142305	Research Methodology	2
Credit Subtotal			10
SEMESTER III			
QUALITY AND MANUFACTURING MANAGEMENT CONCENTRATION			
1	TI142313	Green Manufacturing	3
2	TI142314	Reliability Engineering	2
3	TI142306	Proposal Seminar	3
4	TI14241X	Elective Course 2	2
Credit subtotal			10
INDUSTRIAL SYSTEM OPTIMIZATION CONCENTRATION			
1	TI142323	Metaheuristik	3
2	TI142324	Industrial System Simulation	2
3	TI142306	Proposal Seminar	3
4	TI14242X	Elective Course 2	2
Credit subtotal			10
LOGISTICS AND SUPPLY CHAIN MANAGEMENT CONCENTRATION			
1	TI142333	Procurement And Materials Management	3
2	TI142334	Contemporary Logistics	2
3	TI142306	Proposal Seminar	3
4	TI14243X	Elective Course 2	2
Credit Subtotal			10
INDUSTRIAL ERGONOMICS AND SAFETY CONCENTRATION			
1	TI142343	Safety And Health System Engineering	3
2	TI142344	Work Method Design	2
3	TI142306	Proposal Seminar	3
4	TI14244X	Elective Course 2	2
Credit Subtotal			10
ENGINEERING MANAGEMENT CONCENTRATION			
1	TI142353	Knowledge And Innovation Management	3
2	TI142354	Strategic Management	2
3	TI142306	Proposal Seminar	3
4	TI14245X	Elective Course 2	2
Credit Subtotal			10
OPERATIONS AND SUPPLY CHAIN ENGINEERING CONCENTRATION			

1	TI142461	Internship	4
2	TI142462	Seminar Professional Development	2
Credit Subtotal			6
SEMESTER IV (All Concentration)			
1	TI142307	Thesis	6
Credit Subtotal			6

ELECTIVE COURSE FOR ALL CONCENTRATION

N	Code	Course	Credit
o.			
1	TI142411	Computer Integrated Manufacturing	2
2	TI142412	Concurrent Engineering	2
3	TI142413	Maintenance And Warranty Management	2
4	TI142414	Product Life Cycle Management	2
5	TI142415	Manufacturing Productivity	2
6	TI142416	Lean Six Sigma	2
7	TI142421	Game Theory	2
8	TI142422	Data Mining	2
9	TI142423	Multicriteria Decision Making	2
10	TI142431	Aviation Logistics	2
11	TI142432	Demand and Revenue Management	2
12	TI142441	Macro Ergonomics	2
13	TI142442	Work Functions and Biomechanics	2
14	TI142451	Finance for Engineer	2
15	TI142452	Enterprise Risk Management	2
16	TI142453	Organizational Behavior and Human Resource Management	2
17	TI142454	Performance Management	2
18	TI142461	Internship	4
19	TI142462	Seminar Professional Development	2