Course Overview

This course provides a practical introduction to the creation and use of business forecasts for informing pharmaceutical drug development strategy. While the primary emphasis will be on commercial forecasting, we will examine other areas such as trial duration, probability of clinical and regulatory success, trial costs, and portfolio optimization.

Forecasts can play an important role in helping to evaluate the value and risk inherent in strategic alternatives. The exercise of developing and analyzing forecasts also leads to important insights that can help managers to develop higher value strategies, to mitigate downside risks, and to capture upside opportunities. For managers in a drug development team, collective forecasting exercises improve communication between different specialty areas, and help to ensure consistency and continuity of key assumptions across the long development lifecycle. For analysts looking at drugs in development, forecasts can provide a critical window into understanding value and fit within a portfolio of investments.

In this course, we will review the key strategic decision points in the development process, and discuss the types of forecasts that can be useful to inform those decisions. Advantages and disadvantages of using forecasts will be analyzed, and students will be introduced to the use of sensitivity analysis and scenario modeling to bridge these challenges. This course will provide a special focus on forecasting in areas where little market or clinical data exists. Through case studies and project work, students will learn practical Excel tools for building models, performing sensitivity analysis, challenging forecasts, and sourcing data.

We will take a cross-functional approach, and focus on “real-world” problems currently facing senior managers in drug development organizations. While emphasizing the drug development perspective, this course will be useful for students interested in careers in pharmaceuticals and biotechnology, as well as management consulting, investment banking, equity research, venture capital, and private equity, given the large and growing healthcare/pharmaceutical practices of such firms.

Important Note: this course is designed for students with at least a basic understanding of the pharmaceutical industry. Also please note that this course covers applications of material and tools introduced in the Decision Models core course, in the context of drug development decision making. While it can be taken concurrently with the Decision Models course, students may benefit from having completed the Decision Models course before taking this class.

Format and Approach

The format of this course is in-class lectures and discussion, with assignments to be completed out of class. The first half of each session will be content and discussion, and the second half of each session will feature a guest lecture, related to the content reviewed and discussed on the day. Students will be expected to prepare question for guests in advance. I have removed specific names from the bidding syllabus, since they are publically searchable and I don’t like to compromise internet privacy.
This course will use several cases to reinforce the lecture material. Students will be expected to spend time with relevant assigned cases before each class. Case preparation should include some modeling and analysis. Students may prepare cases in groups or alone, as they prefer. While students are not expected to do any research outside of the content provided in the cases, additional research may enhance the quality of insights they can bring to the discussion. In addition to class participation, graded work will include a mid-term (independent) assignment, a final group presentation, and a short (independent) written final essay.

**Materials**

This course will require 3-4 case studies and other readings on the healthcare industry, which will be posted on Canvas the week before each class. Some material will be posted before the beginning of the course. It is expected that students will have read a substantial amount of this reading prior to the beginning of the course, especially students with limited exposure to drug development. Other readings will be posted or distributed pertaining to specific class sessions. A list of supplementary materials and reference books will also be posted on the course web page. Students will also use Excel and RiskSolver (or Crystal Ball), which should have been installed on your computer by Computer Services when you arrived at CBS.

**Course Requirements and Evaluation**

**Class participation (25%)**: Please come to class fully prepared to engage in discussion and classroom activities. The class participation grade will reflect class attendance and the quality of your involvement in classroom activities and discussion, with an emphasis on the case study content.

**Midterm Assignment (25%)**: For the mid-term assignment, students will prepare analysis based on a case study, presented in a short paper with accompanying exhibits (3-5 pages). The assignment will be posted in the first week of February, and will be collected in mid-Feb (date to be confirmed).

**Final Paper/Analysis (50%)**: The final project will be a longer case study, in small groups (size TBD). The deliverable will be a Powerpoint presentation, describing the results of analysis, with exhibits and documented assumptions. An additional short essay will also be required (about 2-4 pages), to be completed individually. The final project will be assigned in mid February, and collected in mid March.

**Learning Goals**

- To gain confidence in the use of a range of types of forecasts in pharmaceutical development organizations.
- To build a vocabulary and intuition for challenging forecasts developed by others.
- To gain the basic model structuring and Excel skills to build decision-relevant forecasts and perform sensitivity analysis on those forecasts.

**Preliminary Class Schedule and Topics**
**W1**  
**Course Introduction, Drug Development Decision Making, Basic considerations and risks, Data Sources**

- Introductions
- Drug development decision making
- The use of forecasts in pharma development
- Basic components of development forecasts
  - Clinical/Development
  - Commercial
- Risk factors to consider in forecasts
  - Drug development risk
    - Clinical risk
    - Product uncertainties and the “therapeutic window”
    - Timing risk
    - Regulatory risk
  - Commercial risk
    - Market size/penetration
    - Intellectual property
    - Price/access risk
- Sources of Data
  - Sales and Prescription data
  - Epidemiology
  - Claims
  - Electronic Medical Records
  - Pricing
  - Sellside/Consensus
  - International and Other
- External guest lecture – To be announced prior

**W2**  
**Forecasting and Valuation**

**Guest lecture – To be announced**

- Forecasting and Valuation (Part 1 - Equity Valuation)
  - Equity Valuation and the Wall Street Dynamic (Sell-side versus Buy-side perspectives)
  - Drivers of Pharmaceutical Equity Valuation
    - Pharma and Biotech are event-driven sectors
    - Forecasting used to determine impact of new catalysts on fundamental values
    - Development Stage Companies Versus Commercial/Mature Companies
  - Methods of Valuing Pharmaceutical Companies
    - DCF
    - Multiples (PE, PEG, EV/EBITDA, Price/Sales)
    - Sum of the Parts
  - Valuation for in-licensing and business development
- Valuation (Part 2)
  - Net Present Valuation and Risk-Adjusted Net Present Valuation
  - Importance of risks in valuation
○ Types of risks
○ Historic benchmarks of risk
○ Factors that temper historic risk rates

W3 Forecasting Demand, Forecasting Non-Commercial Factors, Sensitivity Analysis
● Model structuring
● Patient demand forecasting
  ○ Influencing clinical practice
● Patient share forecasting – competitive analysis
● Data sources
● Forecasting when there is little data
● Forecasting non-commercial factors
  ○ probability of clinical trial success
  ○ regulatory approval
  ○ launch timing
● Sensitivity and scenario analysis
  ○ Practical tools for sensitivity and scenario analysis in Excel/Crystal Ball
  ○ Sensitivity and scenario analysis
● Guest lecture – To be announced

W4 Forecasting Revenues – Market access and pricing
● Market access
  ○ Payers, providers and patients
  ○ The changing US landscape
  ○ International considerations
● Health economic and pricing considerations
  ○ Real world data
  ○ Generics and bio-equivalents
● Guest lecture – To be announced

W5 Forecasting Operational Drivers
● Cost of development
● Clinical trial timing and costs
  ○ Probability of clinical success
  ○ Readout and trial timing
● Preparing for submission
● Special topics in forecasting for development decision making
  ○ Adherence
  ○ Modeling drug efficacy and safety
  ○ Global factors
  ○ New technologies
● Guest lecture – To be announced

W6 Influencing Drug Development Strategy
● Using evidence-based forecasts to influence strategy
● Special topics
● Open issues and topics that arise in earlier sessions
● Guest lecture – To be announced