

**SATUAN ACARA PERKULIAHAN**  
**TEKNIK OPTIMASI AGROINDUSTRI**

**Oleh :**

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**PROGRAM STUDI PASCASARJANA**  
**DEPARTEMEN TEKNOLOGI INDUSTRI PERTANIAN**  
**FAKULTAS TEKNOLOGI PERTANIAN**  
**INSTITUT PERTANIAN BOGOR**

**2016**

## Course Syllabus

### Agroindustry Optimization Techniques

Course title	Agroindustry Optimization Techniques		
Course code: TIN611	Credits: 3(2-3)	Semester: Genap	Compulsory/optional: Optional
Coordinator's name	Prof. Dr. Ir. Erliza Noor	Instructor's name	Dr. Ir. Yandra Arkeman
Main reference (Title, author, year) (maximum 3 references)	<ol style="list-style-type: none"> <li>1. Edwin C, Stanislaw H.Z. 2013. An Introduction to Optimization. John Wiley Publication</li> <li>2. J K Sharma, Operations Research Theory and Applications, MacMillan India Ltd</li> <li>3. Sergienko V Ivan. 2012. Methods of optimization and Systems Analysis for Problems of Transcomputational Complexity</li> </ol>		
Additional reference (Supplemental materials)	<ol style="list-style-type: none"> <li>1. Marti Kurt. 2015. Stochastic Optimization Methods. Springer, Verlag Berlin Heidelberg</li> </ol>		
Brief description	Discuss quantitative optimization techniques that could be used for the Agroindustry operation solutions. Introductions theory of errors in the calculation numerical. The conditions optimal for problems without constraints and problems with constraints. Numerical methods for optimization, Newton method application, line search algorithm, penalty method and Active Set Strategies for optimization		
Prerequisite			
Course outcome	<ol style="list-style-type: none"> <li>1. Able to understand importance of optimization of agroindustry management</li> <li>2. Able to apply basic concepts of mathematics to formulate an optimization problem</li> <li>3. Able to nalyse variety of performance measures for various optimization problem</li> </ol>		
Offered to	Study Program of Agro industrial Technology-IPB and other study programs as elective course		
Topics to be covered	<ol style="list-style-type: none"> <li>1. Basic of Set Constrained and Unconstrained Optimization</li> <li>2. One-Dimensional Search Methods</li> <li>3. Global Search Algorithm</li> <li>4. Linier Programming</li> <li>5. Problems with Equality Constraints</li> <li>6. Problems with Inequality Constraints</li> <li>7. Multiobjective Optimization</li> <li>8. Optimization Methods</li> <li>9. Sequential Analysis,</li> <li>10. Optimization Model</li> <li>11. Mathematical Modeling and Analysis of Complex Processes on Supercomputer System</li> <li>12. Analyzing the Solution of Complicated Combinatorial Problems</li> </ol>		

Percentage	Knowledge	40 %	Facility/media	x	White board
	Skill	40 %		x	LCD projector
	Attitude	20 %		x	Computer
Activity, contact hours (hour/week)	Lecture	2 hours/week		x	Wifi
	Lab work	2 hours/week		x	Sound system
	Tutorial	-			Courseware
	Others	40 %		Other: ....	
Assessment	Assignment	50% (paper, critical review, practical report)			
	Examination	50% (midterm and final exams)			
	Quiz	-			

