

NEW COURSE—CONTENTS SUBJECT TO CHANGE

SLOAN SCHOOL OF MANAGEMENT
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Andrew W. Lo

15.S13 Special Seminar in Management

Fall 2026

CATAPULT Bio

Translating Theory into Practice in the Life Sciences

How do breakthrough discoveries in the lab become real-world therapies, diagnostics, and technologies that improve human health? CATAPULT Bio is designed to equip the next generation of scientists, engineers, and innovators with the knowledge and skills to answer that question—and to act on it.

This course introduces students to the full lifecycle of translating scientific research into impact across the life sciences, including therapeutics, devices, and diagnostics. Through a combination of foundational frameworks and real-world perspectives, students will explore development pathways; understand how scientific programs are evaluated, valued, and financed; and learn how regulatory, clinical, and market considerations shape decision-making.

Beyond technical knowledge, the course emphasizes the core translational skills required to succeed at the interface of science and practice. Students will develop the ability to communicate complex ideas to diverse stakeholders, navigate collaborations and conflicts of interest, manage intellectual property in academic settings, and work effectively across interdisciplinary teams. The course also addresses the human side of innovation—leadership, negotiation, resilience, and decision-making under uncertainty.

Topics include career pathways across academia, industry, startups, and investing; communicating science for impact; drug, device, and diagnostic development; valuation and financing of biomedical programs; intellectual property strategy; academic–industry collaboration; company formation; and managing both failure and success.

CATAPULT Bio is intended for students interested in translating scientific ideas into real-world applications across the life sciences—whether through research, industry, startups, investing, or policy. ***No prior business experience is required; students from scientific, engineering, and related backgrounds who are curious about the “how” behind scientific impact will benefit most.***

Prerequisite

Permission of instructor required. Please complete the application form here: https://survey.qualtrics.com/jfe/form/SV_9WWIbxUAH9OEdg2.

Class Schedule and Format

The class meets once per week on Tuesdays from 4:00 to 7:00pm in 34-101. Classes will consist of a mix of lectures and guest speakers. Runs in parallel with other CATAPULT core courses, with combined sessions during weeks covering shared topics.

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Recitations

The TA, [TBD], will hold recitations on [DAY/TIME], in [LOCATION]. Class material will be reviewed and additional applications and exercises presented. Questions should be directed to [TA CONTACT].

Course Websites

The primary course website is Canvas, [URL], and all teaching materials *except problem sets* will be posted on this site, including announcements, TA office hours, lecture notes, readings, handouts, and data.

Online problem sets and their solutions, pre-lecture questions, and in-class group problems can be found on the MITx website: [URL].

Office Hours

Professor Lo and [TA] will hold regular office hours. Professor Lo's office hours will be by appointment and scheduled by his assistant, Viniqua Gooding (goodin41@mit.edu). [TA]'s office hours will be on [DAY/TIME] in [LOCATION] and by appointment.

Course Admin

The course administrators, Viniqua Gooding and Andres Gallego (afg1988@mit.edu), are responsible for all logistical aspects of the course, including scheduling meetings with guest speakers, practicum mentors, and Professor Lo.

Course Requirements and Grading

Course requirements include: (1) regular attendance (which includes coming to class **on time**) and class participation which requires having read the articles, cases if any, completing the pre-lecture questions on MITx prior to coming to class, and being prepared to discuss these materials (25%); (2) three online problem sets (30% = 10% for each problem set); and (3) one group “practicum” due before the end of the semester (45% = 20% for project deliverables + 25% for peer evaluation). There is no final examination for the class.

The group project involves proposing a live translational challenge—perhaps a technology being developed by a team member—and then applying the principles covered in class throughout the semester, culminating in a written plan for translation due at the end of the semester. Groups will have the opportunity to present the results of their project to their peers and this presentation will be recorded and graded, along with their project plan.

Course Materials

- **Healthcare Finance**, by A. Lo and S. Chaudhuri, Princeton University Press.
- **Science Business: The Promise, the Reality, and the Future of Biotech**, by Gary P. Pisano, Harvard Business School Press.
- Research articles and case studies will be made available on the course website and Study.net.

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Additional Recommended Readings

S. Mukherjee, *The Emperor of All Maladies*, 2010.

- Pulitzer-prize-winning “biography” of cancer, which is a fascinating introduction to one of the most important motivations for this course.

L. Friedhoff, *New Drugs: An Insider’s Guide to the FDA’s New Drug Approval Process*, 2009.

- A very concise exposition of the process of getting a drug approved by the FDA, written by an MD/PhD and 30-year veteran of the pharma industry who headed teams that developed and received FDA approval for six new drugs, including the blockbusters Aricept and Aciphex.

AI Policy

This course encourages students to explore the use of generative artificial intelligence (GAI) tools such as ChatGPT, Claude, Gemini, or DeepSeek for all assignments and assessments. Any such use must be appropriately acknowledged and cited. It is each student’s responsibility to assess the validity and applicability of any GAI output that is submitted; you bear the final responsibility. Violations of this policy will be considered academic misconduct. We draw your attention to the fact that different classes at MIT Sloan may implement different AI policies, and it is the student’s responsibility to conform to expectations for each course.

Sloan Values

You are responsible for upholding Sloan’s code of conduct, which mandates zero tolerance for cheating and plagiarism. For more details on Sloan’s academic policies, please read the document “Classroom Values in Practice” which is available on the course website.

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Class and Assignments Schedule[†]

Asterisk indicates combined session with other CATAPULT core courses.

