

**Course Learning Objectives (CLO)**

(CLO 1): Develop economic models using matrix algebra

(CLO 2): Use derivatives and partial derivatives in performing comparative-static analysis

(CLO 3): Interpret and evaluate economics journal articles

(CLO 4): Construct a mathematical model that explains consumer behavior

(CLO 5): Construct a mathematical model that explains firm behavior

(CLO 6): Formulate an objective function used in Economics and choose a method to maximize or minimize it

Module	Module Objectives	Learning Materials	Activities	Assessments	Dates
Getting Started	<ol style="list-style-type: none"> <li>1. Explore the Canvas Course.</li> <li>2. Review the syllabus, course policies, and institutional policies.</li> <li>3. Meet your instructor and read the welcome message. Identify the purpose of the course, pre-requisites, and response time of the instructor to your questions.</li> <li>4. Introduce yourself to the class on the discussion board. To do this, add a photo of yourself or a short video, and give a brief</li> </ol>	<p>Course Syllabus</p> <p>Netiquette Pledge</p>	<p>Read syllabus, welcome message, and Netiquette Pledge</p>	<p>Student acceptance of Netiquette Pledge</p> <p>Take the syllabus quiz. (Due August 15)</p>	<p>August 15</p>

	<p>bio stating your major, hobbies, professional goals, etc. Be sure to respond to as many other students in the class as possible.</p> <p>5. Review the Netiquette Pledge</p>				
Chapter 4—Linear Models and Matrix Algebra	<p>1. Construct different matrices (CLO 1)</p> <p>2. Represent a system of linear equations using matrices (CLO 1)</p>	<p>Chiang, Alpha C. and Wainwright, Kevin. (2005). Fundamental Methods of Mathematical Economic, 4e, McGraw Hill Irwin.</p> <p>Power point lectures</p> <p>Instructor-provided videos</p>	<p>Read Chapter 4 Power Points</p> <p>Read Chapter 4 in text book</p> <p>Watch instructor videos at the end of each section</p>	<p>Homework Set 1: Matrix operations including addition, subtraction, and multiplication of matrices (Due August 21)</p> <p>Homework Set 2: Using the inverse of a matrix to solve an equation system when the inverse matrix is given (Due August 23)</p>	August 15 to August 23
Chapter 5—Determinants and Matrix Inversion	<p>1. Explain when a system of equations possesses a unique solution (CLO 1)</p> <p>2. Solve an equation system using matrix algebra (CLO 1, CLO 3, CLO 4, CLO 5, CLO 6)</p>	<p>Chiang, Alpha C. and Wainwright, Kevin. (2005). Fundamental Methods of Mathematical Economic, 4e, McGraw Hill Irwin.</p> <p>Power point lectures</p>	<p>Read Chapter 5 Power Points</p> <p>Read Chapter 5 in text book</p> <p>Watch instructor videos at the end of each section</p>	<p>Homework Set 3: Finding the determinant of a 2x2 square matrix (Due August 28)</p> <p>Homework Set 4: Finding the determinant of a 3x3 matrix (Due August 30)</p> <p>Homework Set 5: Finding the inverse of a 3x3</p>	August 28 to September 11

		Instructor-provided videos		<p>matrix (Due September 4)</p> <p>Homework Set 6: Using Excel to perform matrix operations and to solve an equation system (Due September 6)</p> <p>Homework Set 7: Solving an equation system using the matrix inversion technique and Cramer's rule (Due September 9)</p> <p>Discussion Board 1 (Due September 11)</p>	
Chapter 6— Comparative Statics and the Concept of the Derivative	1. Describe what a derivative of function represents (CLO 2)	<p>Chiang, Alpha C. and Wainwright, Kevin. (2005). Fundamental Methods of Mathematical Economic, 4e, McGraw Hill Irwin.</p> <p>Power point lectures</p> <p>Instructor-provided videos</p>	<p>Read Chapter 6 Power Points</p> <p>Read Chapter 6 in text book</p> <p>Watch instructor videos at the end of each section</p>	<p>Homework Set 8: Find the difference quotient for a specific function and finding the limit of that different quotient (Due September 13)</p>	September 13 to September 17

