MGT 6400 Pricing Analytics and Revenue Management

#### Professor Mark Ferguson

**Email:** [mark.ferguson@mgt.gatech.edu](mailto:mark.ferguson@mgt.gatech.edu)

#### Office: COM 4428 (South Side of Building) 404-894-4330

##### Office Hours: T,TH 12:30-3 or by appointment

The main objective of this course is to introduce spreadsheet-based modeling methods for maximizing a firm’s profit. The first component of this course involves the forecasting of customer demand. Demand forecasts provide a critical input to everything we discuss in the latter part of the class, so we will first focus on the fundamental steps of creating a good forecast. The logic behind advanced forecasting software systems will be demonstrated using spreadsheet-based methods including Excel Solver and the statistical open source software package R.

The main component of this course focuses on the revenue side of the profit equation and includes an introduction to the rapidly growing field of Pricing and Revenue Optimization (PRO) – also called “revenue management.” PRO systems use mathematical optimization to set and update prices offered through various channels in order to maximize profit.  A familiar example is the passenger airline industry, where a carrier may sell seats on the same flight at many different prices. PRO practices have transformed the transportation and hospitality industries, and are increasingly important in industries as diverse as retail, telecommunications, entertainment, health care and manufacturing. In this course, students learn to identify and exploit PRO opportunities in different business contexts. Specific topics include pricing of constrained capacity, overbooking policies, and customer segmentation for revenue maximization.

Web Page

The class web page will be your source for homework and required readings. [**http://www.prism.gatech.edu/~mf122/**](http://www.prism.gatech.edu/~mf122/)

Required Material

* [Pricing Simulation](http://forio.com/simulation/harvard-pricing/public_main.htm?page=demo) (purchase directly from HBSP for $12.50)

Supplemental Material

* Pricing and Revenue Optimization by Phillips
* Data Analysis and Decision Making with Microsoft Excel by Albright et al.
* Revenue Management: Hard-Core Tactics for Market Domination by Robert G. Cross
* Business Forecasting with Accompanying Excel-Based ForecastX Software by Wilson

All readings listed in the course outline are included on the class web page.

Grading

Evaluations will be based upon the following components weighted by the given percentages.

|  |  |
| --- | --- |
| 1. *Class Participation and HWs* | *25%* |
| 1. *Forecasting Assignment* | *15%* |
| 1. *Pricing Simulation* | *25%* |
| 1. *Revenue Management Project* | *35%* |

The stated weights will apply for students who perform adequately along each dimension. That is, acceptable performance in *each* area is a necessary condition for successfully completing the course. Final course grades are determined using the total points accumulated.

Class Participation and Attendance

Contribution to class discussion will require that you prepare for the class lesson ahead of time by both reading the material to be covered and working out any problems or home works assignments that are provided on the class webpage. There will be random checking to see if you are spending an acceptable amount of effort on the homework assignments. The following outlines the basic rules of respectful behavior that must be followed to permit the classroom to be a positive learning experience for all who have chosen to attend. Please turn off cell phones, do not talk to your neighbors, or do not read anything other than the class material currently being discussed. Students should make every effort to be at class on time and, if late, find a seat quickly and disturb the class as little as possible. Please bring your **name tent** with you to every class.

Group Projects

You are to form groups to undertake some of the exercises involving the application of the main concepts introduced in class. The exercises involve an analysis of the problem, a presentation of the findings, and a report (written from the perspective of a profit analytics consultant who is writing for an audience that is familiar with the principles, concepts, problem areas, systems, and techniques discussed in class). Specific details of the projects will be passed out during the term. Projects should be done in groups of *three* to *five* members. If you are taking the course on a pass/fail basis, you do not need to participate in the group projects.

