Module 08 - Analytical Decisions: Business Optimization
November 24 - December 9

Learning outcomes for this module

1. Develop linear optimization models to maximize value and minimize risks
2. Apply the linear optimization models to a variety of technology, product and operation cases

Textbook:
Chapter 6 “Integer Linear Programming” of Ragsdale “Spreadsheet Modeling and Decision Analysis” textbook

Announcement

Howdy,

First and foremost, Happy Thanksgiving!

The current module is concluding on November 21st and module 8, the last one of this course, “business optimization”, will not be released until November 24. So, we will have a short Thanksgiving holiday break.

Module 8 will discuss some advanced data-driven decision-making principles, models and optimization analysis. The key learning points are:

1. How to construct a mathematic model to describe business operations in a quantitative means (Topics 1-3)

2. The application of quantitative analysis to financing activities (Topics 4-5)
3. You will notice that the aggregate planning business case (Topics 6 and 7) bolts together several modules: strategic positioning, performance, forecasting and optimization together.
   I created three MS Excel models for your learning: production model, financing model and aggregate models. Please feel free to use them for your assignments.

There are three quizzes (17-19) and two assessments (1. optimization model and 3. aggregate planning). Note that we chose to skip the assessment-2, financial planning in this module.

Again, I expect you to focus on mastering the principle and business applications of the optimization-based decision-making process at your organizations, rather than optimization math.

Also, I was suggested to release your current grade as Marc did. After careful consideration and discussion with Sam, I decided NOT to do so simply because I want all of us to focus on the learning, rather than the grade. Please contact me if you want to discuss your grade.

Yours truly,

Xiaomin

Topic 1 - Module Introduction Duration about 5 minutes Watch lecture Download transcript

"The person who chases two rabbits catches neither." - Confucius

Topic 2 - Linear Optimization Duration about 29 minutes Watch lecture Download transcript

Optimization model 1 - Production Optimization Attached Files:
Simple production Optimization Demo.xlsx (37.206 KB)
This is the MS Excel production optimization model that we discussed in the lecture. Analytic Solver for Excel software is required to run the model.

Optimization Assessment - 1 Build the following Integer-Linear programming model with Analytic Solver for Excel, and solve it. . Due December 1st mid night. . **MAX**: 4*X 1+ 5*X 2 . **Constraints**: . 2*X 1 + 3*X 2 ≤ 120 4*X 1 + 3*X 2 ≤ 140 X 1 + X 2 ≤ 80 X 1 ≥ 0 X 2 ≥ 0 X 1 & X 2 are integers **Deliverables: .** 1. Submit the model and results in MS Excel format on eCampus. . 2. Submit Analyticsolver model screen-shot including the Objective, Variables and Constraints.

Quiz 17 Due Nov. 30 midnight

"THINK AHEAD. Don't let day-to-day operations drive out planning" - Donald Rumsfeld

Topic 3 - Business Analytics to Transform Decision Making Duration about 3 minutes Watch lecture Download transcript

Topic 4 - Long-term and Short-term Debt Duration about 5 minutes Watch lecture Download transcript

Topic 5 - Financial Planning Duration about 24 minutes Watch lecture Download transcript

Quiz 18 Due Dec. 3rd midnight.

Optimization Model 2 - Cash Flow Decision Attached Files:
Cash Flow Decision.xlsx (40.281 KB)
This is the MS Excel cash flow optimization model that we discussed in the lecture. Analytic Solver for Excel software is required to run the model.

Optimization Assessment - 2 OPTIONAL Availability: Item is not available. Attached Files:
Assessment-2(Cash flow optimization).xlsx (14.44 KB)
This is an OPTIONAL assessment for your own satisfaction. Submission is NOT required. No points. As a CFO of company XYZ, you are responsible for managing the financing cost and cash flow for the next calendar year. At the beginning of 1Q2016, the cash level of your department is $6.5million. The business model of the assessment is in the attached Excel file, and the operation cash flow is as follows:

	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun 18
Cash flow from operations/sales	$7,000,000	$5,000,000	$3,000,000	$8,000,000	$7,000,000	$7,000,000

You need to decide the amounts of long-term (one year) loan and short-term (monthly) loan forecast that the company needs to borrow to maintain robust cash flow for the company. Your objective is to minimize the financing cost (interest). Complete the AnalyticSolver optimization model. Use the attached template for your solution.

"Most people don't plan to fail. They fail to plan" - John Beckley

Topic 6 - Demand/Production Planning and Inventory Optimization Duration about 12 minutes
Watch lecture Download transcript

Topic 7 - Optimization Business Case Duration about 25 minutes Watch lecture Download transcript

Quiz 19 Due Dec. 8th midnight.

Optimization Model 3 - Aggregate Planning Attached Files:
Aggregate planning with optimization.xlsx (43.645 KB)

Optimization Assessment - 3 Attached Files:
Assessment-3 (Aggregate planning).xlsx (13.303 KB)
The attached Excel file has various details for company XYZ's production plan for a given year. Understand the production model. Due December 9th midnight.
Deliverables:
1. Use AnalyticSolver to calculate the optimum productions in each quarter to maximize annual profit. Use the attached template for your solution, and submit the excel file on eCampus.
2. Submit (in PDF format, at most 2 pages) a report describing your model, explain the optimization outcomes and present business insights derived from your analysis.

"When it's obvious that the goals cannot reach. Don't adjust the goals, adjust the action steps." - Confucius