

SATUAN ACARA PERKULIAHAN
PERENCANAAN DAN PENGENDALIAN PRODUKSI

Oleh :

Prof. Dr. Ir. Machfud, MS

Prof. Dr. Ir. Sukardi, MM

Dr. Ir. Elisa Anggraeni, MSc

M. Arif Darmawan, STP, MT



DEPARTEMEN TEKNOLOGI INDUSTRI PERTANIAN
FAKULTAS TEKNOLOGI PERTANIAN
INSTITUT PERTANIAN BOGOR

2016

Course Syllabus

Production Planning and Inventory Control

Course title	Production Planning and Inventory Control		
Course code: TIN312	Credits: 3(2-3)	Semester: 6	Compulsory/optional: Compulsory
Coordinator's name	Prof. Dr. Ir. Machfud, MS	Instructor's name	Prof. Dr. Sukardi, MSc Dr. Elisa Anggraeni, M. Arif Darmawan, STP, MT
Main reference (Title, author, year) (maximum 3 references)	<ol style="list-style-type: none"> 1. Stefan VoB and David L. Woodruff. 2006. Introduction to Computational Optimization Models for Production Planning in Supply Chain, 2th edition. Springer – Verlag Berlin Heidelberg 2. Stephen N. Chapman. 2006. The Fundamentals of Production Planning and Control. Pearson Prentice Hall 3. Tony Wild and Butterworth Heinemann. 2002. Best Practice in Inventory Management 2th edition. 4. Kempf G Karl, Keskinocak P, and Uzsoy R. 2011. Planning Production and Inventories in the Extended Enterprise. Springer 		
Additional reference (Supplemental materials)	<ol style="list-style-type: none"> 1. Stephen N. Chapman. 2006. Fundamentals of Production Planning and Control. Prentice Hall. 2. John F. Barlow. Excel Models for Business and Operations Management. 2nd Ed. 2005 John Wiley & Sons, USA. 3. Lee J. Krajewski, Larry P. Ritzman, and Manoj K. Malhotra. 2010. Operations Management, Processes and Supply Chains. 9th Ed Pearson Education Inc. New Jersey. 4. Jay Heizer and Barry Render. 2006. Principles of Operations Management. Prentice Hall, New Jersey 		
Brief description	This course is designed to give the students a comprehensive understanding and skill in the production system. It will cover the factors, techniques and method of forecasting, production planning, master scheduling, production/job scheduling, and control of deterministic and stochastic inventory systems, material requirement planning and enterprise resource planning.		
Prerequisite	1. Statistical Method		
Course outcome	<ol style="list-style-type: none"> A. Understand the basic concepts and principles of production planning and inventory control, and its role to improve productivity of agro industry. B. Able to select and apply technique of time series forecasting method. C. Able to understand the objectives, factors and problems of aggregate production planning and apply quantitative methods and optimization techniques in planning the production. D. Able to understand the importance of inventory, the objectives and model of inventory control, and apply optimization techniques in controlling the inventory. E. Able to understand the objectives, factors and problems of production 		

	<p>scheduling and apply quantitative methods and optimization techniques in scheduling the production.</p> <p>F. Able to understand the objectives, principles and application of material requirement planning in production planning and inventory control.</p> <p>G. Able to apply concepts and principles by using computer software in production planning and inventory control</p> <p>H. Able to work with a team to design production planning and inventory control.</p>
Relationship between course outcomes and program outcomes	<ol style="list-style-type: none"> 1. Course outcome A, B, C, D, E, F, G supports student outcomes 1, 2, 4, 5, 6, 8, 9, 12 and 13. 2. Course outcome G supports student outcomes 1, 2, 5, 6, 7, 8, 9, 12, and 13.
Offered to	Study Program of Agroindustrial Technology-IPB and other study programs as elective course
Topics to be covered	<ol style="list-style-type: none"> 1. Introduction 2. Production Forecasting and Planning and forecasting method classification 3. Time series forecasting 4. Box – Jenkins Method 5. Aggregate production planning and MPS 6. Linear programming application in production planning 7. Inventory control 8. Deterministic inventory models 9. Probabilistic inventory models 10. Production operation scheduling 11. Just-in-Time and MRP system
ATSP Student Outcomes	<ol style="list-style-type: none"> 1. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities 2. An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies 4. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives 5. An ability to function effectively as a member or leader on a technical team 6. An ability to identify, analyze, and solve broadly-defined engineering technology problems 7. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature 8. An understanding of the need for and an ability to engage in self-directed continuing professional development 9. An understanding of and a commitment to address professional and

