

ECONOMICS 100A: MICROECONOMICS

Fall 2006

Section A:

Tu, Th 9:30-10:50am

York Hall 2622

Section B:

Tu, Th 2:00-3:20pm

WLH 2005

Prof. Mark Machina

Office: Economics Bldg. 217

Office Hours: Wed 8-noon

TA's: Michael Futch	Sequoyah Hall 228	Tue 3:30-5:00
Sofia Marouli	Economics Bldg. 128	Thu 3:30-4:30
Jonathan Smith	Sequoyah Hall 239	Mon 2:00-3:00
Alok Tandon	Sequoyah Hall 233	Wed 2:00-4:00
Chris Wonnell	Economics Bldg. 126	Fri 10:00-11:30

DATE	TOPIC	TEXT/MATH HANDOUT
Sep. 21	Introduction & Mathematical Review #1	Chapters 1,2/ Sections A,B
Sep. 26	Mathematical Review #1 (continued)	2/C,D
Sep. 28	Consumer Preferences: Utility Functions and Indifference Curves	3
Oct. 3	Consumer Preferences: Utility Functions and Indifference Curves (continued)	3
Oct. 5	Mathematical Review #2	E
Oct. 10	Utility Maximization and Demand Functions	4
Oct. 12	Utility Maximization and Demand Functions (continued)	4
Oct. 17	Mathematical Review #3	F,G,H
Oct. 17	(Tuesday) 1st Midterm Exam Mandeville Auditorium 6:00-7:30pm	
Oct. 19	Comparative Statics of Demand	5
Oct. 24	Comparative Statics of Demand (continued)	6
Oct. 26	Supply of Factors of Production	16,17
Oct. 31	Theory of Production	7
Nov. 2	Theory of Cost	8
Nov. 7	Theory of Cost (continued)	8
Nov. 7	(Tuesday) 2nd Midterm Exam Mandeville Auditorium 6:00-7:30pm	
Nov. 9	Profit Maximization and Supply under Perfect Competition	pp.248-264
Nov.14	Profit Maximization and Supply under Perfect Competition (continued)	10
Nov.16	Equilibrium and Dynamics of Perfectly Competitive Markets	11
Nov.21	Equilibrium and Dynamics of Perfectly Competitive Markets (continued)	11
Nov.28	Demand for Factors of Production	pp.265-270
Nov.30	Demand for Factors of Production (continued)	pp.265-270
Dec. 5	(Tuesday) FINAL EXAM (Section B) 3:00-6:00pm (location T.B.A)	
Dec. 7	(Thursday) FINAL EXAM (Section A) 8:00-11:00am (location T.B.A)	

TEXT & READINGS: *Microeconomic Theory: Basic Principles & Extensions* by Walter Nicholson, Thomson South-Western, 2005 (9th Edition or "Customized for UCSD" edition). You are responsible for all the material in the assigned chapters. There is also a Soft Reserve package, with a Mathematical Handout that contains required material for the course.

EXAMS: Grades are determined on the basis of two Midterm Exams and a Final Exam.

PRACTICE PROBLEMS: A large set of old exam problems is included in the Soft Reserve package. You are urged to practice on them, in preparation for the actual exams.

ECON 100A COURSE OUTLINE – Fall 2006

I. INTRODUCTION

- a. **Domain of Microeconomic Analysis**
- b. **Circular Flow Diagram**
- c. **Stocks vs. Flows and the Dimensions of Economic Variables**

II. MATHEMATICAL REVIEW #1

- a. **Calculus Review (Math Handout, Section A)**
 - Derivatives, Partial Derivatives and the Chain Rule
 - Approximation Formulas for Small Changes in Functions (Total Differentials)
- b. **Elasticity (Math Handout, Section B)**
 - Absolute, Proportionate and Percentage Changes in Variables
 - Definition of Elasticity and Examples
 - Constant Elasticity Functions
- c. **Level Curves of Functions (Math Handout, Section C)**
 - Definition and Graphical Illustration
 - Algebraic Formula for a Level Curve
 - Formula for the Slope of a Level Curve
- d. **Scale Properties of Functions (Math Handout, Section D)**

