NEW COURSE—CONTENTS SUBJECT TO CHANGE

SLOAN SCHOOL OF MANAGEMENT
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Andrew W. Lo **15.S05 and 15.S13 Special Seminars in Management** **Fall 2026**
John Parsons

CATAPULT
Translating Theory into Practice

How do breakthrough discoveries in the lab become real-world technologies, systems, products, policies, and practices that improve human life and address urgent societal challenges? CATAPULT 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.

Unlike many entrepreneurship courses that implicitly assume students have already decided to launch a startup, CATAPULT is designed to support MIT STEM PhD students interested in translating their research into practice, but are still deciding which career path to follow, academia, industry, government service, or some hybrid. The course helps students understand the diverse pathways through which ideas can be turned into real-world impact, including academic research, university–industry collaboration, licensing, startups, public-sector partnerships, investment, standards-setting, policy, and mission-driven deployment.

The course is organized as a hub-and-spokes model. Across both the hub and the spokes, CATAPULT emphasizes the practical skills required to succeed at the interface of science, engineering, management, and society. The first half of the semester forms the common "hub": five shared sessions focused on management, institutional, and professional issues that arise in translational work across STEM fields. These sessions introduce core skills and frameworks for communicating technical ideas to diverse stakeholders, evaluating translation pathways, managing intellectual property in academic settings, navigating conflicts of interest, structuring collaborations, combining public and private funding, negotiating effectively, and leading interdisciplinary teams.

In the second half of the semester, students choose a domain-specific "spoke" consisting of six focused sessions in one of two concentrations (more will be added in the future): biotechnology and advanced energy technologies. Each spoke applies the shared CATAPULT framework to the unique innovation ecosystem of a particular domain and explores the scientific, regulatory, commercial, financial, deployment, and institutional factors that shape translational opportunities and challenges. Students will learn specific translational pathways in their preferred domain, including how technologies are evaluated, valued, protected, financed, tested, scaled, adopted, and governed. Topics include STEM career pathways across academia, industry, startups, investing, government, and policy; valuation and decision-making under uncertainty; company creation when appropriate; and domain-specific development and deployment pathways.

Students will learn to communicate complex ideas clearly, frame research in terms of real-world use, assess stakeholders and incentives, work across disciplinary and organizational boundaries, manage uncertainty, and make decisions when scientific, technical, financial, ethical, and institutional considerations interact. The course also addresses the human side of translation: leadership, negotiation, resilience, team formation, conflict management, and dealing constructively with both failure and success.

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Prerequisites and Enrollment

CATAPULT is intended primarily for MIT STEM PhD students interested in translating scientific and technological ideas into real-world applications. No prior business or management experience is required. Students from scientific, engineering, and related backgrounds who are curious about the "how" behind research impact—and who want to understand the practical, managerial, institutional, and domain-specific pathways by which discoveries become useful products and services—will benefit most.

Enrollment in this course is not determined by the Sloan bidding process—permission of instructor is required. To enroll, please complete the short application form here: https://survey.qualtrics.com/jfe/form/SV_ePss5i8ceQPNOxU.

Class Schedule and Format

The class meets once per week on Tuesdays from 4:00 to 7:00pm. Classes will consist of a mix of lectures and guest speakers. Class locations will vary as follows:

- **H1 CATAPULT Hub (Sept. 9 through Oct. 23)**: All spokes meet together in 34-101
- **H2 CATAPULT Bio (Nov. 2 through Dec. 10)**: 34-101
- **H2 CATAPULT Advanced Energy Technologies (Nov. 2 through Dec. 10)**: 45-230

Recitations

Class material will be reviewed and additional applications and exercises presented in weekly recitations led by the TA(s). Questions should be directed to [TA CONTACT(S)].

Recitation locations will vary as follows:

During H1 (Sept. 9 through Oct. 23), recitations for all spokes will be held together on Fridays from 1:00 to 2:00pm in 34-101.

During H2 (Nov. 2 through Dec. 10), recitations for each spoke will meet as follows:

- **CATAPULT Bio**: Fridays, 1:00–2:00pm, in 34-101
- **CATAPULT Advanced Energy Technologies**: Fridays, 2:00–3:00pm, in 4-370

Course Websites

The primary course website is Canvas:

- **CATAPULT Bio**: https://canvas.mit.edu/courses/38629
- **CATAPULT Advanced Energy Technologies**: https://canvas.mit.edu/courses/38623

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 websites: [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.

