

[FINCB 8356] Financing Innovation in Healthcare

[First version: 08/2023, This version: 03/2024]

1 General Information

Instructor: Xuelin Li, Assistant Professor of Finance, Email: xuelin.li@columbia.edu.

Office Hour: Book through this link. In-person at my office: Kravis 1181.

Schedule: Spring 2024 (B-Term), M/W 9:00 – 10:30 am, Kravis 620

Course Description: The primary objective of this course is to provide you with a comprehensive understanding of the significant economic, strategic, and regulatory aspects involved in financing innovations within the healthcare industry. In the first half of the course, you will be introduced to the risk-return profiles and market failures specific to the biopharma industry. Additionally, we will explore the integral roles played by various financing channels, including government funding, non-profit organizations, venture capital, and mergers and acquisitions, in driving the innovation process. The second half of the course will focus on examining the distinctive financial characteristics of U.S. hospitals and analyzing how external financing impacts healthcare quality and technology adoption.

Format and Course Materials: This course incorporates lectures, readings, and statistical analysis of real data to enhance your learning experience. The readings encompass both references and “required” materials (refer to Section 3), offering tangible real-life examples related to the subject matter. Through statistical analysis, you will gain a deeper understanding of the shared characteristics within the field. The instructor will supply the necessary data, along with comprehensive course notes. All readings, notes, data, and case studies will be accessible through links provided on Canvas. Please note that students are strictly prohibited from posting any course materials on the internet, cloud storage, or any other online platform without obtaining prior written consent from the professors.

Connection to the Core: The learning in this course will utilize, build on and extend concepts covered in the following core courses:

1. **Corporate Finance:** Risk, Capital Market, Firm Valuation Model
2. **Managerial Economics:** Market Competition and Equilibrium, Barrier to Entry, Market Power, Strategic Interaction
3. **Managerial Statistics:** Modeling Uncertainty: Random Variables, Distributions, Making Decisions Under Uncertainty

2 Course Structure

Evaluation: Students will be evaluated on the basis of class participation (25%), three homework problem sets (45%), and a final paper (30%). Grade distribution will be consistent with School guidelines for electives.

Class Attendance and Participation: Class participation will be based on **in-person** attendance, as well as the extent and quality of contributions to class participation. Students are expected to review the required readings, discuss and demonstrate the readings, and perform the statistical analysis along with the instructor. If you have to miss a session, please use this form link to request.

Homework: : This course includes three **team** assignments. Students are required to form teams of four members or less during the first week of class. Each problem set consists of approximately five questions and contributes to 15% of the final grade.

Final Paper: : As part of this course, you will be expected to complete an **individual** final paper, spanning 2 to 4 pages (excluding exhibits). Throughout the semester, the instructor will address three data challenges in the following topics: Evergreen, Rural Hospital Financial, Municipal and Charity Care. Students are required to choose one topic, identify a statistical feature within the data, and discuss the significance of this feature using real-life case examples. The structure of homework assignments will serve as guiding examples to assist students in drafting their final paper. [**Due May 7, Tuesday 11:59 pm**]

Guest Speakers: Prominent guest speakers from the healthcare industry will provide additional real world insight on key industry challenges, trends, and experiences.

3 Course Schedule, Readings and Homework

Session I: Overview and Early-Stage Life Science Financing:

1. Risk and Return Profile of Life Science [March 18]

- **Overview:** Lo and Chaudhuri, *Healthcare Finance*: Chapter 1.2 – 1.6
- **Financial Engineering/Megafund:** Lo and Siah (2020), *Financing Correlated Drug Development Projects*
- **PBM:** Fiedler et al. (2023), *A Brief Look At Current Debates About Pharmacy Benefit Managers*, Brookings

2. Financing Early-Stage Life Science [March 20]

- **Overview:** Lo and Chaudhuri, *Healthcare Finance*: Chapter 2.1 – 2.5
- **NonProfit:** Kim and Lo (2019), *Venture Philanthropy: A Case Study of the Cystic Fibrosis Foundation*
- **Grants:** Li et al (2017), *The applied value of public investments in biomedical research*, Science
- **Patent:** McSweeney (2016), *FTC Research, Enforcement, and Advocacy at the Intersection of Antitrust and IP*

