



ISOM 4820: Dynamic Pricing and Revenue Management (DPRM)

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Course Description

Pricing is one of the most powerful levers a company can use to affect profits. It is also among the least understood: pricing decisions are made less thoughtfully and systematically than one would expect.

Coined as the “number-one emerging business strategy” by *The Wall Street Journal*, pricing and revenue management (in short, RM) focuses on how a firm should set and update pricing and sales decisions across its various selling channels in order to maximize its profitability. The value proposition behind RM (and this course) lies beyond the base concept of differential pricing, in how pricing decisions are actually made and coordinated with supply availability decisions---a process that is changing dramatically with advances in data, decision and information technology.

A relatively recent addition to business school curricula, DPRM offers an innovative, analytic perspective on pricing, which combines marketing, operations, and advanced decision support technology. Within the broader area of pricing theory, this course focuses on *tactical* (as opposed to strategic) management of pricing and/or capacity allocation decisions, tackled using (1) **quantitative models** of demand and consumer behavior, and (2) the tools of **constrained optimization** - - the two main building blocks of revenue optimization systems.

A specialized course, DPRM provides *pricing analytics* skills and high-level insights to help managers and management consultants deliver price recommendations.

What you should expect to take away from this course:

1. How to identify and leverage opportunities for RM in different business contexts;
2. Frameworks and tools for implementing RM and providing decision support;
3. A survey of current RM practices in various industries.

Contemporary Business Context

RM originated in the post-deregulation US airline industry, and transformed within a couple of decades the entire transportation industry. Nowadays, combined dynamic pricing and revenue management systems and solutions provide a competitive edge in diverse industries, including hospitality, tourism, retail, manufacturing, rental/leasing services, events/entertainment, internet publishing/advertising, broadcasting, healthcare, telecommunications, energy, cloud computing (*not* all are covered in class). In parallel, pricing and revenue optimization has become a rapidly expanding practice in consulting services, and a growing area of software and IT development.

Course Material

There is no book for this course. All necessary material will be available on the course website <http://lmes2.ust.hk/>. The website provides important download material, including assignments, data files, simulations/games, course slides, as well as additional readings and announcements. So you'll have to check the website regularly.

For those interested in reading more on the subject, I highly recommend the following book which is available in the bookshop (for purchase) and the library (for short-term loan):

Phillips, R, "*Pricing and Revenue Optimization*," Stanford Business Books, 2005.

Course Requirements

You cannot master the material for this course without systematic practice. Hence there will be **regular assignments**. Specifically, there is an individual or group assignment for (almost) every week. Each assignment involves a conceptual component and some Excel-based analysis (solver and/or data analysis). While you do *not* have to be a spreadsheet expert, the course is not recommended for students who are not disposed to 'play around' with data, or to dedicate systematic effort outside of class.

Your final grade in the course is based on 1 group assignment, 5 individual assignments, a course project and class participation. A breakdown of the grading system is given below:

Individual Assignments (5)	25%
Group Assignment (1)	25%
Class Participation	15%
Final project	35%

Individual Assignments (5)

There are 5 cases that each student will study independently. Follow the instructions and the deadlines once the assignments are posted on LMES.

Class Participation

This is a qualitative measure of your contribution to classroom learning. For each class, you are required to do the pre-assigned readings, and prepare to discuss the case questions in class. Attendance, quality of participation (impact), respect for others, and a good attitude are key elements of a high participation grade.

Group Assignment and Final Project

You are required to form groups of size 4, choose a name for your group and submit the list to the course assistant by e-mail no later than 10 am on Feb 10, 2014. Make sure that at least one member in the group is relatively comfortable to work with Excel.

You are expected to sit with your teammates in class. Each team should bring at least one laptop to class with Microsoft Excel installed and Excel Solver enabled. You can Google to figure out how to enable the Solver. If you don't know how to work with Solver, check the course website for a quick reference.

There are 2 group-based assignments.

- 1) There is one case---Personal Training at New York Health Club---that each group will study. See below for how the assignment will be evaluated.
- 2) Each group will conduct a project on DP&RM related topics. I will provide more guidelines during the semester. See below for how the project will be evaluated.

