

OPRE 6377 Demand and Revenue Management - Syllabus

Course Information

- Course number - section: OPRE 6377 - 501
- Course title - term: Demand and Revenue Management - Fall 2009

Professor and Teaching Assistant Contact Information

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Lecture hours: 4-6:45 pm on M at SOM2.804.
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Office hours: 5-7 pm on W at SOM3.407.

Course Description

Conceptual: Management is about matching demand and supply. This course focuses on the demand without attempting to manage the supply. But it does take the amount, location, condition, or vintage of the supplies into account. Demand must be understood first to be managed. This understanding comes partly from statistical forecasting but more importantly from the identification of the demand drivers. These drivers are specific to industries but some are common and easily obtainable such as general macroeconomic indicators, demographic data, housing inventories, and temperatures. Unlike these demand drivers, prices can be managed over time, customer classes, locations. A good portion of the course is dedicated to determining good prices depending on inventory, capacity, input costs, and previous prices¹.

Practical: Revenue management (RM) first emerged in US airline industry after the deregulation in 1980s. It has successfully implemented by companies in air transportation, hospitality (hotels, cruises, theme parks, casinos), car rental, media, broadcasting, natural-gas storage and transmission, electricity generation and transmission, show business (concerts, theaters, sport events), universities. Most applications are recent and made possible by the advances in technology, information systems, and data mining. However, there are issues of legality and customer backlash for charging different prices for virtually the same product. The course will touch upon these issues as well.

Course Objectives

Students will

- be able to list and relate demand drivers to demands in specific industries,
- be able to derive and compute price-demand relationship, optimal prices and revenues.
- be aware of revenue management practices.

Course Pre-requisites and Related Courses

- Pre-requisites: OPRE 6302 and exposure to probability, or consent of the instructor.
Knowledge (not expertise) of equation solving, derivatives and integrals of polynomials, and expectation.
Familiarity with linear programming formulations. Read MBA math review 1-2 under the "Supplements" section of the course web site.

¹This dependence distinguishes this course from a standard marketing course.

- Related courses:
 - OPRE 6335: *Risk and Decision Analysis* by Prof. Alain Bensoussan in Springs.
 - OPRE 6363: *Inventory Management* by Prof. Holly Lutze in Springs.
 - OPRE 6364: *QC: Lean Six Sigma* by Prof. Divakar Rajamani in Springs.
 - OPRE 6366: *Supply Chain Management* by Prof. Metin Çakanyıldırım in Falls and Springs.
 - OPRE 6368: *Supply Chain Software* by Gene Deluke in Summers.
 - OPRE 6370: *Logistics and Distribution* by Prof. Ehad Sabri in Falls.
 - OPRE 6371: *Purchasing and Sourcing Management* by James Hogan in Springs.

Required Textbooks and Materials

- Textbook: Pricing and Revenue Optimization. By Robert L. Phillips. First edition published by Stanford University Press, 2005. ISBN 0-8047-4698-2.
- Linear/Integer Programming Notes: Students are expected to know how to formulate a linear/integer program. This subject is discussed in OPRE 6302. To refresh that discussion and see more formulation examples, students are advised to study the “Formulation”, “Transportation” (pp. 1-4) and “Location” course notes under the “Supplements” section of the course web site.

Suggested Course Material

- Supplementary articles in journals accessible by UTD community. OR (Operations Research), MS (Management Science), TS (Transportation Science), MSOM (Manufacturing and Service Operations Management) and others.
 - *A Taxonomy and Research Overview of Perishable-Asset Revenue Management: Overbooking, Yield Management and Pricing* by L. Weatherford and S. Bodily, OR, vol.40, 1992.
 - *Revenue Management: Research Overview and Prospects* by J. McGill and G. van Ryzin, TS, vol.33, 1999.
 - *An Overview of Pricing Models for Revenue Management* by G. Bitran and R. Caldentey, MSOM, vol.5, 2003.
 - *Dynamic Pricing in the Presence of Inventory Considerations: Research Overview, Current Practices, and Future Directions* by W. Elmaghraby and P. Keskinocak. MS, vol.49, 2003.
 - *Revenue Management and E-commerce* by A. Boyd and I. Bilegan, MS, vol.49, 2003.
- Supplementary books:
 - *Data Analysis for Managers* by Christian Albright, Wayne Winston and Christopher J. Zappe. Second edition by Duxbury, 2004. ISBN 0-534-39721-2. Forecasting in Part 4 is useful. But there are many similar books with titles such as Managerial Statistics, Spreadsheet Modelling, Quantitative Analysis.
 - *The Theory and Practice of Revenue Management* by Kalyan T. Talluri and Garrett J. van Ryzin. First edition published by Kluwer Academic Publishers, 2004. ISBN 1-4020-7701-7. The book is a mixture of theory and practice. The theory is closer to the PhD level than MBA/Master level. The practice (in chapters 1, 10-11) is fun to read.
 - *Yield Management: Strategies for the Service Industries* by A. Ingold, I. Yeoman and U. McMohan.
 - *Revenue Management and Pricing: Case Studies and Applications* by I. Yeoman and U. McMohan-Beattie.
 - *Revenue Management Hard Core Tactics for Market Domination* by R. G. Cross.
 - *Future of Pricing: How Airline Ticket Pricing Has Inspired A Revolution* by A. Body.