III. CONSUMER PREFERENCES: UTILITY FUNCTIONS & INDIFFERENCE CURVES

- a. **Commodities, Commodity Bundles and Preferences**
 - Commodities are Typically *Flows*, not *Stocks*
 - Issue of Divisibility
 - Weak Preference, Strict Preference and Indifference Relations
- b. **Utility Functions**
 - Preferences are Defined over Commodity Bundles, *not* Individual Commodities
 - Utility Functions and Total Utility Curves
 - Important Examples: Linear, Cobb-Douglas, Leontief
 - Marginal Utility and Marginal Utility Curves
 - Hypothesis of Diminishing Marginal Utility
 - Monotonic Transformations of Utility Functions
- c. **Indifference Curves and the Marginal Rate of Substitution**
 - Deriving a Consumer's Indifference Curves from Their Utility Function
 - General Properties of Indifference Curves:
 - One Through Every Commodity Bundle
 - Downward Sloping and Can't Cross
 - Marginal Rate of Substitution (MRS)
 - Graphical Interpretation: Slope of the Indifference Curve
 - Algebraic Formula: Ratio of Marginal Utilities
 - Hypothesis of Diminishing Marginal Rate of Substitution

IV. MATHEMATICAL REVIEW #2

- a. **Solving Optimization Problems (Math Handout, Section E)**
 - General Structure of Optimization Problems
 - First and Second Order Conditions for Unconstrained Optimization Problems
 - First Order Conditions for Constrained Optimization Problems

V. UTILITY MAXIMIZATION AND DEMAND FUNCTIONS

a. Utility Maximization Subject to a Budget Constraint

Graphical Illustration

First Order Conditions for Utility Maximization

Two Interpretations of the First Order Conditions

Second Order Conditions (Hypothesis of Diminishing MRS)

Corner Solutions: Graphical Illustration and Algebraic Condition

Indirect Utility Functions and Their Properties

b. Regular (“Marshallian”) Demand Curves and Demand Functions

Definition of Regular Demand Functions

Examples: Cobb-Douglas, Leontief, Linear

General Properties of Demand Functions:

Walras’ Law

Scale Invariant in Prices and Income

Relationship between Price Elasticities & Income Elasticity for a Good

Market Demand Functions

VI. MATHEMATICAL REVIEW #3

a. Comparative Statics of Solution Functions (Math Handout, Section F)

b. Comparative Statics of Equilibria (Math Handout, Section G)

c. Comparative Statics of Optimal Value Functions (Math Handout, Section H)

VII. COMPARATIVE STATICS OF DEMAND

a. Income Changes

Income-Consumption Locus

Engel Curves: Definition and Graphical Derivation

Income Elasticity

Superior, Normal and Inferior Goods

Income Elasticity and Budget Shares

Relationship Between Income Elasticities of All Goods

Algebraic Derivation of the Effect of an Income Change

b. Price Changes

Price-Consumption Locus

Graphical Derivation of Marshallian Demand Curves

Own Price Elasticity

Price Elasticity and Expenditures

Cross Price Elasticity

Gross Substitutes and Gross Complements

Algebraic Derivation of the Effect of a Price Change

c. Compensated Price Changes and Compensated Demand Functions

Graphical Illustration of a Compensated Price Change

Graphical Derivation of Compensated Demand Curves

Algebraic Derivation of Compensated Demand Functions

Algebraic Derivation of the Effect of a Compensated Price Change

d. Slutsky Equation

Expressing Each of the Three Basic Changes in Terms of the Other Two

Graphical Illustration

Algebraic Formulation and Informal Proof

Giffen Goods

VIII. SUPPLY OF FACTORS OF PRODUCTION

a. Supply of Labor: The Labor-Leisure Decision

Income-Leisure Space and the Labor-Leisure Decision
First Order Conditions for Optimal Supply of Labor
Comparative Statics: Income and Substitution Effects
Backward Bending Supply of Labor Curves
Kinked Budget Lines and the Overtime Decision

b. Supply of Capital: The Consumption-Savings Decision

Intertemporal Income and Consumption Streams
Interest Rates and Discounted Present Value of a Stream
Intertemporal Utility Maximization
First Order Conditions and Interpretation
Comparative Statics: Income and Substitution Effects