<p>Chapter 7— Rules for Differentiation</p>	<ol style="list-style-type: none"> <li>1. Describe how derivatives are taken of various functions (CLO 2, CLO 3, CLO 4, CLO 5, CLO 6)</li> <li>2. Discuss how derivatives are used in economics (CLO 2, CLO 3, CLO 4, CLO 5, CLO 6)</li> <li>3. Describe how partial derivatives are used in economic models (CLO 2, CLO 3, CLO 4, CLO 5, CLO 6)</li> </ol>	<p>Chiang, Alpha C. and Wainwright, Kevin. (2005). <i>Fundamental Methods of Mathematical Economic</i>, 4e, McGraw Hill Irwin.</p> <p>Power point lectures</p> <p>Instructor-provided videos</p>	<p>Read Chapter 7 Power Points</p> <p>Read Chapter 7 in text book</p> <p>Watch instructor videos at the end of each section</p>	<p>Homework Set 9: Using derivatives to find the profit-maximizing amount of output, price, and profit for a firm (Due September 18)</p> <p>Take Exam 1 (Due September 20)</p> <p>Homework Set 10: Taking partial derivatives of functions (Due September 25)</p> <p>Homework Set 11: Finding and Interpreting partial derivatives of a Cobb-Douglas production function (Due September 27)</p> <p>Discussion Board 2 (Due September 29)</p>	<p>September 18 to September 27</p>
<p>Chapter 8—Derivatives of Implicit Functions</p>	<ol style="list-style-type: none"> <li>1. Explain how to take a total differential of a function (CLO 2, CLO 3, CLO 4, CLO 5, CLO 6)</li> <li>2. Given an equation in the form <math>F(y; x_1, x_2, \dots) = 0</math>, evaluate when the implicit function, <math>y = f(x_1, x_2, \dots)</math> is defined</li> </ol>	<p>Chiang, Alpha C. and Wainwright, Kevin. (2005). <i>Fundamental Methods of Mathematical Economic</i>, 4e, McGraw Hill Irwin.</p> <p>Power point lectures</p>	<p>Read Chapter 8 Power Points</p> <p>Read Chapter 8 in text book</p> <p>Watch instructor videos at the end of each section</p>	<p>Homework Set 12: Identifying the existence of the implicit function and finding its partial derivatives (Due October 2, 2018)</p> <p>Homework Set 13: Identifying the existence of the implicit function in</p>	<p>October 2 to October 9</p>

	<p>(CLO 3, CLO 4, CLO 5, CLO 6)</p> <p>3. Given a system of simultaneous equations, evaluate when the implicit functions are defined (CLO 3, CLO 4, CLO 5, CLO 6)</p>	Instructor-provided videos		<p>a more complex case and finding its partial derivatives (Due October 4, 2018)</p> <p>Homework Set 14: Given a set of simultaneous equations, identify the existence of the implicit functions and find their derivatives (Due October 9, 2018)</p>	
Chapter 9— Optimization Problems	<p>1. Construct an objective function used in economics and find the critical value of the choice variable (CLO 3, CLO 4, CLO 5, CLO 6)</p> <p>2. Make a distinction between different types of inflection points and demonstrate how they are used in economics (CLO 5)</p> <p>3. After identifying the critical values of the choice variable from an objective function, employ the second-derivative test to determine if the objective function is</p>	<p>Chiang, Alpha C. and Wainwright, Kevin. (2005). Fundamental Methods of Mathematical Economic, 4e, McGraw Hill Irwin.</p> <p>Power point lectures</p> <p>Instructor-provided videos</p>	<p>Read Chapter 9 Power Points</p> <p>Read Chapter 9 in text book</p> <p>Watch instructor videos at the end of each section</p>	<p>Homework Set 15: Find the critical values of the choice variables for different functions and determine if the functions are maximized or minimized (Due October 11, 2018)</p> <p>Homework Set 16: Explain why the competitive firm will not produce in Stages I or III of production (Due October 16, 2018)</p> <p>Homework Set 17: Given a revenue and cost function of a competitive firm, find the critical values of output and identify the one that</p>	October 11 to October 23