Assignments & Grading Policy

- Classes start on Aug 24 and end on Nov 30. Students are advised to attend the classes.
- Grading
 - 5% for Class attendance and contribution to discussion. Please bring your nametags to the class.
 - 25% * Homeworks: There will be 5-6 homeworks. You may discuss homework problems with others, but you must write up by yourself with the full understanding of what you write. Students handing in identical assignments will be violating university regulations and will not receive credit! Late homeworks are not allowed unless you negotiate with the TA at least one day in advance. Your minimum homework grade will be dropped from consideration.
 - 20% * Quiz 1. October 12.
 - 20% * Quiz 2. November 23.
 - 30% * Project report (20%) due to November 30. Presentation (10%) on December 7.
- During the quizzes, any book/note/printed material can be used but not computers or cellular communication devices.
- Overall grades will be curved by considering the current class average.
- Students who score less than 50% of the first quiz grade must schedule an appointment with the instructor to discuss the possible ways to improve their performance.
- In this course, you will be given +/- minus grades. For example, you may get an A- or B+ grade. Students earn a grade in this course by mastering the course material. Students are not graded based on any type of need, amount of effort, family, personal circumstances, or their previous record in other courses.

UTD Resources

- Practice Lecture Series: We expect to host 1-2 lectures in class. They will be on Revenue Management Practice and be given by practitioners from Dallas area companies. Lecture dates will be announced later on the course web site.
- UTD has two centers relevant to this course. The centers perform interdisciplinary research and develop cooperation in risk management, supply chain management and decision-making by exchanging knowledge and experience among academia, industry, and public agencies. For more info:
 - Center for Intelligent Supply Networks (C4ISN) <http://som.utdallas.edu/centers/c4isn/>.
 - International Center for Decision and Risk Analysis (ICDRiA) <http://som.utdallas.edu/centers/icdria>.
- E-Access to Journals via UTD Library: Library electronically subscribes to many journals such as Harvard Business Review, Management Science, which are of interest. To access such a journal go to the UTD Library web page. Click on "E-Journals". You will see an alphabetical list of journals. Click on "H" for "H"arvard Business Review. You will see that HBR is listed 15-20 from the top among the journals starting with letter "H". Click on HBR link, you will be transferred to EBSCO web site which keeps the journal. To access from a non-UTD computer, you need UTD ID and password. Please respect the copyright laws.
- Career Center: The SOM Career Center (<http://som.utdallas.edu/somResources/somCareerCenter>) provides the following services: Career Counseling, Resume Assistance, Interview Assistance, Job Search Assistance, Career Resource Library, Web Resume Database, On Campus Recruiting, Active Internship Program.

Web Pages/Groups

The course web page can be reached via www.utdallas.edu/~metin/teaching.html with the password
SCM-MS degree unofficial web page is www.utdallas.edu/~metin/SCM/scm-ms.html. UTDSCM Google Group web page is <http://groups.google.com/group/utdscm>. UTD SCM community communicates via a facebook personality named Utd Scm – become its friend to join the community.

Informs Revenue Management and Pricing Section <http://revenue-mgt.section.informs.org>.

Professional Pricing Society www.pricingsociety.com.

The Airline Group of the International Federation of Operational Research Societies (AGIFORS) www.agifors.org.

Regional demand and other data www.dallasfed.org/data/index.html.

Revenue Management Solution Developers

This is an incomplete list. Solution development/software industry is very dynamic. I can add more companies to this list, if you tell me about them.

Sabre Inc. www.sabre.com. JDA Software Group www.jda.com. PROS Revenue Management www.prospricing.com.

Veritec Solutions www.veritecsolutions.com. KSS revenue management solutions www.kssg.com. Rubicon group www.therubicongroup.com. Zilliant www.zilliant.com. RTS www.rtscorp.com. Micros www.micros.com.

TENTATIVE COURSE TIMELINE

1. Week - Aug24. INTRODUCTION
 - (a) Ch2: Introduction to pricing and revenue optimization.
2. Week - Aug31. DEMAND MANAGEMENT
 - (a) Ch3. Demand functions and price optimization: Price-response function; Competition.

Week of Sep07. Labor Day Holiday
3. Week - Sep14.
 - (a) Notes: Price-reponse estimation.
4. Week - Sep21.
 - (a) Case study: Forecasting Sales in the HVAC (Heating, Ventilating, Air Conditioning) Industry.
5. Week - Sep28.
 - (a) Ch4: Price differentiation: Volume discounts; Arbitrage and cannibalization; Consumer welfare.
6. Week - Oct05.
 - (a) Ch5: Constrained supply: Opportunity cost; Segmentation; Variable pricing.
7. Week - Oct12. **Quiz 1.**
8. Week - Oct19. REVENUE MANAGEMENT
 - (a) Ch6: Revenue Management.
9. Week - Oct26.
 - (a) Ch7: Capacity Allocation.
10. Week - Nov02.
 - (a) Ch8: Network Management.
11. Week - Nov09.
 - (a) Ch9: Overbooking.
12. Week - Nov16. OTHER PRICING CONTEXTS
 - (a) Ch10: Markdown Pricing.
13. Week - Nov23. **Quiz 2.**
14. Week - Nov 30
 - (a) Ch11: Customized Pricing: List prices vs. customized prices; Responses to competitor bids.
15. Week - Dec07: Project presentations.