

**SATUAN ACARA PERKULIAHAN**

**PENELITIAN OPERASIONAL**

**Oleh :**

**Dr. Eng. Ir. Taufik Djatna, M.Si**

**Prof. Dr. Ir. Sukardi, MM**

**Dr. Ir. Hartrisari H,DEA**

**Ir. Elisa Anggraeni, M.Sc**



**DEPARTEMEN TEKNOLOGI INDUSTRI PERTANIAN**

**FAKULTAS TEKNOLOGI PERTANIAN**

**INSTITUT PERTANIAN BOGOR**

**2016**

## Course Syllabus Operation Research

Course title	Operation Research		
Course code: TIN311	Credits: 3(2-3)	Semester: 5	Compulsory/optional: Compulsory
Coordinator's name	Dr. Eng. Ir. Taufik Djatna, MSi	Instructor's name	Prof. Dr. Ir. Sukardi, MM Dr. Ir. Hartrisari Hardjomidjojo, DEA Dr. Ir. Elisa Aggraeni, MSc
Main reference (Title, author, year) (maximum 3 references)	<ol style="list-style-type: none"> <li>1. Taha. H. 2010. Introduction to Operations Research 5th Edition. Mc. Graw Hills.</li> <li>2. Lieberman. H. 2010. Operations Research: An Introduction. Prentice Halls.</li> <li>3. Rader DJ. 2010, Deterministic Operations Research: Models and Methods in Linear Optimization. J. Wiley &amp; Sons</li> <li>4. Taylor BW. 2013. Introduction to Management Science. 11th edition. Prentice Hall</li> </ol>		
Additional reference (Supplemental materials)	<ol style="list-style-type: none"> <li>1. Hillier, F. S. and Lieberman, G. J. 2010, Introduction to Operations Research, 9th edn, McGraw-Hill</li> <li>2. Ravindran, R. 2009, <i>Operations Research</i>, CRC Press</li> </ol>		
Brief description	<p>Operations research is a very important area of study, which tracks its roots to business applications. It combines the three broad disciplines of Mathematics, Computer Science, and Business Applications. This course will formally develop the ideas of developing, analyzing, and validating mathematical models for decision problems, and their systematic solution. The course will involve programming and mathematical analysis.</p>		
Prerequisite	None		
Course outcome	<ol style="list-style-type: none"> <li>A. Explain the definition and scope of operations research in general formulation, thinking, definitions of variables, type of data, level and scale of measurement, operational definition</li> <li>B. Explain principles of Linear programming techniques: mathematical formulation and graphical solutions approach</li> <li>C. Explain Simplex Methods and matrices approach with Revised Simplex Methods to solve simple to moderate problems</li> <li>D. Explain principles and computational aspect of duality Theory and Sensitivity Analysis</li> <li>E. Explain principles and computational aspect of transportation Models and Assignments Methods</li> <li>F. Explain principles and computational aspect of Integer programming</li> <li>G. Explain principles and computational aspect of Network Analysis</li> <li>H. Explain principles and computational aspect of Goal programming</li> <li>I. Explain principles and computational aspect of Dynamic Programming and recent progress in operations research</li> <li>J. Explain principles and computational aspect of Game Theory and recent</li> </ol>		

	progress in operations research				
Relationship between course outcomes and student outcomes	<ol style="list-style-type: none"> <li>1. Course outcome A supports student outcomes 1, 2, 3, 4, 5, 12, and 13.</li> <li>2. Course outcome B-J support student outcomes 1, 2, 6, 12, and 13.</li> </ol>				
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"> <li>1. Introduction</li> <li>2. Linear programming techniques: mathematical formulation and graphical solutions</li> <li>3. Simplex methods</li> <li>4. Transportation models</li> <li>5. Assignments methods</li> <li>6. Duality theory and sensitivity analysis</li> <li>7. Network analysis</li> <li>8. Revised simplex methods</li> <li>9. Goal programming</li> <li>10. Integer programming</li> <li>11. Dynamic programming</li> <li>12. Game Theory</li> </ol>				
ATSP Student Outcomes	<ol style="list-style-type: none"> <li>1. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities</li> <li>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</li> <li>3. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes</li> <li>4. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives</li> <li>5. An ability to function effectively as a member or leader on a technical team</li> <li>6. An ability to identify, analyze, and solve broadly-defined engineering technology problems</li> <li>12. An ability to accomplish the integration of system using appropriate analytical, computational, and application practices and procedures</li> <li>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</li> </ol>				
Percentage	Knowledge	65 %	Facility/media	x	White board
	Skill	20 %		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 % (mid and final exams)			
	Examination	70 % (mid and final exams)			
	Quiz	-			

MAIN REFERENCE:

1. Taha. H. 2010. Introduction to Operations Research 5th Edition. Mc. Graw Hills.
2. Lieberman. H. 2010. Operations Research: An Introduction. Prentice Halls.