### JADWAL DAN MATERI PERKULIAHAN

Week	Course Learning	Topic	Detail	Reference	Lecturer
1	Mampu melakukan analisis dan sintesis terhadap teknik <i>unconstrained optimization</i>	Basic of Set Constrained and Unconstrained Optimization	<ul style="list-style-type: none"> <li>✓ Introduction</li> <li>✓ Condition for Local Minimizers</li> </ul>	1	Yandra
2	Mampu melakukan analisis dan sintesis terhadap teknik optimasi <i>One dimensional Search</i>	One-Dimensional Search Methods	<ul style="list-style-type: none"> <li>✓ Golden Section Search</li> <li>✓ Fibonacci Method</li> <li>✓ Bisection Method</li> </ul>	1	Yandra
3			<ul style="list-style-type: none"> <li>✓ Newton's Method</li> <li>✓ Bracketing</li> </ul>	1	Yandra
4	Mampu melakukan analisis dan sintesis terhadap teknik optimasi <i>Global Search Algorithm</i>	Global Search Algorithm	<ul style="list-style-type: none"> <li>✓ The Nelder Mead Simplex</li> <li>✓ Simulated Annealing</li> </ul>	1	Yandra
5			<ul style="list-style-type: none"> <li>✓ Particle Swarm Optimization</li> <li>✓ Genetic Algorithm</li> </ul>	1	Yandra
6	Mampu melakukan analisis dan sintesis terhadap teknik optimasi <i>Linear Programming</i>	Linier Programming	<ul style="list-style-type: none"> <li>✓ Two dimensional Linear Programming</li> <li>✓ Standard Form Linear Programs</li> <li>✓ Basic Solution</li> </ul>	1,2	Yandra
7	Mampu melakukan analisis dan sintesis terhadap teknik optimasi <i>Nonlinear Constrained Optimization</i>	Problems with Equality Constraints	<ul style="list-style-type: none"> <li>✓ Problem Formulation</li> <li>✓ Tangent and Normal Spaces</li> <li>✓ Lagrange Condition</li> </ul>	1,2	Yandra
<i>Midterm Exam</i>					
8	Mampu melakukan analisis dan sintesis terhadap teknik optimasi <i>Nonlinear Constrained Optimization</i>	Problems with Inequality Constraints	<ul style="list-style-type: none"> <li>✓ Karush Kuhn Tucker Condition</li> <li>✓ Second Order Condition</li> </ul>	1,2	Erliza Noor
9		Multiobjective Optimization	<ul style="list-style-type: none"> <li>✓ Pareto Solution</li> <li>✓ Uncertain Linear Programming Problems</li> </ul>	1,2	Erliza Noor

10	Mampu melakukan analisis dan sintesis terhadap teknik optimasi terhadap kasus masing-masing individu	<ul style="list-style-type: none"> <li>• Optimization Methods</li> <li>• Sequential Analysis, Optimization Model</li> </ul>	<ul style="list-style-type: none"> <li>✓ Introduction of Optimization methods and Their Efficient Use</li> <li>✓ General Algorithm of Sequential Analysis of Variants and Its Application</li> <li>✓ Stochastic Optimization Methods</li> <li>Discrete Optimization Methods</li> </ul>	3	Erliza Noor
11	Mampu melakukan analisis dan sintesis dari pembuatan model secara matematis	Mathematical Modeling and Analysis of Complex Processes on Supercomputer System	<ul style="list-style-type: none"> <li>✓ Optimization Methods and Control Processes</li> <li>✓ Optimization of Computations and Information Security</li> <li>✓ Computer Technologies and Analysis of Biological Processes</li> </ul>	3	Erliza Noor
12	Mampu melakukan analisis dan sintesis dari permasalahan kombinatorial yang kompleks	Analyzing the Solution of Complicated Combinatorial Problems	<ul style="list-style-type: none"> <li>✓ Methods to Solve Exteremum Problems on Graphs and Combinatorial Configurations</li> </ul>	3	Erliza Noor
13			<ul style="list-style-type: none"> <li>✓ Problems of Constructing Discrete Images and Combinatorial Recognition</li> </ul>	3	Erliza Noor
14.	Final Term Exam and Report				Erliza Noor & Yandra
<i>Final Exam</i>					

MAIN REFERENCE:

1. Edwin C, Stanislaw H.Z. 2013. An Introduction to Optimization. John Wiley Publication
2. J K Sharma. 2005, Operations Research Theory and Applications, MacMillan India Ltd
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### JADWAL DAN MATERI RESPONSI

