

Handout 01 - ECON 101 (Fall 2026)

Thinking Like an Economist and Mathematical Preliminaries

1 General Information

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	Time	Days	Room
Lectures:	1:00–2:15pm	TTh	6210 Sewell Social Sciences
Office Hours:	11:00am–12:30pm	TTh	6329 Sewell Social Sciences
TA Sessions:			
DIS 340	7:45–8:35am	F	6314 Sewell Social Sciences
DIS 336	9:55–10:45am	F	B203 Van Vleck Hall
DIS 341	12:05–12:55pm	F	6322 Sewell Social Sciences
DIS 344	3:30–4:20pm	F	6322 Sewell Social Sciences
TA Office Hours:	9:00–11:00am	T	TBA

Course materials and communication. Use **Canvas** for weekly materials, announcements, recordings, and assignment links; **Achieve** for readings and graded assignments; and **Piazza** for course-content questions. Consult the syllabus and Canvas for current deadlines and course policies.

2 A Toolkit for Economic Decisions

Economics studies how people, firms, governments, and other agents make choices when resources are **scarce**. Choosing one use of time, money, labor, or other resources necessarily means giving up another use.

Principle	Rule	Question to ask
Cost-benefit	Choose an action when its total benefit is at least as large as its total cost.	Is the choice worth doing?
Opportunity cost	The true cost is the value of the <i>best</i> alternative forgone, not merely the money paid.	“Or what?”
Marginal	For a “how many?” choice, compare the benefit and cost of one more unit.	Is one more worth doing?
Interdependence	A best choice can change when your other choices, other people’s choices, markets, or expectations change.	What else matters?

2.1 Benefits, costs, and economic surplus

Willingness to pay is the maximum amount you would give up to obtain a benefit. It can reflect enjoyment, convenience, or time saved, not just financial gains. The price actually paid may be lower. Expressing benefits and costs in comparable units lets us calculate

$$\text{economic surplus} = \text{total benefit} - \text{total cost}.$$

A positive surplus means an improvement relative to the alternative. Changes in relevant benefits or costs change incentives and can change the best choice.

Match the rule to the choice. For whether to act, compare total benefit with total cost relative to the alternative. For how much to do, each additional unit changes surplus by $MB - MC$. Here MB means **marginal benefit**, the benefit of one more unit, and MC means **marginal cost**, its extra cost. In the usual case where successive units become less worthwhile, continue while $MB \geq MC$ and stop before $MB < MC$. At equality, the extra unit leaves surplus unchanged; the course convention includes it. For example, if another hour of studying is worth more to you than the best use of that hour elsewhere, studying adds surplus. The relevant question is about that *next hour*, not whether studying in general is valuable.

Count each sacrifice once. Opportunity cost is the value of the best feasible alternative forgone, not the sum of mutually exclusive alternatives. If your best alternative to an hour of studying is an hour of paid work, the forgone earnings matter. Do not also add the value of an hour of leisure you could not have taken while working. You give up one best alternative.

2.2 Sunk costs and a four-step check

A **sunk cost** has already been incurred and cannot be recovered. Because it is the same under today's available choices, it is not an opportunity cost and should not affect the current decision.

The lecture's MCOI sequence: (1) *Marginal*: turn "how many?" into "one more?"; (2) *Cost-benefit*: compare the extra benefit and cost; (3) *Opportunity cost*: identify the best forgone alternative; (4) *Interdependence*: identify other choices or conditions that matter.

Where to revisit the material. Module 1 slides 38–44: cost-benefit and willingness to pay; 46–50: opportunity cost (worksheet Q1); 59–60: sunk costs (Q2); 61–72: marginal choices (Q3); 74–78: interdependence and MCOI. Textbook: Chapter 1, *The Four Core Principles of Economics*. Looking ahead to Module 2: Section 2.2, pp. 39–43, applies these principles to buying decisions. Slide numbers throughout this handout count PDF pages.

3 Models and Economic Reasoning

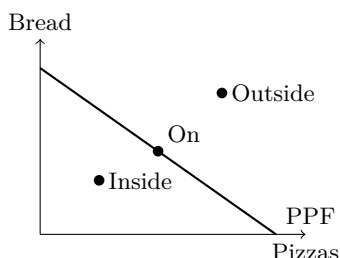
3.1 What a model leaves fixed

An economic **model** is a deliberately simplified representation used to explain relationships or make predictions. A **variable** is something that can take different values. The phrase *ceteris paribus* means that we study one change while holding other relevant factors constant.

