Gurobi®

LESSON PLAN: BUSINESS & BUSINESS ANALYTICS TRACKS

Lesson plans and instructor guide:

Gurobi in collaboration with Prof. Larry Snyder, Lehigh University

INTRODUCTION (FOR INSTRUCTORS)

The Gurobean Optimization Game helps students experience what it means to make decisions in a messy, real-world system, one where demand fluctuates, resources are limited, and outcomes are not predictable.

This version of the teaching guide is designed for business and analytics audiences, focusing on decision quality, insight, and strategy rather than mathematical formulation.

Intended Audience

This guide is appropriate for learners who:

- Work with data or models but don't build them,
- Are familiar with forecasting, dashboards, or KPIs,
- Want to understand how analytics informs decisions

No technical background in optimization is required.

Learning Objectives (Business Emphasis)

After the lesson, students should understand that:

- Good decisions cannot be judged by a single outcome.
- Uncertainty makes performance inherently variable.
- Feasible plans can perform very differently.
- Systems with people and queues behave non-intuitively.
- Analytics supports decisions; it does not eliminate risk.

SAMPLE LESSON STRUCTURE (45–75 MINUTES)

Before class

Play through the game once. Identify the surprising behaviors you'll want to highlight in class.

Decide your emphasis. Choose whether to focus on operational efficiency or on decision evaluation under uncertainty.

(Optional) Have students play the opening rounds beforehand. This lets them learn the controls before the discussion.

In class

Frame the experience. Present Gurobean as a decision sandbox: you choose the policies, the system responds over time, and outcomes are uncertain.

Early gameplay: the confidence phase. Students usually feel in control. Pause and ask: Why does this feel manageable? What assumptions are you making?

Discussion. Did the same decision always give the same result? If your boss asked for the "right" answer, what would you say?

Later gameplay: the complexity phase. As pricing, queues, and customer loss appear, ask: Why did profit stop improving? Why are outcomes inconsistent? This is where learning accelerates.

Discussion: comparing decisions. At the comparison screen, acknowledge strong outcomes, explain why the benchmark targets average performance, and reinforce that randomness can temporarily favor a weaker strategy.

Discussion: the best choice is a moving target. Show how the profit curve changes shape from one round or scenario to the next. Ask: where is the sweet spot now, how much better is it than nearby choices, and how much would a small mistake cost? A flat peak means roughly right is good enough; a sharp peak means precision pays. The point: the best decision moves as conditions change, so it must be re-found rather than memorized.

Choose one: play another round or two, or discuss real-world parallels (pricing, staffing, capacity planning) and how analytics supports, but does not replace, judgment.

After Class

Championship Mode (homework or in class). Spin up a private Class Championship for your students, or point them to the weekly Global Championship and its worldwide leaderboard. See Part 3 for both options.

Coffee Break

Go get some coffee!

CORE TEACHING MOMENTS (BUSINESS)

Feasibility ≠ Success

Meeting constraints does not guarantee performance.

Variability Is Normal

Two "good" days can follow the same decision.

Nonlinear Effects

Small changes can overwhelm intuition, and the shape of the profit curve itself changes from round to round and scenario to scenario, so the best choice keeps moving.

Why Analytics Matters

Humans are poor judges of complex systems without structured tools.

INSTRUCTOR INTERVENTION POINTS

After the first simulation run: ask students why results changed even though decisions didn't.

When profit fluctuates: emphasize that variability is expected, not an error.

When students beat Gurobi: explain expected value vs. single realizations explicitly.

When all solutions seem "reasonable": reinforce that nonlinearity creates many local optima.

COMMON MISCONCEPTIONS TO ADDRESS

- The best decision should always win."
- "More production always means more profit."
- "If it worked once, it's a good policy."

Use these moments to reshape decision intuition.

OPTIONAL EXTENSIONS

- Ask students how they would evaluate a store manager based on this system.
- Discuss KPIs vs. long-term performance.
- Connect to real applications: pricing, staffing, capacity planning.

WHAT STUDENTS SHOULD TAKE AWAY

Gurobean shows that good decision-making is about managing uncertainty, not eliminating it. Analytics and optimization provide disciplined ways to make choices when outcomes cannot be predicted with certainty.