Tentative Schedule

The following is a tentative schedule. In general, even if the specific date of coverage may change slightly, the order of coverage should remain as presented below. Modifications may be made as the semester progresses and the appropriate changes will be announced in class.

|  |  |  |
| --- | --- | --- |
| Class | Date | Readings and Cases |
| 1 | 1/6 | Class Outline  Project descriptions |
| 2 | 1/8 | Forecasting  Combining Forecasting and Optimization |
| 3 | 1/13 | Forecasting  Forecasting with Trend |
| 4 | 1/15 | Forecasting  Forecasting with Seasonality |
| 5 | 1/20 | Forecasting  Confidence Intervals and Prediction Intervals |
| 6 | 1/22 | **Forecasting**  Price Changes and Promotions |
| 7 | 1/27 | Forecasting Project Presentations |
| 8 | 1/29 | **Revenue Management**  Introduction to Revenue Management |
| 9 | 2/3 | **Revenue Management**  The Golf Game – 7 Core Concepts |
| 10 | 2/5 | **Revenue Management**  Overbooking and Booking Limits: Critical Fractile Methods |
| 11 | 2/10 | **Revenue Management**  Booking Limits: EMSR-b and Bid-Price Models |
| 12 | 2/12 | **Revenue Management**  Capacity Modeling using @Risk |
| 13 | 2/17 | **Revenue Management**  Capacity Modeling when Customers Change Fare Classes |
| 14 | 2/19 | **Revenue Management**  Unconstraining of Demand Data |
| 15 | 2/24 | **Revenue Management**  Guest Speaker |
| 16 | 2/26 | **Price Optimization**  Introduction to Price Optimization |
| 17 | 3/3 | **Price Optimization**  Measuring Price Responses |
| 18 | 3/5 | **Price Optimization**  Guest Speaker |
| 19 | 3/10 | **Price Optimization**  Customized Pricing |
| 20 | 3/12 | **Price Optimization**  Customized Pricing |
| 21 | 3/24 | **Price Optimization**  Markdown Pricing |
| 22 | 3/26 | **Price Optimization**  Markdown Pricing |
| 23 | 3/31 | **Price Optimization**  Guest Speaker |
| 24 | 4/2 | **Price Optimization**  Case Studies in Pricing |
| 25 | 4/7 | **Price Optimization**  Case Studies in Pricing |
| 26 | 4/9 | **Price Optimization**  Guest Speaker |
| 27 | 4/14 | **Price Optimization**  Ethical and Legal Issues in Price Discrimination |
| 28 | 4/16 | **Price Optimization**  Pricing Simulation Debrief |
| 29 | 4/21 | **Project Presentations** |
| 30 | 4/23 | **Project Presentations** |
| Finals |  | **Present Projects to Industry Sponsors** |

**Peer Review Form For Group Projects**

**Name** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**Date** \_\_\_\_\_\_\_\_\_**Group name or #** \_\_\_\_\_\_\_\_\_\_\_\_\_

Rate each member of your group; do not rate yourself. Base your assessments on your interactions in the classroom and during group meetings. Each question is worth 0-10 points. Each member of your group can receive 0-40 points. I will make adjustments to the case grade based on your comments. You will be penalized 1 point (out of a possible 10) for any dimension in which your average score is 3 or less.

|  |  |  |
| --- | --- | --- |
| **Dimensions** | **Points** | **Description of Behavior** |
| Attendance | 0-3  4-7  8-10 | Absent quite often; group had to work around this member  Absent occasionally, but did not inconvenience the group  Routinely present; the group could count on this member to be present |
| Preparation | 0-3  4-7  8-10 | Was not prepared for meetings based on previous agreements  Was prepared for meetings based upon what the group had agreed  Was prepared for group meetings, offered unique insights |
| Cooperation | 0-3  4-7  8-10 | Highly uncooperative  Moderately cooperative  Highly Cooperative |
| Fair Share | 0-3  4-7  8-10 | Frequent free rider; did not do fair share of the work  Ordinary group member; did acceptable amount of work  Did more than fair share of the work |

# Note: Do not include yourself on this form

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **NAME** | **ATTEND-**  **ANCE** | **PREPA-**  **RATION** | **CO-**  **OPERATION** | **FAIR SHARE** | **TOTAL** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**Comments (feel free to use the back)**

Did any member(s) make exceptionally strong contributions? Describe.

Did any member(s) fail to make appropriate contributions? Describe.