For example, asking how more study time affects learning while holding sleep fixed is different from asking what happens when you study longer by sleeping less. Naming what stays fixed makes the claim easier to interpret.

3.2 The production possibilities frontier: trade-offs on a graph

A **production possibilities frontier (PPF)** shows the boundary of what can be produced with available resources and technology.



Inside: attainable, but resources could be used better to produce more.

On: producing more of one good requires giving up some of the other. This is *productive efficiency*.

Outside: unattainable with current resources and technology.

Moving *along* the PPF changes what is produced. If gaining two pizzas requires giving up six loaves, the opportunity cost is $6/2 = 3$ loaves per pizza. The cost is the amount given up, expressed as a positive number. An outward *shift* means more can be produced because resources or technology improved. Moving from inside to the frontier instead uses existing resources better. Neither efficiency nor the frontier tells us which combination people prefer.

Where to revisit the material. Resources and circular flow: slides 25–34. PPF and opportunity cost: slides 51–57.

4 Mathematical and Graphing Preliminaries

Put x on the horizontal axis and y on the vertical axis unless a problem says otherwise. Use the following rules as a reference while working the worksheet.

4.1 Lines and slopes

A straight line has slope-intercept form $y = mx + b$. The **slope** m tells you how much y changes when x rises by one unit. The **vertical intercept** b is the value of y when $x = 0$. For two points (x_1, y_1) and (x_2, y_2) with $x_1 \neq x_2$,

$$m = \frac{y_2 - y_1}{x_2 - x_1}, \quad b = y_1 - mx_1.$$

If the slope and one point are known, the same intercept formula applies. A positive slope means y rises as x rises; a negative slope means it falls. Distinct points with the same x lie on a vertical line, whose slope is undefined.

For example, $y = 8 - 2x$ starts at $y = 8$ when $x = 0$. Each one-unit increase in x reduces y by two. The line reaches $y = 0$ at $x = 4$. These two intercepts, $(0, 8)$ and $(4, 0)$, are enough to draw it. The numbers in each pair always give the horizontal coordinate first.

4.2 Intersections

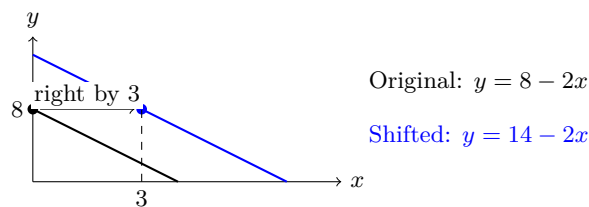
At an intersection, the same (x, y) satisfies both equations. For two lines $y = m_1x + b_1$ and $y = m_2x + b_2$, set their right-hand sides equal, solve for x , and substitute that value into either original equation to recover y . Check the ordered pair in both equations. If $m_1 = m_2$, different intercepts mean parallel lines with no intersection; equal intercepts mean the same line, with infinitely many shared points.

4.3 Shifting a line

Start with the line $y = mx + b$ and let h and k be positive amounts.

- **Up by k :** add k to every height. The new line is $y = mx + b + k$.
- **Right by h :** each old height occurs h units farther right. The new line is $y = m(x - h) + b$.

The minus sign in $x - h$ *undoes* the rightward move before applying the old rule. For example, moving $y = 8 - 2x$ right by three gives $y = 8 - 2(x - 3) = 14 - 2x$. The old point $(0, 8)$ becomes $(3, 8)$: substituting $x = 3$ into the new equation still gives $y = 8$. Moving the original line *up* by three would instead give $y = 11 - 2x$. The direction and units of the shift matter.



4.4 Graphing checklist

Label both axes and curves, mark intercepts or two known points, use the sign of the slope as a check, and label any requested starting and ending points. A rough sketch before doing algebra often makes the direction of a shift clear.

Where to revisit the material. Worksheet Q5a–b: lines and intercepts; Q5c: intersections; Q5d–e: shifts. Slide 22 explains the role of mathematics in the course. The textbook’s *A Quick Review of Graphs* provides a graphing reference.

Other Module 1 topics. For the circular-flow model, use slides 25–34. For reasoning mistakes, use slides 79–85 and worksheet Q4.