## ECONOMICS 100A: MICROECONOMICS

**Fall 2012**

**Professor Mark Machina**

**Office:** Econ Bldg 217  
**Office Hrs:** Wed 9am-1pm

(See other side for Section times & locations, and TA’s offices & office hours)

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>TEXT CHAPTER/MATH HANDOUT SECTION</th>
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<tr>
<td>Sep. 27</td>
<td>Introduction &amp; Mathematical Review #1</td>
<td>Ch.1, 2.1, 2.5 / Sects. A, B</td>
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<td>Oct. 2</td>
<td>Mathematical Review #1 (cont.)</td>
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<td>Oct. 4</td>
<td>Consumer Preferences: Utility Functions and Indifference Curves</td>
<td>Ch.3.1, 3.2</td>
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<td>Oct. 9</td>
<td>Consumer Preferences: Utility Functions and Indifference Curves (cont.)</td>
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<td>Oct. 11</td>
<td>Mathematical Review #2</td>
<td>Sects. D, E</td>
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<td>Oct. 16</td>
<td>Mathematical Review #2 (cont.)</td>
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<td>Oct. 18</td>
<td>Utility Maximization and Demand Functions</td>
<td>Ch.3.3, 3.4, 4.1</td>
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<td>Oct. 23</td>
<td>(Tuesday) 1st Midterm Exam</td>
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<td>Oct. 25</td>
<td>Utility Maximization and Demand Functions (cont.)</td>
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<td>Oct. 30</td>
<td>Utility Maximization and Demand Functions (cont.)</td>
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<tr>
<td>Nov. 1</td>
<td>Comparative Statics of Demand</td>
<td>Ch.4.2, 4.3</td>
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<td>Nov. 6</td>
<td>Comparative Statics of Demand (cont.)</td>
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<td>Nov. 8</td>
<td>Comparative Statics of Demand (cont.)</td>
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<td>Nov. 13</td>
<td>Comparative Statics of Demand (cont.)</td>
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<tr>
<td>Nov. 15</td>
<td>(Thursday) 2nd Midterm Exam</td>
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<td>Nov. 20</td>
<td>Supply of Labor: The Labor-Leisure Decision</td>
<td>Ch.5.5</td>
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<td>Nov. 27</td>
<td>Supply of Capital: Consumption-Saving Decision</td>
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<td>Nov. 29</td>
<td>Supply of Capital: Consumption-Saving (cont.)</td>
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<td>Dec. 4</td>
<td>Decision Making under Risk and Uncertainty (cont.)</td>
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<tr>
<td>Dec. 6</td>
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**FINAL EXAM** (Thursday Dec 13, 8am-11am) (location TBA)

**TEXT & READINGS:** *Microeconomics: Theory and Applications, Second Custom Edition for UCSD*, by Jeffrey Perloff, Addison Wesley, 2011. There is also a Soft Reserve Package which contains the Math Handout, practice problems, and old exam questions. Although we will go over some of these questions in office hours and review sessions, the best way to prepare for the exam is to form study groups and practice doing them together.

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

**COURSE WEB PAGE:** The course web page is at:  
[www.econ.ucsd.edu/~mmachina/courses/ECON_100A/ECON_100A.html](http://www.econ.ucsd.edu/~mmachina/courses/ECON_100A/ECON_100A.html)
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<td>B01</td>
<td>Mon 4:00pm-4:50pm</td>
<td>Center 222</td>
<td>Travis Brayak</td>
<td>Sequoyah Hall 224, Mon 10:00-12:00</td>
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<tr>
<td>B02</td>
<td>Wed 8:00am- 8:50am</td>
<td>Center 222</td>
<td>Travis Brayak</td>
<td>Sequoyah Hall 224, Mon 10:00-12:00</td>
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<tr>
<td>B03</td>
<td>Thu 6:00pm- 6:50pm</td>
<td>Peterson 102</td>
<td>Michael Kuhn</td>
<td>Economics Bldg. 122, Thu 2:30-4:30</td>
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<td><a href="mailto:mkuhn@ucsd.edu">mkuhn@ucsd.edu</a></td>
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<tr>
<td>B04</td>
<td>Fri 1:00pm 1:50pm</td>
<td>Center 222</td>
<td>Michael Kuhn</td>
<td>Economics Bldg. 122, Thu 2:30-4:30</td>
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<td><a href="mailto:mkuhn@ucsd.edu">mkuhn@ucsd.edu</a></td>
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</tbody>
</table>
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
      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

III. CONSUMER PREFERENCES: UTILITY FUNCTIONS & INDIFFERENCE CURVES
   a. Commodities, Commodity Bundles and Preferences
      Commodities are Typically Flows, not Stocks
      Issue of Divisibility
      The Relevant Time Period
   b. Preference Relations and Utility Functions
      Preferences are defined over Commodity Bundles, not Individual Commodities
      Weak Preference, Strict Preference and Indifference
      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. Scale Properties of Functions (Math Handout, Section D)
   b. 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
   c. Inequality Constraints and Corner Solutions
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
      Plotting Regular Demand Curves
      Regular Demand Functions
      General Properties of Demand Functions:
      Walras’ Law
      Scale Invariant in Prices and Income
      Relationship between Price Elasticities & Income Elasticity for a Good
      Examples: Cobb-Douglas, Leontief, Linear
      Market Demand Functions