	ethical responsibilities including a respect for diversity				
	12. An ability to accomplish the integration of system using appropriate analytical, computational, and application practices and procedures				
	13. An ability to apply knowledge of probability, statistics, engineering economic analysis and cost control, and other technical sciences and specialties necessary in the field of agroindustrial engineering technology				
Percentage	Knowledge	45 %	Facility/media	x	White board
	Skill	40 %		x	LCD projector
	Attitude	15 %		x	Computer
Activity, contact hours (hour/week)	Lecture	2 hours/week		x	Wifi
	Lab work	3 hours/week		x	Sound system
	Tutorial	-			Courseware
	Others	-		Other:	
Assessment	Assignment	30 % (paper)			
	Examination	65 % (mid and final exams)			
	Quiz	5 %			

MAIN REFERENCE:

1. Kempf G Karl, Keskinocak P, and Uzsoy R. 2011. Planning Production and Inventories in the Extended Enterprise. Springer
2. Stefan VoB and David L. Woodruff. 2006. Introduction to Computational Optimization Models for Production Planning in Supply Chain, 2th edition. Springer – Verlag Berlin Heidelberg
3. Stephen N. Chapman. 2006. The Fundamentals of Production Planning and Control. Pearson Prentice Hall
4. Tony Wild and Butterworth Heinemann. 2002. Best Practice in Inventory Management 2th edition.

JADWAL DAN MATERI PERKULIAHAN

Week	Learning Outcomes	Topics	Sub Topics	Reference	Lecturer
1.	<p>Know:</p> <ul style="list-style-type: none"> Understand scope and role of production planning and control in agroindustry production management <p>Able to:</p> <ul style="list-style-type: none"> Describe, illustrate and present argument of the importance of PPC in agroindustry production management 	Introduction	<ul style="list-style-type: none"> ✓ PPC in agroindustry and its relations to productivity ✓ PPC scope in terms of system and material flow 	1,2	Machfud
2.	<p>Know:</p> <ul style="list-style-type: none"> Understand demand/supply forecasting in PPC Understand forecasting methods and technique <p>Able to:</p> <ul style="list-style-type: none"> Describe demand/supply forecasting method Apply smoothing method on data set <p>Aware:</p> <ul style="list-style-type: none"> Assumptions underlying smoothing 	Production Forecasting and Planning and forecasting method classification	<ul style="list-style-type: none"> ✓ Forecasting in planning ✓ Forecasting methods and characteristics ✓ Smoothing method 	1,2	Machfud
3.	<p>Know:</p> <ul style="list-style-type: none"> Understand moving average 	Time series forecasting	<ul style="list-style-type: none"> ✓ Moving average 	1	Machfud
4.	<ul style="list-style-type: none"> Understand exponential 		<ul style="list-style-type: none"> ✓ Exponential smoothing ✓ Decomposition 		

	<p>smoothing</p> <ul style="list-style-type: none"> • Understand decomposition method <p>Able to:</p> <ul style="list-style-type: none"> • Apply moving average method to given time-series data • Apply exponential smoothing method to given time-series data • Apply decomposition method to given time-series data • Present and communicate in a group discussion result and argument <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying moving average, exponential smoothing and decomposition method 				
5.	Know:	Box – Jenkins Method	<ul style="list-style-type: none"> ✓ Tools and statistical measures for time series data analyzes ✓ ARIMA model ✓ Steps in Box-Jenkins method 	1	Machfud
6.	<ul style="list-style-type: none"> • Understand Box-Jenkins method as a forecasting method • Understand ARIMA models <p>Able to:</p> <ul style="list-style-type: none"> • Apply Box-Jenkins method to a set of data with statistical software • Identify, categorize and analyze ARIMA models 				

	<ul style="list-style-type: none"> • Present and communicate in a group discussion result and argument <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying Box-Jenkins/ARIMA method 				
7.	<p>Know:</p> <ul style="list-style-type: none"> • Understand aggregate production planning understand dis-aggregation method understand master production schedule and methods in designing MPS <p>Able to:</p> <ul style="list-style-type: none"> • Apply aggregate production planning, dis-aggregation, and mps • Present and communicate in a group discussion result and argument <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying aggregate production planning 	Aggregate production planning and MPS	<ul style="list-style-type: none"> ✓ Understanding and goal of aggregate production planning ✓ Dis-aggregation and Master Production Schedule ✓ Graphical technique, management coefficient and parametric method 	1,2	Machfud
<i>Midterm Exam</i>					
8.	<p>Know:</p> <ul style="list-style-type: none"> • Understand static demand • Understand dynamic demand • Understand linear programming 	Linear programming application in production planning	<ul style="list-style-type: none"> ✓ Linear programming model in static demand ✓ Linear programming in dynamic demand 	1,2	Sukardi
9.					

