SYLLABUS

COURSE

MATHEMATICAL ECONOMICS

(EKO1202)

Lecturer Team:

1. **Prof. Dr. Ir. Dominicus Savio Priyarsono, M.S.**
2. **Prof. Dr. Toni Bakhtiar, S.Si., M.Sc**
3. **Dr. Ir. Sri Mulatsih, M.Sc, Agr**
4. **Dr. Novindra, SP., M.Si**
5. **Dr. Heni Hasanah, SE., M.Si**

DEVELOPMENT ECONOMICS STUDY PROGRAM
DEPARTMENT OF ECONOMICS
FACULTY OF ECONOMICS AND MANAGEMENT
IPB UNIVERSITY

2024

IPB University — Bogor Indonesia	**IPB UNIVERSITY** **FACULTY OF ECONOMICS AND MANAGEMENT** **DEPARTMENT OF ECONOMICS** **DEVELOPMENT ECONOMICS STUDY PROGRAM**

SEMESTER LESSON PLANS (RPS)

Course Name (MK)	Course Code	Course Cluster	Weight (credits)		Semester	Approval Date
Mathematical Economics	EKO1202	Foundational Literasies, Academic Core Courses	Lecture: 3(2-1)	Practicum: 3(2-1)	3	August 12, 2024
	Total student workload:		**Face-to-face:**	**Independent learning:**	**Maximum class size:**	
	135 Hours		60 Hours	75 Hours	100 Students	

AUTHORIZATION / APPROVAL	**RPS Developer Lecturer**	**Course Coordinator**	**Head of Study Program**
	Signature Name	Signature Prof. Dr. Ir. Dominicus Savio Priyarsono, M.S.	Signature Dr. Tony Irawan, S.E, M.App.Ec

Course Category	~~CCC/FC/~~FL/ACC/~~IC/Final Year Project~~ *(cross out unnecessary parts)*
Course Description	This course covers the key concepts and techniques of Mathematics frequently used in the analysis of Economics. The main topics include Calculus (optimization of multivariable functions without and with constraints) and Dynamic Analysis (differential equations and difference equations).

Intended Learning Outcomes (ILOs) of the Study Program	**Study Program Learning Outcomes assigned to the Course**	
	ILO 1	Possessing skills in applying analytical methods, concepts, and economic theories according to the development of science and technology for decision-making, problem-solving, and planning, both on a micro and macro scale for development, social, and business interests.
	ILO 2	Mastering the concepts, theories, and analytical methods in the field of economics both micro and macro, as well as their branches.
	ILO 3	Able to communicate verbally and in writing in the field of economics logically, creatively, and innovatively by utilizing the development of science and technology, interact with the community, and make decisions responsibly both independently and in groups.
Course Learning Outcomes	**Learning Outcomes (CLOs)**	
	CLO 1	Students are able to formulate economic problems into simple and complex mathematical models accurately and relevantly.
	CLO 2	Students are able to apply the concepts of derivatives and integrals to solve various real-world problems in the field of economics accurately and relevantly.
	Sub-Learning Outcomes (Sub-CLOs)	
	Sub-CLO 1	Students are able to explain the concept of partial derivatives and their applications, differentials and total differentials and their rules accurately.
	Sub-CLO 2	Students are able to apply concepts in comparative statics of general models and their applications accurately and relevantly.

	Sub-CLO 3	Students are able to explain optimization problems both unconstrained and constrained, and their applications in economics accurately.	
	Sub-CLO 4	Students are able to explain differential equations and difference equations, both first and second order, and apply them to economic theory.	
	Sub-CLO 5	Students are able to explain and apply dynamic analysis in economics accurately.	
Relevance of CLO and Sub-CLO		**CLO 1**	**CLO 2**
	Sub-CLO 1	✔	✔
	Sub-CLO 2	✔	✔
	Sub-CLO 3	✔	✔
	Sub-CLO 4	✔	✔
	Sub-CLO 5	✔	✔
Courses offered for	✔ Major ✔ Enrichment Other Study Programs)		
Main References	1. Chiang, A.C. & K. Wainwright, 2005. Fundamental Methods of Mathematical Economics. McGraw-Hill. 2. Sydsaeter, K. & P.J. Hammond, 2005. Mathematics for Economic Analysis. Prentice Hall		
Lecturers (Teaching Team)	1. Prof. Dr. Ir. Dominicus Savio Priyarsono, M.S. 2. Prof. Dr. Toni Bakhtiar, S.Si., M.Sc 3. Dr. Ir. Sri Mulatsih, M.Sc, Agr 4. Dr. Novindra, SP., M.Si 5. Dr. Heni Hasanah, SP., M.Si		