Assessment of the individual and group assignments:

What you deliver as an individual assignment should be at most two pages long, 12-point font, and submitted at the time specified in the assignment through LMES. Late submissions will not be accepted. Each assignment is graded according on a 3-point scale as follows:

	1.5	1	0.5	0
Identification of the main issues/problems	Demonstrate in-depth understanding of the case; identify all main issues	Demonstrate a good understanding of the case; identify most of main issues	Demonstrate some understanding of the case; identify some of the main issues	Demonstrate little/no understanding of the case; identify few of the main issues
Comparison & Comments	Well-reasoned comments with precise and careful comparisons	Well thought-out comments with comprehensive comparison	Superficial or ad hoc and imprecise comments	Little/no comments

What you deliver as a group assignment should discuss the problems in the case, provide solutions to the identified problems, and provide your own comments and recommendations. The report should be at most 8-page long in 12-point font. The case report will be graded on a 10-point scale as follows:

	2-2.5	1.5-2	1-1.5	0-1
Discussion of the main issues/problems	In-depth discussion of the main issues	Clear discussion of the main issues	Some discussion of the main issues	Little/no discussion of main issues
Solutions/analysis	Well-reasoned, thorough analysis with no mistake	Complete analysis with a few minor mistakes	Complete analysis; some minor mistakes but no major flaws	Incomplete analysis, and/or analysis with major flaws
Comments	Well-reasoned and insightful comments	Appropriate and well thought-out comments	Appropriate but superficial comments	Inappropriate comments
Writing and organization	Excellent written with thoughtful organization	Well written with clear organization	Well written with partially unclear organization	Poorly written and/or unclear organization

More on the Final Project

The project will be an opportunity for you to get creative and seek out opportunities for revenue management. Choose a context (it doesn't need to be a for-profit company!) Your job is to identify opportunities for revenue improvement in your chosen context. You are expected to construct a model that can be used to assist the improvement. You do NOT need to collect the data and solve the model. However, you are expected to explain how you will go about getting the needed data, how the model will be solved and what pricing strategies you expect to use. You should also explain how the improvement will be implemented and preferably provide an estimate on the expected magnitude of improvement (justified based on some initial data). Basically, you can consider this as a proposal to a company from either a consulting firm or an internal consulting department.

A one-page proposal is due on March 14 at the beginning of class. Each team will be given time to present its project in the last three weeks of the semester. I will decide on the presentation schedule after I receive the proposals. A one-page executive summary and two copies of the presentation slides should be submitted before the presentation. However, no detailed written report is needed.

Your grade for the project will be based on my assessment of the project, your presentation, how you handle the questions raised in the class on your project and also how your teammates evaluate you. The table below should give you an idea on how the project will be evaluated:

	4/3.5	3/2.5	2/1.5	1/0.5
Problem identification	Well defined and explained; a large amount of original thought; problem with very significant potential improvement	Well defined and explained; some original thought; problem with significant potential improvement	Interesting problem identified, but there is little evidence of original thinking, or unclear potential improvement	It is not clear what the real problem is
Model and Data	Appropriate and rigorous model but yet not overly complicated; Excellent plan for data collection	Appropriate and rigorous model, but some fine-tuning is required; Some good ideas of how data can be collected	Appropriate model, but major adjustment is required; Little idea of how data can be collected	Inappropriate model, and/or major errors in the model; No idea on how data can be collected
Implementation Planning	Concrete and comprehensive plans; show considerations for all key issues; specific on how to measure the benefit	Good and realistic plan for data collection and improvement implementation	There are some good points in the plan, but the plan is either too vague or some ideas are unrealistic	No or little clue about what data is needed and how the improvement should be implemented; Or plans are unrealistic and illogical
Delivery (Presentation)	Excellent use of visuals; very clear and concise flow of ideas; demonstrate and stimulate passion	Good use of visuals; clear flow of ideas; demonstrate interest	Limited and/or not so good use of visuals; ideas presented but focus is lost at times; limited evidence of interest	No use of visuals; hard to follow ideas; lack of enthusiasm and interest
Response to questions/comments (Presentation)	Excellent response; demonstrate in-depth consideration of all issues	Good response; demonstrate in-depth considerations of most issues	Satisfactory response; demonstrate considerations of some of the issues	Limited response; demonstrate a lack of considerations of significant issues

NOTE: Teams are expected to criticize/discuss/provide suggestions on the projects presented by other teams. This will be a determinant of your contribution score.