	<p>Able to:</p> <ul style="list-style-type: none"> • Apply linear programming by formulating static demand • Apply linear programming by formulating dynamic demand <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying aggregate production planning 				
10.	<p>Know:</p> <ul style="list-style-type: none"> • Understand definition, role and effectiveness in inventory control • Understand abc analyzes <p>Able to:</p> <ul style="list-style-type: none"> • Apply ABC method on inventory data <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying inventory control • Assumptions undelrying ABC analyzes 	Inventory control	<ul style="list-style-type: none"> ✓ Definition, role and efectiveness of inventory control to production control ✓ ABC analyzes 	2,3	Sukardi
11.	<p>Know:</p> <ul style="list-style-type: none"> • Understand effectiveness measures and inventory component • Understand factors and models in inventory control <p>Able to:</p> <ul style="list-style-type: none"> • Identify inventory cost 	Inventory control	<ul style="list-style-type: none"> ✓ Effectiveness measures and inventory cost component ✓ Factors and models in inventory control 	3,4	Sukardi

	<p>component</p> <p>Aware:</p> <ul style="list-style-type: none"> Assumptions underlying inventory control 				
12.	<p>Know:</p> <ul style="list-style-type: none"> Understand probabilistic inventory model Understand discount price in ordering policy <p>Able to:</p> <ul style="list-style-type: none"> Apply deterministic inventory model (i.e. EOQ, ROP) <p>Aware:</p> <ul style="list-style-type: none"> Assumptions underlying deterministic inventory model 	Probabilistic inventory models	<ul style="list-style-type: none"> ✓ Formulation and application of probabilistic inventory model ✓ Continuous and periodic probabilistic model ✓ Simulation technique in inventory control 	2,3	Sukardi
13.	<p>Know:</p> <ul style="list-style-type: none"> Understand aggregate production planning Understand dis-aggregation method Understand master production schedule and methods in designing MPS <p>Able to:</p> <ul style="list-style-type: none"> Apply aggregate production planning, dis-aggregation, and MPS <p>Aware:</p> <ul style="list-style-type: none"> Assumptions underlying aggregate production planning 	Production operation scheduling	<ul style="list-style-type: none"> ✓ Understanding, definition and goal of production operation scheduling ✓ Production operation sequencing algorithm in job-shop and flow shop ✓ Assignment and waiting line model application in production scheduling 	1,2	Sukardi

14.	<p>Know:</p> <ul style="list-style-type: none"> • Understand aggregate production planning • Understand dis-aggregation method • Understand master production schedule and methods in designing MPS <p>Able to:</p> <ul style="list-style-type: none"> • Apply aggregate production planning, dis-aggregation, and MPS <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying aggregate production planning 	Sistem Just-in-Time dan MRP	<ul style="list-style-type: none"> ✓ Understanding, charactersitics and application requirements in JIT production system ✓ Understanding, charactersitics and application requirements in MRP production system 	1,2	Sukardi
<i>Final Exam</i>					

JADWAL DAN MATERI RESPONSI

Week	Learning Outcomes	Topics	Sub Topics	Lecturer
1.	<p>Know:</p> <ul style="list-style-type: none"> • Understand scope and role of production planning and control in agroindustry production management <p>Able to:</p> <ul style="list-style-type: none"> • Describe, illustrate and present argument of the importance of PPC in agroindustry production management 	Introduction	<ul style="list-style-type: none"> ✓ PPC in agroindustry and its relations to productivity ✓ PPC scope in terms of system and material flow 	Elisa
2.	Know:	Production Forecasting	✓ Forecasting in planning	Elisa

	<ul style="list-style-type: none"> • Understand demand/supply forecasting in PPC • Understand forecasting methods and technique <p>Able to:</p> <ul style="list-style-type: none"> • Describe demand/supply forecasting method • Apply smoothing method on data set <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying smoothing 	and Planning and forecasting method classification	<ul style="list-style-type: none"> ✓ Forecasting methods and characteristics ✓ Smoothing method 	
3.	Know:	Time series forecasting	<ul style="list-style-type: none"> ✓ Moving average ✓ Exponential smoothing ✓ Decomposition 	Elisa
4.	<ul style="list-style-type: none"> • Understand moving average • Understand exponential smoothing • Understand decomposition method <p>Able to:</p> <ul style="list-style-type: none"> • Apply moving average method to given time-series data • Apply exponential smoothing method to given time-series data • Apply decomposition method to given time-series data • Present and communicate in a group discussion result and argument <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying moving average, exponential 			