Session II: Last-Stage Life Science Financing:

1. Venture capital, acquisition and IPO [March 25]

- **Venture Financing:** Lo and Chaudhuri, *Healthcare Finance*: Chapter 12

- **Homework Discussion:** (REQUIRED) Homework on *Healthcare IPO Characteristics* [Due April 3, Wednesday 11:59 pm]

2. Product Market Concerns [March 27]

- **Safety:** Waxman (2005), *The Lessons of Vioxx — Drug Safety and Sales*, New England Journal of Medicine
- **Addiction:** (REQUIRED) Humphreys (2022), *Responding to the opioid crisis in North America and beyond: recommendations of the Stanford–Lancet Commission*, The Lancet
- **Acquisition:** von Dydiowa (2021), *How large pharma impacts biotechnology startup success*, Nature Biotechnology
- **Acquisition:** Newham and Vokinger (2022), *Adverse effects of acquisitions in the pharmaceutical industry*, Nature Biotechnology
- **Regulation:** Luzzatto et al (2018), *Outrageous prices of orphan drugs: a call for collaboration*, The Lancet
- **Evergreen:** Feldman (2018), *May your drug price be evergreen*, Journal of Law and the Biosciences
- **Data challenge:** (REQUIRED) Course note on *Evergreen*

Session III: Hospital Revenue Management:

1. Guest speaker: Brian T. Regan, Head of Healthcare Group & General Partner, WCAS [April 1]
2. Hospital Financial and Income Characteristics [April 3]
 - **Homework Discussion:** (REQUIRED) Homework on *Hospital Financial Characteristics* [Due the April 19, Friday 11:59 pm]
 - **Tax-status:** Ofri (2020), *Why Are Nonprofit Hospitals So Highly Profitable?*, New York Times
 - **Tax-status:** Bai et al (2021) *Analysis Suggests Government And Nonprofit Hospitals' Charity Care Is Not Aligned With Their Favorable Tax Treatment*, Health Affairs

Session IV: Hospital Revenue Management:

1. Hospital Financial Management [April 8]
 - **AI Potential:** Davenport and Kalakota (2019), *The potential for artificial intelligence in healthcare*, Future Healthcare Journal
 - **Patient Management:** Bressman et al. (2022) *Evaluation of an Automated Text Message–Based Program to Reduce Use of Acute Health Care Resources After Hospital Discharge*, JAMA Open Network
 - **Denial:** Mello and Rose (2024), *Denial—Artificial Intelligence Tools and Health Insurance Coverage Decisions*, JAMA Health Forum
 - **Data challenge:** (REQUIRED) Course note on *Rural Hospital Financial*
2. Guest speaker: Komal Joshi, Chief Financial Officer, Imbria Pharmaceuticals [April 10]

Session V: Hospital Financing:

1. Guest speaker: Claudia Rosen, Vice President, Financial Planning at New York-Presbyterian [April 15]
2. Municipal Debt Financing [April 17]
 - **Overview:** Cestau et al. (2019), *Municipal Bond Markets*, Annual Review of Financial Economics
 - **Data challenge:** (REQUIRED) Course note on *Does Municipal Bond Value Hospital Charity?*
 - **M&A:** Beaulieu et al. (2020), *Changes in Quality of Care after Hospital Mergers and Acquisitions*, The New England Journal of Medicine

Session VI: Technology Advance in Healthcare:

1. Guest speaker: Andrew W. Lo, Charles E. and Susan T. Harris Professor of Finance, MIT [April 22]
 - **Drug Analytic:** Lo and Chaudhuri, *Healthcare Finance*: Chapter 11
2. Private Equity and Joint Ventures [April 24]
 - **PE Buyouts:** Offodile II et al. (2020), *Private Equity Investments In Health Care: An Overview Of Hospital And Health System Leveraged Buyouts, 2003–17*, Health Affairs
 - **HCA:** Julie Creswell and Reed Abelson, *A Giant Hospital Chain is Blazing a Profit Trail*, The New York Times
 - **MPT:** Brian Spegele (2022), *How a Small Alabama Company Fueled Private Equity's Push Into Hospitals*, The Wall Street Journals
 - **Homework:** (REQUIRED) Homework on *Hospital IT Technology Adoption* [**Due May 3, Friday 11:59 pm**]