

# Assessment of Student Learning in a General Education Principles of Economics Course

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JETSET, August 2023

# Accreditation and Assessment

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## Standards:

- I Mission and Goals
- II Ethics and Integrity
- III Design and Delivery of the Student Learning Experience
- IV Support of the Student Experience
- V Educational Effectiveness Assessment
- VI Planning, Resources, and Institutional Improvement
- VII Governance, Leadership, and Administration

# Accreditation and Assessment

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- Standard III: Design and Delivery of the Student Learning Experience (General Education Program)
- Standard V: Educational Effectiveness Assessment

# Accreditation and Assessment: Standard III

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“...**general education program**, free standing or integrated into academic disciplines, that:

...offers a curriculum designed so that students acquire and demonstrate essential skills including at least oral and written communication, ***scientific and quantitative reasoning***, critical analysis and reasoning, technological competency, and information literacy...”

# GW General Education Learning Outcomes

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## Quantitative Reasoning

- 1) Represent mathematical information symbolically, visually, numerically, and verbally
- 2) Use algebraic, geometric, or statistical calculations to solve problems
- 3) Interpret and explain information represented in mathematical forms (e.g., graphs, equations, diagrams, tables)
- 4) Articulate precise mathematical definitions and propositions and draw inferences from them

# Assessment Plan

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## Learning Outcome 1: Math Quiz

MESA-Foundations: *The Mathematics for Economics Skills Assessment, Foundations*. (Satisfactory Performance: 78%)

## Learning Outcomes 2, 3, and 4: Common Final Exam Question

Each Learning Outcome was Measured at

- Fundamental Level (Satisfactory Performance: 75%)
- Advanced Level (Satisfactory Performance: 70%)

# GW General Education Learning Outcomes

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## Quantitative Reasoning

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# Learning Outcome 1 to Course Objectives

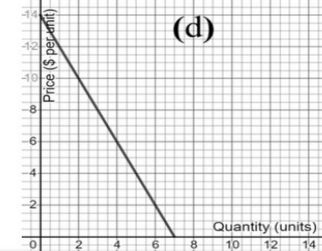
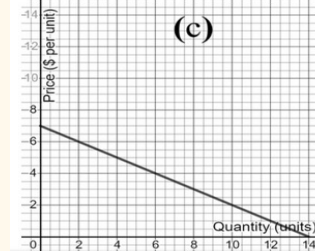
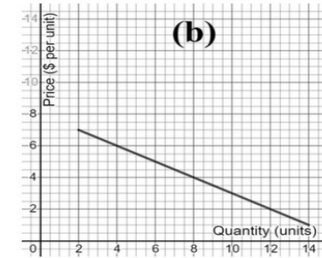
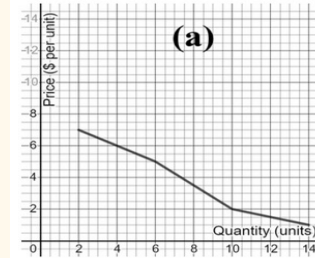
<b>QUANTITATIVE REASONING LEARNING OUTCOMES</b>	<b>ECON 1011 LEARNING OBJECTIVES</b>
1. Represent mathematical information symbolically, visually, numerically, and verbally	<ul style="list-style-type: none"><li>• Large number concepts (prerequisite)</li><li>• Two variable graphs (prerequisite)</li><li>• The slope of a curve (prerequisite)</li><li>• Areas of a rectangle and a triangle (prerequisite)</li><li>• Percentage change – general (prerequisite)</li><li>• Percentage change - midpoint method</li><li>• Solving for unknowns (prerequisite)</li><li>• Solving systems of equations (prerequisite)</li><li>• Elements of game theory</li></ul>



# Learning Outcome 1: Math Quiz Sample Question

“The table below describes the relationship between the price and quantity of apples sold in a city. Which of the graphs below matches the data in the table?”