Week	Course Learning	Topic	Detail	Reference	Lecturer
1	Mampu melakukan analisis dan sintesis terhadap teknik <i>unconstrained optimization</i>	Basic of Set Constrained and Unconstrained Optimization	<ul style="list-style-type: none"> <li>✓ Introduction</li> <li>✓ Condition for Local Minimizers</li> </ul>	1	Yandra
2	Mampu melakukan analisis dan sintesis terhadap teknik optimasi <i>One dimensional Search</i>	One-Dimensional Search Methods	<ul style="list-style-type: none"> <li>✓ Golden Section Search</li> <li>✓ Fibonacci Method</li> <li>✓ Bisection Method</li> </ul>	1	Yandra
3			<ul style="list-style-type: none"> <li>✓ Newton's Method</li> <li>✓ Bracketing</li> </ul>	1	Yandra
4	Mampu melakukan analisis dan sintesis terhadap teknik optimasi <i>Global Search Algorithm</i>	Global Search Algorithm	<ul style="list-style-type: none"> <li>✓ The Nelder Mead Simplex</li> <li>✓ Simulated Annealing</li> </ul>	1	Yandra
5			<ul style="list-style-type: none"> <li>✓ Particle Swarm Optimization</li> <li>✓ Genetic Algorithm</li> </ul>	1	Yandra
6	Mampu melakukan analisis dan sintesis terhadap teknik optimasi <i>Linear Programming</i>	Linier Programming	<ul style="list-style-type: none"> <li>✓ Two dimensional Linear Programming</li> <li>✓ Standard Form Linear Programs</li> <li>✓ Basic Solution</li> </ul>	1,2	Yandra
7	Mampu melakukan analisis dan sintesis terhadap teknik optimasi <i>Nonlinear Constrained Optimization</i>	Problems with Equality Constraints	<ul style="list-style-type: none"> <li>✓ Problem Formulation</li> <li>✓ Tangent and Normal Spaces</li> <li>✓ Lagrange Condition</li> </ul>	1,2	Yandra
<i>Midterm Exam</i>					
8	Mampu melakukan analisis dan sintesis terhadap teknik optimasi <i>Nonlinear Constrained Optimization</i>	Problems with Inequality Constraints	<ul style="list-style-type: none"> <li>✓ Karush Kuhn Tucker Condition</li> <li>✓ Second Order Condition</li> </ul>	1,2	Erliza Noor
9		Multiobjective Optimization	<ul style="list-style-type: none"> <li>✓ Pareto Solution</li> <li>✓ Uncertain Linear Programming Problems</li> </ul>	1,2	Erliza Noor

10	Mampu melakukan analisis dan sintesis terhadap teknik optimasi terhadap kasus masing-masing individu	<ul style="list-style-type: none"> <li>• Optimization Methods</li> <li>• Sequential Analysis, Optimization Model</li> </ul>	<ul style="list-style-type: none"> <li>✓ Introduction of Optimization methods and Their Efficient Use</li> <li>✓ General Algorithm of Sequential Analysis of Variants and Its Application</li> <li>✓ Stochastic Optimization Methods</li> <li>Discrete Optimization Methods</li> </ul>	3	Erliza Noor
11	Mampu melakukan analisis dan sintesis dari pembuatan model secara matematis	Mathematical Modeling and Analysis of Complex Processes on Supercomputer System	<ul style="list-style-type: none"> <li>✓ Optimization Methods and Control Processes</li> <li>✓ Optimization of Computations and Information Security</li> <li>✓ Computer Technologies and Analysis of Biological Processes</li> </ul>	3	Erliza Noor
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13			<ul style="list-style-type: none"> <li>✓ Problems of Constructing Discrete Images and Combinatorial Recognition</li> </ul>	3	Erliza Noor
14.	Final Term Exam and Report				Erliza Noor & Yandra
<i>Final Exam</i>					