Class	Topic
L1: 9/15	STEM Career Paths and Core Skills for Success* <ul style="list-style-type: none">▪ Overview of career pathways across academia, industry, startups, investing, and policy—including how roles differ in incentives, impact, and success metrics▪ Core translational skills including communication, problem framing, and connecting technical work to real-world applications▪ Navigating career decisions and professional growth including working in interdisciplinary teams, evaluating opportunities, and building networks and mentorship▪ Time management Readings: Background:
R1: 9/18	[TBA]
L2: 9/22	Writing and Delivering STEM Topics Effectively* <ul style="list-style-type: none">▪ Translating complex science into clear, impact-oriented narratives that resonate with both expert (grants) and non-expert (pitches, business plans) audiences▪ Tailoring communication to stakeholders including government funding agencies, investors, executives, and policymakers with different goals and incentives▪ Communicating data, uncertainty, and risk in a credible way that supports decision-making and enables funding and partnerships Readings: Assignment:
R2: 9/25	[TBA]
L3: 9/29	Drug Development 101 <ul style="list-style-type: none">▪ Translating academic research into therapeutic candidates, including target validation, preclinical studies, and regulatory milestones (IND-enabling work)▪ Fundamentals of Phase 1–3 trials, randomized controlled trials, endpoints, patient selection, and adaptive/innovative trial designs▪ FDA approval processes, interactions with regulators, and how clinical strategy shapes financing, partnerships, and go-to-market decisions Readings: Assignment:
R3: 10/2	[TBA]

[†] Guest speakers are tentative and there may be last-minute changes.

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- L4: 10/6** **Device, Biomarker, and Diagnostic Development 101**
- Key differences between therapeutics, devices, and diagnostics including development timelines, risk profiles, and evidence requirements
 - Regulatory pathways for devices and diagnostics including FDA classifications, 510(k), PMA, and companion diagnostics
 - Clinical validation, reimbursement, and adoption challenges for diagnostics and biomarkers in real-world settings
- Readings:**
Assignment:
- R4: 10/9* [TBA]
- 10/13** **No Class – Monday Schedule of Classes**
10/20 **No Class – LEAD Week**
- L5: 10/27** **Valuing Biomedical Assets A**
- Translating scientific milestones into value including stage-gating and key inflection points
 - Risk, expected value, and decision-making under uncertainty in drug development
 - Indication prioritization as a value-defining choice including tradeoffs across probability of success, speed, cost, and market opportunity
- Readings:**
Assignment:
- R5: 10/30* [TBA]
- L6: 11/3** **Valuing Biomedical Assets B**
- Time, cost, and capital intensity including discounting and financing constraints, embedded real options, and Monte Carlo simulation tools
 - Market and clinical context including unmet need, competition, and adoption
 - Investor and partner perspectives including portfolio thinking, deal structures, and IP strategy
- Readings:**
Assignment:
- R6: 11/6* [TBA]
- L7: 11/10** **Creating and Managing Your IP in Academic Settings***
- Fundamentals of patents, trade secrets, and data rights in life sciences
 - Navigating university tech transfer offices and invention disclosure processes
 - Strategies for protecting IP while enabling publication, collaboration, and startup formation
- Readings:**
Assignment:
- R7: 11/13* [TBA]

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L8: 11/17 **Managing Scientific and Commercial Collaborations and Navigating Conflicts of Interest***

- Structuring academic collaborations, industry partnerships, sponsored research, and joint ventures
- Identifying and managing conflicts of interest and commitment in academic settings
- Governance, transparency, and ethical considerations in academia-industry collaboration

Readings:

Assignment:

R8: 11/20 [TBA]

L9: 11/24 **How to Start a Biotech Company If You Must**

- Building the founding team, securing early funding, and defining the initial strategy
- Evaluating when to spin out a company versus partnering or licensing
- Translating scientific vision into a compelling business case for investors and partners
- Who gets how much equity and why?

Readings:

Assignment:

11/27 *No Recitation – Happy Thanksgiving!*

L10: 12/1 **Dealing with People***

- Leading interdisciplinary teams across science, business, and clinical domains
- Hiring, incentives, and culture in early-stage biotech ventures
- Negotiation and stakeholder management across investors, partners, and regulators
- How to deal with difficult people, and what if **you** are difficult people?

Readings:

Assignment:

R9: 12/4 [TBA]

L11: 12/8 **Dealing with Failure and with Success***

- Learning from clinical, regulatory, and commercial setbacks and successes in biotech
- Managing risk, resilience, and decision-making under uncertainty
- Scaling responsibly after failure or success including governance, capital strategy, and long-term impact
- Course wrap-up and looking ahead

Readings:

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Readings

Most readings will be made available on Canvas.

TBD

Fagnan, D. E., Yang, N. N., McKew, J. C., & Lo, A. W. (2015). Financing translation: Analysis of the NCATS rare-diseases portfolio. *Science Translational Medicine*, 7(276), 276ps3.

Kumar, N., Lo, A. W., Shukla, C., & Stephenson, B. (2024). Applications of portfolio theory to accelerating biomedical innovation. *Journal of Portfolio Management*, 51, 213–236.

Van Norman G. A. (2016a). Drugs, Devices, and the FDA: Part 1: An Overview of Approval Processes for Drugs. *JACC. Basic to translational science*, 1(3), 170–179.

Van Norman G. A. (2016b). Drugs, Devices, and the FDA: Part 2: An Overview of Approval Processes: FDA Approval of Medical Devices. *JACC. Basic to translational science*, 1(4), 277–287.