Price (\$ per unit)	Quantity (units)
1	14
3	10
5	6
6	4
7	2



# Learning Outcome 1 to Course Objectives

<b>QUANTITATIVE REASONING LEARNING OUTCOMES</b>	<b>ECON 1011 LEARNING OBJECTIVES</b>
1. Represent mathematical information symbolically, visually, numerically, and verbally	<ul style="list-style-type: none"><li>• Large number concepts (prerequisite)</li><li>• <b>Two variable graphs (prerequisite)</b></li><li>• <b>The slope of a curve (prerequisite)</b></li><li>• Areas of a rectangle and a triangle (prerequisite)</li><li>• Percentage change – general (prerequisite)</li><li>• Percentage change - midpoint method</li><li>• Solving for unknowns (prerequisite)</li><li>• Solving systems of equations (prerequisite)</li><li>• Elements of game theory</li></ul>

# Learning Outcome 1: Math Quiz Sample Question

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“Let the lengths of the sides of a rectangle be  $a$  and  $2$ . The area  $A$  of the rectangle in terms of its perimeter  $P$  is then...”

# Learning Outcome 1 to Course Objectives

<b>QUANTITATIVE REASONING LEARNING OUTCOMES</b>	<b>ECON 1011 LEARNING OBJECTIVES</b>
1. Represent mathematical information symbolically, visually, numerically, and verbally	<ul style="list-style-type: none"><li>• Large number concepts (prerequisite)</li><li>• Two variable graphs (prerequisite)</li><li>• The slope of a curve (prerequisite)</li><li>• <b>Areas of a rectangle and a triangle (prerequisite)</b></li><li>• Percentage change – general (prerequisite)</li><li>• Percentage change - midpoint method</li><li>• <b>Solving for unknowns (prerequisite)</b></li><li>• <b>Solving systems of equations (prerequisite)</b></li><li>• Elements of game theory</li></ul>

# Learning Outcome 1 (Prerequisite)

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## Prerequisite

Average Score =	77%
Median Score =	81%
Satisfactory Students =	63%

# GW General Education Learning Outcomes

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## Quantitative Reasoning

- 1) Represent mathematical information symbolically, visually, numerically, and verbally
- 2) Use algebraic, geometric, or statistical calculations to solve problems
- 3) Interpret and explain information represented in mathematical forms (e.g., graphs, equations, diagrams, tables)
- 4) Articulate precise mathematical definitions and propositions and draw inferences from them

# Learning Outcome 2 to Course Objectives

<b>QUANTITATIVE REASONING LEARNING OUTCOMES</b>	<b>ECON 1011 LEARNING OBJECTIVES</b>
2. Use algebraic, geometric, or statistical calculations to solve problems	<ul style="list-style-type: none"><li>• Solve for equilibrium price and quantity given demand and supply equations</li><li>• Compute changes in consumer and producer surplus, and calculate the deadweight loss due to price controls, taxes, market power and externalities</li><li>• Product and cost curves – total, average and marginal</li><li>• Find a firm's profit-maximizing price and quantity under different market structures</li></ul>

# Learning Outcome 2 to Course Objectives (Fundamental)

<b>QUANTITATIVE REASONING LEARNING OUTCOMES</b>	<b>ECON 1011 LEARNING OBJECTIVES</b>
2. Use algebraic, geometric, or statistical calculations to solve problems	<ul style="list-style-type: none"><li>• <b>Solve for equilibrium price and quantity given demand and supply equations</b></li><li>• <b>Compute changes in consumer and producer surplus</b>, and calculate the deadweight loss due to price controls, taxes, market power and externalities</li><li>• Product and cost curves – total, average and marginal</li><li>• Find a firm's profit-maximizing price and quantity under different market structures</li></ul>



## Learning Outcome 2 Final Exam Question (Fundamental)

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Assume a market is perfectly competitive. The market demand curve is  $Q_D = 600 - 10P$  and the market supply curve is  $Q_S = 20P$ .

- What is the equilibrium price and quantity in the market?
- Calculate consumer surplus.
- Calculate producer surplus.