See the Appendix of the syllabus for the peer-evaluation form.

OUTLINE

Module 1: Fundamentals of Revenue Management

What is Revenue Management (Feb 3 and 5)

- Introduction to revenue management and course
- Customer valuations game

Basic Price Optimization (Feb 10 and 12)

- Basics in pricing and customer valuations
- CASE: Springfield Nor'easters: Maximizing Revenues in the Minor Leagues

Market Segmentation and Price Differentiation (Feb 17 and 24)

- Linear demand models and price differentiation
- CASE: What Price Vertigo?

Versioning (Feb 26 and March 3)

- Versioning
- Case: Cambridge Software Corporation (CSC)

Demand Estimation (March 5, 10, 12)

- Models of consumer demand, discrete choice (MNL) model, fitting model parameters
- Case: Personal Training at the New York Health Club

Mid-term Review (March 17)

Module 2: Revenue Management in Business Contexts

Retail Industry: Markdown Management (Mar 19, 24, 26, 31)

- Game: Wait-and-Buy Game
- LP approach to markdown management, dynamic pricing, strategic behavior, customer response
- Case: Retailer Pricing Using Retailer

B2B: Contract Management (Apr 2, 9, 14, 16)

- Game: Procurement Game
- Uncertain capacity, customized pricing, strategic uncertainty, competition
- Case: Break.com

Module 3: Projects and Course Review

Final Project Presentations (April 21, 23, 28, 30 and May 5)

Review of Revenue Management: What Did We Learn? (May 7)

Appendix 1: Peer Evaluation Form

You will assess all team members, including yourself, using the following rubric. For each category, evaluate each team member and give a grade. All responses are confidential. You must hand in this page by the end of class on May 7. Failure to do so will reduce your own total score by 1 point.

Team:

Student:

Team member (Name and Student ID)	Attendance	Contribution	Quality of work	Working with others	Time management	Total

Comments:

	2	1.5	1	0-0.5
Attendance	Attend almost all meetings and all classes; inform and/or seek agreement of the team before absence	Attend most of the meetings and classes; inform and/or seek agreement of the team before absence	Attend at least half of the meetings and classes; inform and/or seek agreement of team before most absences	Frequently miss meetings or classes; Or fail to inform the team before absence
Contribution	Contributes a lot of effort; routinely provides useful ideas in team meetings and class discussions	Tries hard to contribute; usually provides useful ideas in team meetings and class discussions	Does what is required; sometimes provides useful ideas in team meetings and class discussions	May refuse to participate; rarely provides useful ideas in team meetings and class discussions
Quality of work	Provides work of highest quality that impresses other team members	Provides work of high quality that meets expectations of other team members	Provides work that occasionally needs to be redone by other team members to ensure quality	Provides work that usually needs to be redone by other team members to ensure quality
Working with others	Always listens and show support to other team members; always help to keep the team work well together	Usually listens to and show supports to others; may talk too much, but does not cause “waves” in the team	Rarely listens, but still shows support to other team members; sometimes not a good team member	Never shows support to other team members; often not a good team member
Time management	Always does the assigned work without having to be reminded; no need to adjust deadlines or work responsibilities because of him/her	Usually does the assigned work; rarely needs reminding; no need to adjust deadlines or work responsibilities because of him/her	Often needs reminding; occasionally adjust deadlines or work responsibilities because of him/her	Rarely get things done by deadlines; always have to adjust deadlines or work responsibilities because of him/her

Appendix 2: About Your Professor

Javad Nasiry is an assistant professor of Operations Management at the HKUST Business School since 2010. He holds a Ph.D. in Technology and Operations Management from INSEAD, France. He also has an MBA and a BS in industrial engineering from Sharif University of Technology, Iran.



His main research interest is in pricing and revenue management with behavioral considerations where he studies how firms should design their pricing policies taking into account the realistic, but not necessarily rational, customer behavior. His research has appeared in leading academic journals (including Management Science and Operations Research).

He also conducts research in supply chain management particularly in the medical (e.g., flu vaccines), agricultural, and retail industries.

Javad Nasiry has been elected into HKUST Great Minds-2013 (voted by students to recognize the best 10 professors in HKUST in each academic year).