**Course Overview**

This course focuses on the critical factors and approaches that managers and sophisticated investors use to identify and value attractive business opportunities and investments in the medical technologies sector. It will provide students with an understanding of the current economic and competitive environment for the development and commercialization of new medical devices, including regulatory, pricing, and reimbursement factors. It will highlight new emerging technologies in the field, and explore how to assess such novel technologies and build commercial models for valuation purposes.

Guest speakers from the medical device industry (company executives, physicians/surgeons, investors, investment bankers) and investment case studies will be used to provide students with practical insight into this complex sector. Critical issues to be examined include:

- Strategies and risks associated with discovering, developing, and approving new medical technologies, including impact of government oversight and regulation;
- Pricing/reimbursement and health policy/legislative matters impacting the medical technology sector;
- Keys to evaluating novel medical technologies and analyzing business drivers and future performance of medical device & diagnostic companies (public and private);
- How to build commercial models, including valuation methodologies that successful investors use to value/price companies in this sector;
- Conducting due diligence and market analysis on medical technologies from which to formulate investment ideas;
- Considerations in taking long and short investment positions in this sector.

The course is cross-functional in its approach, and focuses on “real-world” problems currently facing senior managers and investors in this sector. This course will be useful for students interested in careers in the life science and healthcare services.
sectors, as well as healthcare consulting, investment banking, equity research, venture capital, private equity, and investment management given the large and growing healthcare practices of such firms. Some understanding of, or experience in, the healthcare/medical technologies sector will be highly valuable.

**Connection to the Core**

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

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<thead>
<tr>
<th>Core Course</th>
<th>Connection with Core</th>
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<td>Corporate Finance</td>
<td>1. Time Value of Money</td>
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<td>2. Risk</td>
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<td>3. Firm Valuation Model</td>
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<tr>
<td>Decision Models</td>
<td>1. Decision Making Under Uncertainty and Risk</td>
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<td></td>
<td>2. Sensitivity Analysis</td>
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<td>3. Modeling Competitive Effects</td>
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<td>4. Modeling in Practice</td>
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<tr>
<td>Managerial Economics</td>
<td>1. Analyzing Complex Decision-making Under Uncertainty</td>
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<td>Marketing Strategy</td>
<td>1. Company Analysis</td>
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<tr>
<td></td>
<td>2. Competitive Analysis</td>
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<td>3. Market Penetration and Marketing Strategy</td>
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**Format and Approach**

Class participation is highly valued. The course will constantly seek to directly apply the information and ideas discussed in the classroom to issues currently confronting senior managers in this sector. These critical issues will be analyzed in considerable depth. Prominent guest speakers from the medical device industry, along with investors and analysts that focus in this sector, will provide additional real-world insight on key industry challenges and trends.

**Materials**

Readings and useful links will be posted on Canvas. Certain lecture notes will be distributed at the beginning of class sessions.

**Guest Speakers**

- Oct. 30: Michael F. Mahoney, Chairman & Chief Executive Officer, Boston Scientific Corp
- Nov. 13: Michael A. Giaquinto, Managing Director, Greenhill & Co.
- Nov. 20: Rhonda Robb, Vice President and General Manager, Medtronic
- Nov. 27: José E. Almeida, President & Chief Executive Officer, Baxter
- Nov. 27: Lisa Earnhardt, President & Chief Executive Officer, Intersect ENT
Nov. 27: Damien McDonald, Chief Executive Officer, LivaNova
Dec. 4: Jeff Burbank, Chief Executive Officer, NxStage Medical
Dec. 11: Harold Swerdlow Ph.D., Vice President of Technology, Innovation at the New York Genome Center
Dec. 11: Christopher Mason Ph.D., Associate Professor at Weill Cornell Medical College

Course Requirements and Evaluation

Participation (25%): Students will only get out of this course as much as they put in. It is therefore important that students take an active role in classroom activities and discussions and come fully prepared. The class participation grade will reflect class attendance and the quality of the student’s involvement in class discussion.

Writing Assignment (25%): For a mid-term writing assignment, students will be given a case study or series of questions for their written analysis and recommendations (2-4 page paper, excluding exhibits).

Final Paper/Presentation (50%): There will be a final (individual) paper (3-5 pages, excluding exhibits) analyzing a company in the medical technologies sector. Each student will select the company from a list provided by the professor, and write a short analysis (buy or sell recommendation). Due Date: December 15th

Class Schedule and Topics

The following is the schedule of topics (note: specific case studies, companies, and speakers may vary depending on schedules/availability).

Lecture #1 - October 30th

Section I: Understanding Key Characteristics and Business Drivers of The Medical Devices Sector

Introduction/Overview
• Review of syllabus
• Course objectives:
  o Learn the basics of the medical technology industry
  o Learn the basics of investing in medical technology company
  o Gain an understanding of risk/reward and selecting strong ideas for either “longs” or “shorts”

Current Themes in Healthcare Investing
• “Big Picture” - key opportunities & challenges in the med. device sector
• Leading geographic markets, med tech sub-sectors, companies, customers

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- Financial characteristics of the sector – margin analysis, growth, valuation

**Future Outlook of the Medical Technologies Sector**
- What new technologies are most promising?
- How will the regulatory environment change?
- What changes in the market structure & selling dynamics will take place?
- Who are likely to be the “winners” and “losers” in the next ten years?