	smoothing and decomposition method			
5.	Know:	Box – Jenkins Method	✓ Tools and statistical measures for time series data analyzes	Elisa
6.	<ul style="list-style-type: none"> • Understand Box-Jenkins method as a forecasting method • Understand ARIMA models Able to: <ul style="list-style-type: none"> • Apply Box-Jenkins method to a set of data with statistical software • Identify, categorize and analyze ARIMA models • Present and communicate in a group discussion result and argument Aware: <ul style="list-style-type: none"> • Assumptions underlying Box-Jenkins/ARIMA method 		<ul style="list-style-type: none"> ✓ ARIMA model ✓ Steps in Box-Jenkins method 	
7.	Know: <ul style="list-style-type: none"> • Understand aggregate production planning understand dis-aggregation method understand master production schedule and methods in designing MPS Able to: <ul style="list-style-type: none"> • Apply aggregate production planning, dis-aggregation, and mps • Present and communicate in a group discussion result and argument Aware:	Aggregate production planning and MPS	<ul style="list-style-type: none"> ✓ Understanding and goal of aggregate production planning ✓ Dis-aggregation and Master Production Schedule ✓ Graphical technique, management coefficient and parametric method 	Elisa

	<ul style="list-style-type: none"> Assumptions underlying aggregate production planning 			
<i>Midterm Exam</i>				
8.	<p>Know:</p> <ul style="list-style-type: none"> Understand static demand Understand dynamic demand Understand linear programming <p>Able to:</p> <ul style="list-style-type: none"> Apply linear programming by formulating static demand Apply linear programming by formulating dynamic demand <p>Aware:</p> <ul style="list-style-type: none"> Assumptions underlying aggregate production planning 	Linear programming application in production planning	<ul style="list-style-type: none"> Linear programming model in static demand Linear programming in dynamic demand 	Arif
9.				
10.	<p>Know:</p> <ul style="list-style-type: none"> Understand definition, role and effectiveness in inventory control Understand abc analyzes <p>Able to:</p> <ul style="list-style-type: none"> Apply ABC method on inventory data <p>Aware:</p> <ul style="list-style-type: none"> Assumptions underlying inventory control Assumptions underlying ABC analyzes 	Inventory control	<ul style="list-style-type: none"> Definition, role and effectiveness of inventory control to production control ABC analyzes 	Arif
11.	<p>Know:</p> <ul style="list-style-type: none"> Understand effectiveness measures and inventory component 	Inventory control	<ul style="list-style-type: none"> Effectiveness measures and inventory cost component Factors and models in inventory control 	Arif

	<ul style="list-style-type: none"> • Understand factors and models in inventory control <p>Able to:</p> <ul style="list-style-type: none"> • Identify inventory cost component <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying inventory control 			
12.	<p>Know:</p> <ul style="list-style-type: none"> • Understand probabilistic inventory model • Understand discount price in ordering policy <p>Able to:</p> <ul style="list-style-type: none"> • Apply deterministic inventory model (i.e. EOQ, ROP) <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying deterministic inventory model 	Probabilistic inventory models	<ul style="list-style-type: none"> ✓ Formulation and application of probabilistic inventory model ✓ Continuous and periodic probabilistic model ✓ Simulation technique in inventory control 	Arif
13.	<p>Know:</p> <ul style="list-style-type: none"> • Understand aggregate production planning • Understand dis-aggregation method • Understand master production schedule and methods in designing MPS <p>Able to:</p> <ul style="list-style-type: none"> • Apply aggregate production planning, dis-aggregation, and MPS <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying 	Production operation scheduling	<ul style="list-style-type: none"> ✓ Understanding, definition and goal of production operation scheduling ✓ Production operation sequencing algorithm in job-shop and flow shop ✓ Assignment and waiting line model application in production scheduling 	Arif

	aggregate production planning			
14.	<p>Know:</p> <ul style="list-style-type: none"> • Understand aggregate production planning • Understand dis-aggregation method • Understand master production schedule and methods in designing MPS <p>Able to:</p> <ul style="list-style-type: none"> • Apply aggregate production planning, dis-aggregation, and MPS <p>Aware:</p> <ul style="list-style-type: none"> • Assumptions underlying aggregate production planning 	Sistem Just-in-Time dan MRP	<ul style="list-style-type: none"> ✓ Understanding, characteristics and application requirements in JIT production system ✓ Understanding, characteristics and application requirements in MRP production system 	Arif
<i>Final Exam</i>				