

Revenue Management and Pricing

Syllabus - Fall 2004

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Introduction

Revenue management (also called *yield management*) involves managing a firm's demand-side decisions (e.g. segmentation, pricing and availability) to maximize revenues. It has gained attention recently as one of the most impactful areas of operations management (OM) and operations research (OR). It has grown from its origins as a relatively obscure practice among a handful of major airlines in the post-deregulation era here in the U.S. (about 1978), to its status today as a mainstream business practice, with its own supporting industry of established consulting firms and range of industry users from Walt Disney Resorts to National Car Rental. Major airlines including American, British Air, Continental, Lufthansa, Northwest and SAS have large staffs of developers and OR analysts working on revenue management. Major consulting/software firms such as PROS, Sabre and Tallus (now merged with Manugistics) each have over 400 professionals devoted to their revenue management practices, working on a range of activities from business consulting to software development to OR methodology.

At the same time, research on the methodology behind revenue management has been growing rapidly. In academic circles, the number of published papers on revenue management has increased dramatically in the last ten years. INFORMS has started a Revenue Management and Pricing Section, which will organize its 4th. Annual Meeting in 2004. There are other important revenue management conferences each year: AGIFORS¹ sponsors an annual revenue management conference that attracts close to 200 professionals, and IATA² hosts an annual revenue management conference

¹The Airline Group of the International Federation of Operations Research Societies

²The International Air Transport Association

that draws even more attendees (approximately 800). A new journal, The Journal of Pricing and Revenue Management, has recently been launched, etc.

A few of the links below give some indication of the level of professional and scholarly activity in the area:

Companies:

PROS Strategic Solution <http://www.prosrm.com/>

Manugistics <http://www.manugistics.com/>

Veritech Solutions <http://www.veritecsolutions.com>

Revenue Mgmt. Sys. Inc. <http://www.revenuemanagement.com/Index.htm>

KhiMetrics <http://www.khimetrics.com/>

Journals and conferences:

J. of Pricing and RM <http://www.henrystewart.com/journals/jrpm/endorse.html>

IATA RM Conference <http://www.iata.org/ice/index>

AGIFORS RM Study Group, Site and Conf. <http://www.agifors.org/rymsg/>

INFORMS Rev. Mgmt. Section <http://www.rev-man.com/index.htm>

Deming Center, Columbia Univ., INFORMS RM Section <http://www.demingcenter.com/>

Objectives

This course provides a comprehensive introduction to both the theory and the practice of revenue management and pricing. Fundamentally, revenue management is an applied discipline; its value derives from the business results it achieves. At the same time, it has strong elements of an applied science and the technical elements of the subject deserve rigorous treatment. The plan of this course is to cover both these practice and theory elements.

Prerequisites

The prerequisites for the course are some familiarity with basic OR subjects such as probability theory and optimization. Some background in microeconomics is useful as well, but is not essential. More specialized topics will be covered as they arise. The course should be relevant and accessible to most graduate students in business, engineering and economics. It is targeted at students with both a business and technical interest in the subject.

Methods, Materials and Assignments

This is a joint course between the Department of Information Systems, Operations and Management Sciences at the Stern School of Business (NYU) and the Department of

Decision, Risk and Operations at the Columbia Business School. It will be co-taught by three instructors: Prof. Costis Maglaras and Prof. Garrett van Ryzin (Columbia Univ.) and Prof. Gustavo Vulcano (NYU). Roughly, two thirds of the lectures will be offered at the Columbia Business School, and one third at Stern.

Sessions will be a combination of lecture and seminar format. The first one will be a full lecture, and from that moment on, in each session there will be two paper presentations by students on the topic of the previous class, for the first half of the meeting; and a lecture by one of the instructors on a new topic during the second half. There will be two students presenting per class, and two discussants that will deeply read and critique the corresponding papers, giving the students the opportunity of both gaining in presentation skills and positioning as referees of scientific work in the arena of Revenue Management and Pricing.

The regular assignments for the class will be to read the required material and to prepare for and participate in class discussions. Besides, there will be two homeworks and a final project, which will consist on exploring further on a specific research topic -by reading a set of four or five papers, and presenting a careful detailed discussion on their contribution, strong and weak points-; or either an innovative research topic that could potentially lead to a paper publication.

Assessment

General class participation: 20%

Homeworks: 20%

Paper presentation and discussion: 30%

Final Project: 30%

About the instructors

Prof. Costis Maglaras: His research and teaching interests are stochastic modeling and operations management. His recent focus has been on the theory of revenue management and its application in the manufacturing and service sector. He is also involved in several research projects in the area of information services integrating product/services design, pricing and operational optimization decisions. Prior to joining the Columbia faculty, Maglaras worked in consulting and research for Canon Research Center America. He was awarded the 1999 Nicholson Prize for the best student paper in operations research and management science. Maglaras, whose research has appeared in a variety of academic journals, is also an associate editor for several leading journals.

Prof. Garrett van Ryzin: His research interests include stochastic optimization, pricing and revenue management and supply chain management. His research has been

supported by grants from the National Science Foundation and major corporations and he has served as a consultant to several leading companies in the area of pricing and revenue management. He is currently editor in chief of M&SOM and has served as area editor for Operations Research. He is also an associate editor for Management Science and Transportation Science.

Prof. Gustavo Vulcano is Assistant Professor of operations management at New York University Stern School of Business. His primary research areas include application of auction theory to revenue management; supply chain management and stochastic optimization. He received his bachelor of science and master of science in computer science from University of Buenos Aires, Argentina, and his doctor of philosophy from the Graduate School of Business, Columbia University.

Course Topics Outline

- 1 Introduction. Single resource capacity control.
- 2 Network capacity control.
- 3 Consumer behavior and market response models.
- 4 Dynamic pricing.
- 5 Auctions: Generalities.
- 6 Auctions: Design of optimal mechanisms.
- 7 Queueing and pricing: the effect of congestion.
- 8 Queueing: Network pricing.
- 9 Supply chain management and pricing.
- 10 Economics of revenue management.
- 11 Industry profiles for revenue management.