# Learning Outcome 2 Assessment Results (Fundamental)

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	<u>Fundamental</u>
Average Score =	89%
Median Score =	100%
Satisfactory Students =	82%

# Learning Outcome 2 to Course Objectives (Advanced)

QUANTITATIVE REASONING LEARNING OUTCOMES	ECON 1011 LEARNING OBJECTIVES
2. Use algebraic, geometric, or statistical calculations to solve problems	<ul style="list-style-type: none"><li>• <b>Solve for equilibrium price and quantity given demand and supply equations</b></li><li>• <b>Compute changes in consumer and producer surplus, and calculate the deadweight loss due to price controls, taxes, market power and externalities</b></li><li>• Product and cost curves – total, average and marginal</li><li>• Find a firm's profit-maximizing price and quantity under different market structures</li></ul>

## Learning Outcome 2 Final Exam Question (Advanced)

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Assume a market is perfectly competitive. The market demand curve is  $Q_D = 600 - 10P$  and the market supply curve is  $Q_S = 20P$ .

The government now imposes a **tax of \$4**. Given this tax:

- Calculate the quantity traded.
- Calculate the price that consumers pay and producers receive.
- Calculate consumer and producer surplus.
- Calculate tax revenue.
- Assuming the initial market equilibrium was efficient, calculate the dead weight loss resulting from the new equilibrium under the tax.

# Learning Outcome 2 Assessment Results (Fundamental & Advanced)

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	<u>Fundamental</u>	<u>Advanced</u>
Average Score =	89%	55%
Median Score =	100%	57%
Satisfactory Students =	82%	48%

# GW General Education Learning Outcomes

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## Quantitative Reasoning

- 1) Represent mathematical information symbolically, visually, numerically, and verbally
- 2) Use algebraic, geometric, or statistical calculations to solve problems
- 3) Interpret and explain information represented in mathematical forms (e.g., graphs, equations, diagrams, tables)
- 4) Articulate precise mathematical definitions and propositions and draw inferences from them

# Learning Outcome 3 to Course Objectives

<b>QUANTITATIVE REASONING LEARNING OUTCOMES</b>	<b>ECON 1011 LEARNING OBJECTIVES</b>
3. Interpret and explain information represented in mathematical forms (e.g. graphs, equations, diagrams, tables)	<ul style="list-style-type: none"><li>• Graph production possibility frontiers</li><li>• Graph supply and demand functions and/or schedules</li><li>• Identify consumer and producer surplus, deadweight loss (due to price controls, taxes, market power and externalities) and the incidence of a tax on a graph</li><li>• Solve utility maximization problems graphically</li><li>• Solve firm profit maximization problems under different market structures graphically</li></ul>

# Learning Outcome 3 to Course Objectives (Fundamental)

QUANTITATIVE REASONING LEARNING OUTCOMES	ECON 1011 LEARNING OBJECTIVES
<p>3. Interpret and explain information represented in mathematical forms (e.g. graphs, equations, diagrams, tables)</p>	<ul style="list-style-type: none"> <li>• Graph production possibility frontiers</li> <li>• <b>Graph supply and demand functions and/or schedules</b></li> <li>• <b>Identify consumer and producer surplus, deadweight loss (due to price controls, taxes, market power and externalities) and the incidence of a tax on a graph</b></li> <li>• Solve utility maximization problems graphically</li> <li>• Solve firm profit maximization problems under different market structures graphically</li> </ul>



## Learning Outcome 3 Final Exam Question (Fundamental)

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Assume a market is perfectly competitive. The market demand curve is  $Q_D = 600 - 10P$  and the market supply curve is  $Q_S = 20P$ .

- Graph the supply and demand curves.
- Label equilibrium price and quantity.
- Label the area depicting consumer surplus.
- Label the area depicting producer surplus.

# Learning Outcome 3 Assessment Results (Fundamental)

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	<u>Fundamental</u>
Average Score =	78%
Median Score =	100%
Satisfactory Students =	72%

# Learning Outcome 3 to Course Objectives (Advanced)

QUANTITATIVE REASONING LEARNING OUTCOMES	ECON 1011 LEARNING OBJECTIVES
<p>3. Interpret and explain information represented in mathematical forms (e.g. graphs, equations, diagrams, tables)</p>	<ul style="list-style-type: none"> <li>• Graph production possibility frontiers</li> <li>• Graph supply and demand functions and/or schedules</li> <li>• <b>Identify consumer and producer surplus, deadweight loss (due to price controls, taxes, market power and externalities) and the incidence of a tax on a graph</b></li> <li>• Solve utility maximization problems graphically</li> <li>• Solve firm profit maximization problems under different market structures graphically</li> </ul>

## Learning Outcome 3 Final Exam Question (Advanced)

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Assume a market is perfectly competitive. The market demand curve is  $Q_D = 600 - 10P$  and the market supply curve is  $Q_S = 20P$ .