IX. THEORY OF PRODUCTION

a. Production Functions

Types of Factors and Their Income
Important Examples: Linear, Leontief, Cobb-Douglas
Total Product Curves

b. Marginal Products and the Law of (Eventually) Diminishing Marginal Product

Definition of Marginal Product
Marginal Product Curves
Examples: Linear, Leontief, Cobb-Douglas
Hypothesis of Diminishing Marginal Product of a Factor

c. Average Products and the Average-Marginal Relationship

Definition of Average Product
Average Product Curves
Examples: Linear, Leontief, Cobb-Douglas
Average-Marginal Relationship ("Grade Point Average Theorem")
Proof of the Average-Marginal Relationship

d. Isoquants and the Marginal Rate of Technical Substitution (MRTS)

Definition and General Properties of Isoquants
Examples: Linear, Cobb-Douglas, Leontief
Definition of the Marginal Rate of Technical Substitution
Expressing the MRTS in Terms of Marginal Products
Examples: Linear, Leontief, Cobb-Douglas
Hypothesis of Diminishing MRTS

e. Returns to Scale

X. THEORY OF COST

a. The Nature of Cost

Definition of Cost
Accounting Cost vs. Opportunity Cost of Owned Factors
Numerical Example
Cost of Entrepreneurial Ability and Definition of "Economic Profits"
Short Run Planning versus Long Run Planning

b. Short Run Cost Functions

Expansion Path in the Short Run
Graphical Derivation of the Short Run Total Cost Curve

Algebraic Derivation of Short Run Total Cost Function (STC)

Examples: Linear, Leontief, Cobb-Douglas

Short Run Variable Cost Function (SVC)

Short Run Fixed Cost Function (SFC)

Short Run Marginal Cost Function (SMC)

Relation of SMC to Marginal Product of Labor and Wage Rate

Short Run Average Total Cost Function (SATC)

Short Run Average Variable Cost Function (SAVC)

Short Run Average Fixed Cost Function (SAFC)

Average-Marginal Relationships

c. Long Run Cost Minimization

Isocost Lines

Graphical Illustration of Long Run Cost Minimization

First Order Conditions for Long Run Cost Minimization

Two Interpretations of the First Order Conditions

Second Order Conditions (Hypothesis of Diminishing MRTS)

Output-Constrained Factor Demands

d. Long Run Cost Functions

Expansion Path in the Long Run

Graphical Derivation of the Long Run Total Cost Curve

Algebraic Derivation of Long Run Total Cost Function (LTC)

Properties of Long Run Total Cost Functions:

Increasing in Output

Nondecreasing in Factor Prices

Constant Returns to Scale in Factor Prices

Examples: Linear, Leontief, Cobb-Douglas

Long Run Marginal Cost Function (LMC)

Relation of LMC to all Marginal Products and Factor Prices

Long Run Average Cost Function (LAC)

Average-Marginal Relationship

Returns to Scale and Long Run Average Cost

e. Relationship Between Long Run and Short Run Cost Curves

Long and Short Run Total Cost Curves

Long and Short Run Average Cost Curves

Long and Short Run Marginal Cost Curves

XI. PROFIT MAXIMIZATION AND SUPPLY UNDER PERFECT COMPETITION

a. Long Run Profit Maximization and Long Run Supply

Long Run Profit Maximization (Graphical Illustration and Algebraic Formulation)

First Order Conditions and Interpretation

Second Order Condition (Increasing Marginal Cost)

Graphical Derivation of the Long Run Supply Curve

Algebraic Formulation of Long Run Supply Function

Examples: Cobb-Douglas, Cubic LTC, Constant Returns to Scale

Properties of Long Run Supply Functions:

Increasing in Output Price

Nonincreasing in Factor Prices

Scale Invariant in Output Price and Factor Prices

Long Run Elasticity of Supply

b. Short Run Profit Maximization and Short Run Supply

- Short Run Profit Maximization and the Shut Down Decision
- Illustration in Terms of STC and SVC Curves
- Illustration in Terms of SATC and SAVC Curves
- Short Run Supply Curve of the Firm
- Short Run Supply Function of the Firm
- Properties of Short Run Supply Functions:
 - Increasing in Output Price
 - Nonincreasing in Factor Prices
 - Scale Invariant in Output Price and Factor Prices
- Short Run Market Supply