## JADWAL DAN MATERI PERKULIAHAN

Week	Learning Outcomes	Topics	Reference	Lecturer
1	Explain the definition and scope of operations research in general formulation, thinking, definitions of variables, type of data, level and scale of measurement, operational definition	✓ Introduction to Operations Research, Idea, formulation	1,2	Elisa
2	Explain principles of Linear programming techniques : mathematical formulation and graphical solutions approach	✓ Linear programming techniques: mathematical formulation and graphical solutions	1,2	Elisa
3	Explain Simplex Methods and matrices approach with Revised Simplex Methods to solve simple to moderate problems	✓ Simplex Methods with revised simplex method	1,2	Elisa
4	Explain principles and computational aspect of duality Theory and Sensitivity Analysis	✓ Duality Theory	1,2	Hartrisari
5		✓ Sensitivity Analysis		
6	Explain principles and computational aspect of transportation Models and Assignments Methods	✓ Transportation Models	1,2	Hartrisari
7		✓ Assignments Methods		
<i>Midterm Exam</i>				
8	Explain principles and computational aspect of Integer programming	✓ Integer Programming	1,2	Sukardi
9				
10	Explain principles and computational aspect of Network Analysis	✓ Network Analysis - Distance based		Taufik
11		✓ Network Analysis – Time Based Project Planning		Taufik
12	Explain principles and computational aspect of Goal programming	✓ Goal Programming	1,2	Taufik
13	Explain principles and computational aspect of Dynamic Programming	✓ Dynamic Programming	1,2	Taufik
14	Explain principles and computational aspect of Dynamic Programming and recent progress in operations research	✓ Dynamic Programming + Recent Progress in OR	1,2	Taufik

15	Explain principles and computational aspect of Game Theory and recent progress in operations research	✓ Game Theory + Recent Progress in OR	1,2	Taufik
<i>Final Exam</i>				

### JADWAL DAN MATERI RESPONSI

Week	Learning Outcomes	Topics	Reference	Lecturer
1	Explain the definition and scope of operations research in general formulation, thinking, definitions of variables, type of data, level and scale of measurement, operational definition	✓ Introduction to Operations Research, Idea, formulation	1,2	Elisa
2	Explain principles of Linear programming techniques : mathematical formulation and graphical solutions approach	✓ Linear programming techniques: mathematical formulation and graphical solutions	1,2	Elisa
3	Explain Simplex Methods and matrices approach with Revised Simplex Methods to solve simple to moderate problems	✓ Simplex Methods with revised simplex method	1,2	Elisa
4	Explain principles and computational aspect of duality Theory and Sensitivity Analysis	✓ Duality Theory	1,2	Hartrisari
5		✓ Sensitivity Analysis		
6	Explain principles and computational aspect of transportation Models and Assignments Methods	✓ Transportation Models	1,2	Hartrisari
7		✓ Assignments Methods		
<i>Midterm Exam</i>				
8	Explain principles and computational aspect of Integer programming	✓ Integer Programming	1,2	Sukardi
9				
10	Explain principles and computational aspect of Network Analysis - Distance based	✓ Network Analysis - Distance based		Taufik

11	aspect of Network Analysis	✓ Network Analysis – Time Based Project Planning		Taufik
12	Explain principles and computational aspect of Goal programming	✓ Goal Programming	1,2	Taufik
13	Explain principles and computational aspect of Dynamic Programming and recent progress in operations research	✓ Dynamic Programming	1,2	Taufik
14	Explain principles and computational aspect of Game Theory and recent progress in operations research	✓ Dynamic Programming + Recent Progress in OR	1,2	Taufik
15	Explain principles and computational aspect of Game Theory and recent progress in operations research	✓ Game Theory + Recent Progress in OR	1,2	Taufik

*Final Exam*