The government now imposes a **tax of \$4**. Given this tax:

- Label the price consumers actually pay.
- Label the price producers actually receive.
- Label the area that represents consumer surplus.
- Label the area that represents producer surplus.
- Label the area that represents government tax revenue.
- Label the area that represents dead weight loss.

# Learning Outcome 3 Assessment Results (Fundamental & Advanced)

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	<u>Fundamental</u>	<u>Advanced</u>
Average Score =	78%	66%
Median Score =	100%	100%
Satisfactory Students =	72%	59%

# GW General Education Learning Outcomes

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## Quantitative Reasoning

- 1) Represent mathematical information symbolically, visually, numerically, and verbally
- 2) Use algebraic, geometric, or statistical calculations to solve problems
- 3) Interpret and explain information represented in mathematical forms (e.g., graphs, equations, diagrams, tables)
- 4) Articulate precise mathematical definitions and propositions and draw inferences from them

# Learning Outcome 4 to Course Objectives

<b>QUANTITATIVE REASONING LEARNING OUTCOMES</b>	<b>ECON 1011 LEARNING OBJECTIVES</b>
4. Articulate precise mathematical definitions and propositions and draw inferences from them	<ul style="list-style-type: none"><li>• Elasticity – revenue implications of price changes; tax incidence, and tax efficiency.</li><li>• Total and Marginal Utility – implications for consumer demand</li><li>• Revenue and Costs – implications for firm profit maximization; firm supply; and entry/exit decisions</li><li>• Economic &amp; Accounting Profit – the role and importance of opportunity costs</li></ul>

# Learning Outcome 4 to Course Objectives (Fundamental & Advanced)

QUANTITATIVE REASONING LEARNING OUTCOMES	ECON 1011 LEARNING OBJECTIVES
4. Articulate precise mathematical definitions and propositions and draw inferences from them	<ul style="list-style-type: none"><li>• <b>Elasticity</b> – revenue implications of price changes; <b>tax incidence</b>, and tax efficiency.</li><li>• Total and Marginal Utility – implications for consumer demand</li><li>• Revenue and Costs – implications for firm profit maximization; firm supply; and entry/exit decisions</li><li>• Economic &amp; Accounting Profit – the role and importance of opportunity costs</li></ul>



# Learning Outcome 4 Final Exam Question (Fundamental & Advanced)

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Assume a market is perfectly competitive. The market demand curve is  $Q_D = 600 - 10P$  and the market supply curve is  $Q_S = 20P$ .

The government now imposes a **tax of \$4**. Given this tax:

- Calculate and categorize the price elasticity of demand at the equilibrium price and quantity.
- Solve for the consumer and producer tax burden.
- Would consumers pay more or less of the tax if demand became more price elastic?

# Learning Outcome 4 Assessment Results (Fundamental & Advanced)

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	<u>Fundamental</u>	<u>Advanced</u>
Average Score =	39%	47%
Median Score =	0%	50%
Satisfactory Students =	29%	39%

# Learning Outcome 1 (Prerequisite)

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## Prerequisite

Average Score =	77%
Median Score =	81%
Satisfactory Students =	63%

# Learning Outcome 1 Assessment Results (Bonus Quiz)

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	<u>Prerequisite</u>	<u>Before Course</u>	<u>End of Course</u>
Average Score =	77%	77%	77%
Median Score =	81%	81%	78%
Satisfactory Students =	63%	51%	49%

# Learning Outcome 1 Assessment Results (Filtered)

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	<u>Before</u> <u>Course</u>	<u>End of</u> <u>Course</u>
Average Score =	76%	78%
Median Score =	78%	81%
Satisfactory Students =	61%	65%