	maximized or minimized (CLO 3, CLO 4, CLO 5, CLO 6)			maximizes profit (Due October 18, 2018)  Discussion Board 3 (Due October 20)  Take Exam 2 (Due October 23, 2018)	
Chapter 10— Exponential and Logarithmic Functions	<p>1. Explain how to find the derivatives of exponential and logarithmic functions (CLO 2, CLO 3, CLO 4, CLO 5, CLO 6)</p> <p>2. Identify demand and output elasticities from different demand and production functions (CLO 3, CLO 4, CLO 5)</p>	<p>Chiang, Alpha C. and Wainwright, Kevin. (2005). Fundamental Methods of Mathematical Economic, 4e, McGraw Hill Irwin.</p> <p>Power point lectures</p> <p>Instructor-provided videos</p>	<p>Read Chapter 10 Power Points</p> <p>Read Chapter 10 in text book</p> <p>Watch instructor videos at the end of each section</p>	<p>Homework Set 18: Find derivatives of exponential and logarithmic functions (Due October 25, 2018)</p>	<p>October 25 to October 30</p>
Chapter 11—The Case of More Than One Choice Variable	<p>1. Given a function of several choice variables, be able to identify the critical values of the choice variables by use of the first-order necessary condition (CLO 1, CLO 3, CLO 5, CLO 6)</p> <p>2. After identifying the critical values of the</p>	<p>Chiang, Alpha C. and Wainwright, Kevin. (2005). Fundamental Methods of Mathematical Economic, 4e, McGraw Hill Irwin.</p> <p>Power point lectures</p> <p>Instructor-provided videos</p>	<p>Read Chapter 11 Power Points</p> <p>Read Chapter 11 in text book</p> <p>Watch instructor videos at the end of each section</p>	<p>Homework Set 19: Given an objective function with two choice variables, find the critical values of each (Due October 30, 2018)</p> <p>Homework Set 20: Given the objective function from Homework 19, determine if the objective function is</p>	<p>October 30 to November 6</p>

	choice variables from an objective function with many choice variables, determine if the objective function is maximized or minimized (CLO 1, CLO 3, CLO 5, CLO 6)			maximized or minimized (Due November 1, 2018)  Homework Set 21: Given an economic objective function with two choice variables, identify the critical values of the choice variables (Due November 6, 2018)	
Chapter 12— Optimization with Equality Constraints	<p>1. Construct a Lagrangian function from an objective function and a constraint equation and solve for the critical values of the choice variables (CLO 3, CLO 4, CLO 5, CLO 6)</p> <p>2. Construct a Lagrangian function for the consumer problem when the consumer maximizes a utility function subject to a budget constraint (CLO 3, CLO 4, CLO 6)</p> <p>3. For the constrained utility maximization problem of the consumer, derive the consumers' demand</p>	<p>Chiang, Alpha C. and Wainwright, Kevin. (2005). Fundamental Methods of Mathematical Economic, 4e, McGraw Hill Irwin.</p> <p>Power point lectures</p> <p>Instructor-provided videos</p>	<p>Read Chapter 12 Power Points</p> <p>Read Chapter 12 in text book</p> <p>Watch instructor videos at the end of each section</p>	<p>Homework Set 22: Construct the Lagrangian function for a problem involving an objective function and a constraint function. Also find the critical values of all choice variables (Due November 8, 2018)</p> <p>Homework Set 23: For the problem in Homework Set 22, construct the Bordered Hessian and determine if the objective function is maximized or minimized subject to the constraint (Due November 13, 2018)</p> <p>Discussion Board 4 (Due November 15)</p>	November 8 to November 29

	<p>functions and find their derivatives (CLO 2, CLO 3, CLO4, CLO 6)</p> <p>4. Construct the Bordered Hessian for a constrained optimization problem and explain if the objective function is maximized or minimized (CLO 1, CLO 3, CLO 4, CLO5, CLO 6)</p>			<p>Take Exam 3 (Due November 29)</p>	
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