Table 1. Lesson Plan for Each Meeting

Week	Basic Competency/ Final Skills (Sub-CLO)	Study Material	Learning Method	Estimated Time (Minutes)	Learning Experience	Indicator	Assessment Criteria	Assessment Weight (%)
Students are able to:								
1	Students are able to explain the concept of partial derivatives and their applications; differentials and total differentials and their rules; accurately	Explanation of the Course and Review of Calculus for Derivatives of Single Variable Functions	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	*Active participation in lectures by asking and answering questions*	Accuracy and completeness of explanations in answering exam questions	● *Cognitive/Knowledge:* ○ *Midterm Exam*	0
2	Students are able to explain the concept of partial derivatives and their applications; differentials and total differentials and their rules; accurately	Functions of Multiple Variables(1)	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	● *Active participation in lectures by asking and answering questions* ● *Practicing solving problems*	Accuracy and completeness of explanations in answering exam questions	● *Cognitive/Knowledge:* ○ *Midterm Exam*	100
3	Students are able to explain concepts in the comparative statics of general models and their applications accurately and relevantly	Functions of Multiple Variables(2)	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	● *Active participation in lectures by asking and answering questions* ● *Practicing solving problems*	Accuracy and completeness of explanations in answering exam questions	● *Cognitive/Knowledge:* ○ *Midterm Exam*	100
4	Students are able to explain optimization problems both unconstrained and constrained, and their applications in economics accurately	Optimization of Functions of Multiple Variables Without Constraints (1)	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	● *Active participation in lectures by asking and answering questions* ● *Practicing solving problems* ● *Doing quizzes*	Accuracy and completeness of explanations in answering exam questions and quiz	● *Cognitive/Knowledge:* ○ *Midterm Exam* ○ *Quiz*	25
5	Students are able to explain optimization problems both	Optimization of Functions of Multiple Variables	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum:*	● *Active participation in lectures by*	Accuracy and completeness of	● *Cognitive/Knowledge:* ○ *Midterm Exam*	25

	unconstrained and constrained, and their applications in economics accurately	Without Constraints (2)		*3x50'*	*asking and answering questions* ● *Practicing solving problems*	explanations in answering exam questions		
6	Students are able to explain optimization problems both unconstrained and constrained, and their applications in economics accurately	Optimization of Functions of Multiple Variables With Constraints(1)	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	● *Active participation in lectures by asking and answering questions* ● *Practicing solving problems*	Accuracy and completeness of explanations in answering exam questions	● *Cognitive/Knowledge:* o *Midterm Exam*	25
7	Students are able to explain optimization problems both unconstrained and constrained, and their applications in economics accurately	Optimization of Functions of Multiple Variables With Constraints(2)	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	● *Active participation in lectures by asking and answering questions* ● *Practicing solving problems* ● *Doing quizzes*	Accuracy and completeness of explanations in answering exam questions and quiz	● *Cognitive/Knowledge:* o *Midterm Exam* o *Quiz*	25
8	Exams to evaluate material mastery by students on the material of Meeting 1 up to Meeting 7	Material from Meeting 1 to Meeting 7	Completing written exam questions	**2x60"**	Understanding the material taught, both in theory and in its practical application in the real world.	● Completeness and accuracy of explanations in answering exam questions	● Paper-based written exam to assess understanding of the material	
9	Students are able to explain differential equations and difference equations of both first and second order and apply them to economic theory	● Differential Equations (1)	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	● *Active participation in lectures by asking and answering questions* ● *Practicing solving problems*	Accuracy and completeness of explanations in answering exam questions	● *Cognitive/Knowledge:* o *Final Exam*	16.7
10	Students are able to explain differential	● Differential Equations (2)	*Lecture (lecture, discussion)*	*Lecture Duration: 2x50'*	● *Active participation in*	Accuracy and completeness	● *Cognitive/Knowledge:* o *Final Exam*	16.7

	equations and difference equations of both first and second order and apply them to economic theory		*Practicum*	*Practicum: 3x50'*	*lectures by asking and answering questions* ● *Practicing solving problems*	of explanations in answering exam questions		
11	Students are able to explain differential equations and difference equations of both first and second order and apply them to economic theory	● Differential Equations (3)	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	● *Active participation in lectures by asking and answering questions* ● *Practicing solving problems*	Accuracy and completeness of explanations in answering exam questions	● *Cognitive/Knowledge:* o *Final Exam*	16.7
12	Students are able to explain differential equations and difference equations of both first and second order and apply them to economic theory	● Difference Equations (1)	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	● *Active participation in lectures by asking and answering questions* ● *Practicing solving problems* ● *Doing quizzes*	Accuracy and completeness of explanations in answering exam questions and quiz	● *Cognitive/Knowledge:* o *Final Exam* o *Quiz*	16.7
13	Students are able to explain differential equations and difference equations of both first and second order and apply them to economic theory	● Difference Equations (2)	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	● *Active participation in lectures by asking and answering questions* ● *Practicing solving problems*	Accuracy and completeness of explanations in answering exam questions	● *Cognitive/Knowledge:* o *Final Exam*	16.7
14	Students are able to explain differential equations and difference equations of both first and second	● Difference Equations (3)	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	● *Active participation in lectures by asking and answering questions*	Accuracy and completeness of explanations in answering	● *Cognitive/Knowledge:* o *Final Exam*	16.7

	order and apply them to economic theory				• *Practicing solving problems*	exam questions		
15	Students are able to explain and apply dynamic analysis in economics accurately	• Simultaneous Differential Equations and Difference Equations	*Lecture (lecture, discussion)* *Practicum*	*Lecture Duration: 2x50'* *Practicum: 3x50'*	• *Active participation in lectures by asking and answering questions* • *Practicing solving problems* • *Doing quizzes*	Accuracy and completeness of explanations in answering exam questions and quiz	• *Cognitive/Knowledge:* o *Final Exam* o *Quiz*	100
16	Students are capable of completing written exam questions to evaluate their mastery of the material from Meeting 9 through Meeting 15	Material from Meeting 9 to Meeting 15	Completing written exam questions	**2x60"**	Understanding the material taught, both in theory and in its practical application in the real world.	• Completeness and accuracy of explanations in answering exam questions	• Paper-based written exam to assess understanding of the material	

Table 2. Assessment Components

No	Assessment Component	Weight (%)	Description
1.	Cognitive/Knowledge		
	• Quiz	20	Consisting of 4 quizzes, each with a weight of 5%
	• Midterm Exam	40	Essay questions
	• Final Exam	40	Essay questions
	Total Weight (%)	**100**	