XII. EQUILIBRIUM, DYNAMICS AND COMPARATIVE STATICS OF PERFECTLY COMPETITIVE MARKETS

a. Assumptions of Perfect Competition and the “Law of One Price”

- Large Number of Buyers and Sellers
- Homogeneous Commodity
- Perfect Information
- Free Entry and Exit in the Long Run
- Law of One Price

b. Equilibrium in Perfectly Competitive Markets

- Market Equilibrium in the Very Short Run
- Market Equilibrium in the Short Run
- Market Equilibrium in the Long Run
 - Long Run Supply Curve of the Market
 - Properties of Long Run Competitive Equilibrium

c. Dynamics of Market Adjustment

d. Comparative Statics of Perfectly Competitive Markets

- Shifts in Supply and Demand Functions
 - What Determines How Much Price vs. Quantity Adjusts?
- Taxes and Subsidies
 - Who Bears the Burden of a Tax?
- Price Floors and Price Ceilings

XIII. DEMAND FOR FACTORS OF PRODUCTION

a. Maximizing Profits by Choosing Optimal Input Levels

- Marginal Value Product of a Factor of Production

b. Short Run Factor Demand

- First Order Condition for Short Run Profit Maximization
- Short Run Factor Demand Functions
 - Nonincreasing in Own Factor Price
 - Scale Invariant in Output Price and Factor Prices
 - Relation to Short Run Supply Function

c. Long Run Factor Demand

- First Order Conditions for Long Run Profit Maximization
- Long Run Factor Demand Functions
 - Nonincreasing in Own Factor Price
 - Scale Invariant in Output Price and Factor Prices
 - Relation to Long Run Supply Function

ECON 100A FAMOUS OPTIMIZATION PROBLEMS

Optimization Problem	Objective Function	Constraint	Control Variables	Parameters	Solution Functions	Optimal Value Function
Consumer's Problem	$U(x_1, \dots, x_n)$ utility function	$p_1 \cdot x_1 + \dots + p_n \cdot x_n = I$ budget constraint	x_1, \dots, x_n commodity levels	p_1, \dots, p_n, I prices and income	$x_i(p_1, \dots, p_n, I)$ regular demand functions	$V(p_1, \dots, p_n, I)$ indirect utility function
Expenditure Minimization Problem	$p_1 \cdot x_1 + \dots + p_n \cdot x_n$ expenditure level	$U(x_1, \dots, x_n) = u_0$ desired utility level	x_1, \dots, x_n commodity levels	p_1, \dots, p_n, u_0 prices and utility level	$h_i(p_1, \dots, p_n, \bar{u})$ compensated demand functions	$e(p_1, \dots, p_n, u_0)$ expenditure function
Labor/Leisure Decision	$U(H, I)$ utility function	$I = I_0 + w \cdot (168 - H)$ budget constraint	H, I leisure time, disposable inc.	w, I_0 wage rate and nonwage income	$168 - H(w, I_0)$ labor supply function	$V(w, I_0)$ indirect utility function
Consumption/ Savings Decision	$U(c_1, c_2)$ utility function	$c_2 = I_2 + (1+i) \cdot (I_1 - c_1)$ budget constraint	c_1, c_2 consumption levels	I_1, I_2, i income stream and interest rate	$c_1(I_1, I_2, i), c_2(I_1, I_2, i)$ consumption functions	$V(I_1, I_2, i)$ indirect utility function
Long Run Cost Minimization	$w \cdot L + r \cdot K$ total cost	$F(L, K) = Q$ desired output	L, K factor levels	Q, w, r desired output and factor prices	$L(Q, w, r), K(Q, w, r)$ output-constrained factor demand functions	$LTC(Q, w, r)$ long run total cost function
Long Run Profit Maximization (in terms of Q)	$P \cdot Q - LTC(Q, w, r)$ total profit	none	Q output level	P, w, r output price and factor prices	$Q(P, w, r)$ long run supply function	$\pi(P, w, r)$ long run profit function
Long Run Profit Maximization (in terms of L and K)	$P \cdot F(L, K) - w \cdot L - r \cdot K$ total profit	none	L, K factor levels	P, w, r output price and factor prices	$L(P, w, r), K(P, w, r)$ factor demand functions	$\pi(P, w, r)$ long run profit function