VI. 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 ("Hicksian") Demand Functions
      Graphical Illustration of a Compensated Price Change
      The Expenditure Minimization Problem
      Compensated Demand Functions and their Properties
      Expenditure Functions and their Properties
      Algebraic Derivation of the Effect of a Compensated Price Change
   d. The Slutsky Equation
      Expressing Each of the Three Basic Changes in Terms of the Other Two
      Graphical Illustration
      Algebraic Formulation and Informal Proof
      Giffen Goods
   e. Consumer Surplus and Welfare Analysis
      Consumer Surplus
      Equivalent and Compensating Variation
VII. 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

VIII. 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. DECISION MAKING UNDER RISK AND UNCERTAINTY
   a. Outcomes, Lotteries and Expected Value
      Choice over Lotteries
      Expected Value
      The St. Petersburg Paradox
   b. Expected Utility
      Two-Stage Lotteries and the Independence Axiom
      von Neumann-Morgenstern Utility Functions and Expected Utility
   c. Risk Aversion
      Properties of Risk Averse Preferences
      Arrow-Pratt Measure of Risk Aversion
      Risk Aversion and Wealth
   d. Measures of Risk Aversion
   e. Demand for Insurance
   f. Investment in a Risky Asset
# FAMOUS OPTIMIZATION PROBLEMS IN ECONOMICS

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<tr>
<th>Optimization Problem</th>
<th>Objective Function</th>
<th>Constraint</th>
<th>Control Variables</th>
<th>Parameters</th>
<th>Solution Functions</th>
<th>Optimal Value Function</th>
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<tr>
<td><strong>Consumer’s Problem</strong></td>
<td>$U(x_1,\ldots,x_n)$ utility function</td>
<td>$p_1x_1+\ldots+p_n x_n = I$ budget constraint</td>
<td>$x_1,\ldots,x_n$ commodity levels</td>
<td>$p_1,\ldots,p_n, I$ prices and income</td>
<td>$x_i(p_1,\ldots,p_n,I)$ regular demand functions</td>
<td>$V(p_1,\ldots,p_n,I)$ indirect utility function</td>
</tr>
<tr>
<td><strong>Expenditure Minimization Problem</strong></td>
<td>$p_1x_1+\ldots+p_n x_n$ expenditure level</td>
<td>$U(x_1,\ldots,x_n) = u$ desired utility level</td>
<td>$x_1,\ldots,x_n$ commodity levels</td>
<td>$p_1,\ldots,p_n, u$ prices and utility level</td>
<td>$h_i(p_1,\ldots,p_n,u)$ compensated demand functions</td>
<td>$e(p_1,\ldots,p_n,u)$ expenditure function</td>
</tr>
<tr>
<td><strong>Labor/Leisure Decision</strong></td>
<td>$U(H,I)$ utility function</td>
<td>$I = I_0 + w(168-H)$ budget constraint</td>
<td>$H, I$ leisure time, disposable inc.</td>
<td>$w, I_0$ wage rate and nonwage income</td>
<td>$168-H(w,I_0)$ labor supply function</td>
<td>$V(w,I_0)$ indirect utility function</td>
</tr>
<tr>
<td><strong>Consumption/ Savings Decision</strong></td>
<td>$U(c_1,c_2)$ utility function</td>
<td>$c_2 = I_2 + (1+i)\cdot(I_1-c_1)$ budget constraint</td>
<td>$c_1, c_2$ consumption levels</td>
<td>$I_1, I_2, i$ income stream and interest rate</td>
<td>$c_1(I_1, I_2, i), c_2(I_1, I_2, i)$ consumption functions</td>
<td>$V(I_1, I_2, i)$ indirect utility function</td>
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<tr>
<td><strong>Long Run Cost Minimization</strong></td>
<td>$w\cdot L + r\cdot K$ total cost</td>
<td>$F(L,K) = Q$ desired output</td>
<td>$L, K$ factor levels</td>
<td>$Q, w, r$ desired output and factor prices</td>
<td>$L(Q,w,r), K(Q,w,r)$ output-constrained factor demand functions</td>
<td>$LTC(Q,w,r)$ long run total cost function</td>
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<td><strong>Long Run Profit Maximization</strong></td>
<td>$P\cdot Q - LTC(Q,w,r)$ total profit</td>
<td>none</td>
<td>none</td>
<td>$P, w, r$ output price and factor prices</td>
<td>$Q(P,w,r)$ long run supply function</td>
<td>$\pi(P,w,r)$ long run profit function</td>
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<tr>
<td><strong>Long Run Profit Maximization</strong></td>
<td>$P\cdot F(L,K) - w\cdot L - r\cdot K$ total profit</td>
<td>none</td>
<td>$L, K$ factor levels</td>
<td>$P, w, r$ output price and factor prices</td>
<td>$L(P,w,r), K(P,w,r)$ factor demand functions</td>
<td>$\pi(P,w,r)$ long run profit function</td>
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