**Guest speaker:** Michael F. Mahoney, Chairman & Chief Executive Officer, Boston Scientific Corp

**Lecture #2 - November 13th**

**Introduction to Lecture #2**
- Recap/key takeaways from Lecture #1
- Objectives
- Overview of medical devices regulatory approvals
- How medical device approvals and reimbursement impact companies

**Clinical Development & Regulatory Approval Process for Devices**
- Overview of medical device classifications and regulatory (FDA) review process & analysis for new products (e.g., 510k, PMA)
- Overview of clinical development process/strategies for new med. devices
- Review of device approval process – U.S. and selected int’l markets (how it compares with drugs)
- Working with the FDA in the current regulatory environment

**Section II: Commercial/ Financial Modeling & Valuation Methodologies**

**Building Commercial Models; Valuation of Public and Private Companies**

**M&A and Financing in the Medical Device Sector, including Deal Structures and Valuation Methodologies**
- M&A trends and medical device deal flow (recent past/current)
- Current healthcare/medical device financing environment – IPOs, acquisition financing
- Valuation methodologies and deal structures in the space
- Analyzing commercial opportunities
- Deal analysis/examples - medical devices: 1-2 transactions

**Guest speaker:** Michael Giaquinto, Managing Director, Greenhill & Co.
Lecture #3 - November 20th

Introduction to Lecture #3

- Recap/key takeaways from Lecture #2
- Objectives

Conducting Primary Research and Effective Analyses

- Determining customer preference
- What to look for at medical meetings
- Interpreting clinical data; incidence and prevalence
- Risk adjusting; POS assumptions
- Pricing and reimbursement assumptions

Building Commercial Models

- Essential tools in building commercial models in the healthcare sector
- Modeling out key revenue and expense drivers

Valuation Considerations

- Public market valuation techniques
- Relative vs. absolute valuations
- Considerations when going long or short

Medtronic, Perspective on the Clinical Development and Adoption of Novel Cardiovascular Devices and Treatments

- Product development and going to market
- Market sizing
- Risk adjusting; POS assumptions
- Thinking about competition
- Pricing and reimbursement assumptions

Guest speaker: Rhonda Robb, Vice President and General Manager, Medtronic

Midterm Review & Assignment
Lecture #4 - November 27th

Introduction to Lecture #4
- Recap/key takeaways from Lecture #3
- Objectives

Modelling New Markets vs. Existing Markets: Dialysis
- Sizing the PD market
- Thinking about PD vs. HDD
- Case study

Review of Midterm Assignment

Case Study: Cyberdyne
- Company overview & history
- Investment thesis
- A look at the valuation

Case Study: Edwards
- Company overview & history
- A long or a short? Risks?
- What are the key determinates and questions we need answered?

Catalysts, Risks, and Other Considerations – a long or a short?
- How important is the intellectual property?
- Compare other potential technologies
- Timelines/catalysts
- Putting it all together: is the company a long or a short?
- If we don’t yet have an answer, what key questions remain?

Company Perspective:
- Guest speaker 1: José E. Almeida, Chief Executive Officer, Baxter
- Guest speaker 2: Lisa Earnhardt, Chief Executive Officer, Intersect ENT
- Guest speaker 3: Damien McDonald, Chief Executive Officer, LivaNova

Lecture #5 – December 4th

Introduction to Lecture #5
- Recap/key takeaways from Lecture #4
- Objectives
Section III: Investment Ideas

Analysis of the DCB Market
- History of peripheral arterial disease (PAD) and drug coated balloons (DCB)
- Overview of the different technologies
- Analyzing the products

Case Study: Spectranetics
- Company overview & history
- Impact of DCB on its base business
- Opportunity for DCB to benefit the company
- A long or a short? Risks?
- What are the key determinates and questions we need answered?

Company Perspective
- Guest speaker: Jeff Burbank, Chief Executive Officer, NxStage Medical

Lecture #6 - December 11th

Introduction to Lecture #6
- Recap/key takeaways from Lecture #5
- Objectives

Case Study: Illumina
- Company overview & history
- Growth of genomics sequencing
- Opportunity for clinical market growth
- Competitive risks?
- Is Illumina a long or a short? Why?
- What are the key determinates and questions we need answered?

Genomics, Sequencing and Diagnostics / Illumina Investment Example
- Understanding genomics, sequencing, bioinformatics analysis, high performance computing and data storage, etc.
- Sizing the market for next generation sequencing (NGS)
- Assessing the competitive landscape
- Research applications vs. clinical applications
- NGS vs. Molecular Diagnostics
Debate: Illumina Sequencing Technology vs. New Technologies

- **Guest speaker 1:** Harold Swerdlow Ph.D., Vice President of Technology, Innovation at the New York Genome Center
- **Guest speaker 2:** Christopher Mason Ph.D., Associate Professor at Weill Cornell Medical College

Post Mortem on Illumina Post the Debate

- How has our perspective changed?
- What are the risks and uncertainties?
- What is the magnitude of the risks, vs. the upside opportunities from competitive technologies?

Final Exam Assignment & Discussion

Course Wrap-Up