Revenue 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).

This course provides a comprehensive introduction to the theory of revenue management and pricing, and reviews their application in many practical settings. It will comprise of a set of lectures that will cover the theoretical fundamentals of the area, as well as an overview of the status of current research in the field through the presentation and discussion of recent papers.

The course deliverables will be: two homework assignments, a final project, and two class presentations of current research papers (mentioned above) that focus on some aspect of the theory and/or application of revenue management.

This is a joint course between Columbia Business School and the Stern School of Business (NYU). It will be co-taught by Professors Costis Maglaras and Garrett van Ryzin (DRO, Columbia Univ.) and Professor Gustavo Vulcano (NYU). Two thirds of the course (i.e., 8 sessions) will meet at Columbia and the other third (4 sessions) at NYU.

The time slot for the course is Wednesdays 4-7pm.

(At Columbia we meet at 4:15pm-7:15pm in Uris 306, and at NYU at 4pm-7pm in KMC 5-90.)

All course material will be available from BOLD (the Columbia Business School course material server) at http://my.gsb.columbia.edu/courseware5/. A guest account will be setup for NYU students – details will be forwarded by email within the next few days.

Our coordinates

Professor Costis Maglaras
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Course structure

Half the course will follow a lecture format covering the theoretical fundamentals of the area, while the other half will discuss (mostly) current research papers in various related topics. Starting with session 3, class time will be split in two parts: the first 90 min will discuss two papers that are related to the previous lecture, and the second 90 min will be the lecture on the following material.

Discussion of research papers

From session 3 onwards you will be responsible for presenting two research papers in the first half of the class. The plan is to allocate 30-40 min in each paper. One student will be the designated presenter for each paper, but all other students should have read through the paper as well. The presenter should try to summarize the main idea of the paper and its key results, while relating it to the material covered in class. A few days prior to class we will email out some questions that can help guide the discussion for each paper. The plan is that each student will present twice.

Homework and project

There will be two graded homeworks in the course that will focus on the analytical aspects of what we cover in class. At least a few of the questions in these assignments will involve the numerical solution of some optimization problem. This can be done in Matlab or even Excel.

In addition, each student is expected to do a course project. Such projects may vary from literature surveys of some specialized area, computational studies of some sort, or even work on a research problem that may lead to a publication. The goal is to match your interests and objectives from the course to an appropriate project. Specific topics will be determined in one-on-one meetings with one of the faculty of the course. Your end deliverable is a report that is due on April 30th.
Course Topics Outline

1. Introduction. Single resource capacity control. (Columbia, Jan. 28th)
2. Network capacity control. (Stern, Feb. 4th)
3. Consumer behavior and market response models. (Columbia, Feb. 11th)
4. Dynamic pricing I. (Columbia, Feb. 18th)
5. Dynamic pricing II. (Columbia, Feb. 25th)
6. Forecasting and estimation (Columbia March 3rd)
7. Auctions: Introduction. (Stern, March 10th)
8. Auctions: Design of optimal mechanisms. (Stern, March 31st)
9. Queueing and pricing: the effect of congestion. (Columbia, April 7th)
10. Supply chain management and pricing. (Stern, April 14th)
11. Economics of revenue management. (Columbia, April 21st)
12. Industry profiles for revenue management. (Columbia, April 28th)

The main text that we will use in the class is a draft of the upcoming book by Kalyan Talluri and Garrett van Ryzin “The theory and practice of revenue management.”
List of papers

1. Introduction. Single-resource capacity control. (Columbia, Jan. 28th)
   (a) Lin, Lu and Yao, The stochastic knapsack revisited: structure, switch-over policies, and dynamic pricing, 2003
   (b) Brumelle et. al. Allocation of airline seats between stochastically dependent demands, Transportation Science, 24:183-192, 1990

2. Network capacity control. (Stern, Feb. 4th)

3. Consumer behavior and market response models. (Columbia, Feb. 11th)

4. Dynamic pricing I. (Columbia, Feb. 18th)

5. Dynamic pricing II: a) asymptotic analysis of pricing heuristics; b) overview of retail revenue management. (Columbia, Feb. 25th)
   (b) Smith and Achabal, Clearance pricing and inventory policies for retail chains, Management Science, 44(3): 285-300, 1998.

6. Forecasting and estimation (Columbia March 3rd)

7. Auctions: Introduction. (Stern, March 10th)
8. Auctions: Design of optimal mechanisms. (Stern, March 31st)

9. Queueing and pricing: the effect of congestion. (Columbia, April 7th)

10. Supply chain management and pricing. (Stern, April 14th)
    (b) Chen and Simchi-Levi, Coordinating inventory control and pricing strategies with random demand and fixed ordering cost: Part I. the finite horizon case, Part II: The infinite horizon case, Working papers, MIT, 2002.

11. Economics of revenue management. (Columbia, April 21st)
    (b) Dana, Monopoly price dispersion under demand uncertainty, Working paper, Northwestern University, 1999.

12. Industry profiles for revenue management. (Columbia, April 28th)
    [The following papers are background reading for this last class. Please skim through prior to class. They will not be any associated student presentations for them.]
    (a) Boyd and Bilegan, Revenue management and e-commerce, Management Science, 49(10):1363-1386, 2003
    (b) Talluri and van Ryzin, Chapter 10, 2004.