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Course Admin

The course administrator is Viniqua Gooding (goodin41@mit.edu), who is responsible for all logistical aspects of the course.

Teaching Assistants (TAs)

[TBD]

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

- ***Launching from the Lab***, by Lita Nelsen and Maureen Stancik Boyce, MIT Press. (required)

Additional Recommended Readings

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

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 Schedule

Class	Topic

H1: CATAPULT HUB All spokes meet together in 34-101

L1: 9/15 **STEM Career Paths and Core Skills for Success**

- 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

R1: 9/18 *[TBA]*

L2: 9/22 **Writing and Delivering STEM Topics Effectively**

- 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

R2: 9/25 *[TBA]*

L3: 9/29 **From Ideas to IP: Creating and Managing Your IP in Academic Settings and Navigating Conflicts of Interest**

- How lab-based discoveries become intellectual property
- The rules of inventor-ship (and how they differ from authorship)
- Fundamentals of patents, trade secrets, data rights, and licensing
- Navigating university tech transfer offices and invention disclosure processes
- Identifying and managing conflicts of interest and commitment in academic settings
- Strategies for protecting IP while enabling publication, collaboration, and startup formation

R3: 10/2 *[TBA]*

L4: 10/6 **Managing Scientific and Commercial Collaborations**

- Structuring academic collaborations, industry partnerships, sponsored research, and joint ventures
- Governance, transparency, and ethical considerations in academic–industry collaboration

R4: 10/9 [TBA]

10/13 **No Class – Monday Schedule of Classes**

L5: 10/20 **Dealing with People, Failure, and Success**

- Leading interdisciplinary teams across scientific, engineering, business, and policy domains
- Hiring, incentives, and culture in early-stage ventures
- Negotiation and stakeholder management across investors, partners, and regulators
- How to deal with difficult people, and what if ***you*** are difficult people?
- Learning from setbacks and successes
- Scaling responsibly after failure or success including governance, capital strategy, and long-term impact

R5: 10/23 *[TBA]*

10/27 **No Class – Sloan LEAD Week**

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H2: CATAPULT BIO SPOKE Meets in 34-101

B-L6: 11/3 **Introduction to Career Paths in the Life Sciences**

- The life-science academic career ladder—from PhD student to postdoc to principal investigator, tenured professor, and scientific leader
- Building a research program
- The evolution from individual contributor to mentor, manager, and steward of a scientific community
- Alternative models for achieving impact beyond the traditional faculty path

R6: 11/6 [TBA]

B-L7: 11/10 **Drug Development 101**

- 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

R7: 11/13 [TBA]

B-L8: 11/17 **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

R8: 11/20 [TBA]

B-L9: 11/24 **Valuing Biomedical Assets**

- 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

11/27 No Recitation – Happy Thanksgiving!

B-L10: 12/1 **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?

R9: 12/4 *[TBA]*

L11: 12/8 **The Future of Translation: Course Wrap-Up and Next Steps**

- The future of technology and the evolving role of universities
- How to start translating
- Resources at MIT

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H2: CATAPULT ADVANCED ENERGY TECHNOLOGIES SPOKE Meets in 45-230

E-L6: 11/3 **Introduction to Career Paths in Advanced Energy Tech**

- Career pathways for translating energy technologies into impact
- Why energy innovation is different
- Lessons from leaders who transformed scientific ideas into commercially viable technologies
- Building organizations that matter—from research groups and innovation centers to startups, manufacturing companies, project developers, and mission-driven institutions

R6: 11/6 [TBA]

E-L7: 11/10 **Building a Power Plant: Case Study on Fission and Fusion**

- Understanding how electricity markets work, including who buys electricity and how power plants generate revenue
- Comparing different utility and power market models and how they influence investment and deployment decisions
- How power plants earn money through electricity generation, capacity markets, and other revenue sources
- Financing large-scale energy projects, including milestone-based funding, offtake agreements, construction financing, and federal loan guarantees
- Regulatory and end-of-life considerations, including spent fuel management, fuel recycling, and decommissioning

R7: 11/13 [TBA]

E-L8: 11/17 **The Commercialization Journey**

- Mapping critical materials, components, and capabilities across advanced energy systems—e.g., superconducting materials, nuclear fuels, high-temperature materials, drilling technologies, and specialized manufacturing—and assessing current availability and bottlenecks
- Building the workforce and industrial ecosystem required to scale emerging energy technologies, including partnerships with national laboratories, universities, and private industry, and government programs in supporting commercialization
- Scaling deep-tech supply chains, qualifying vendors, and managing long lead-time procurement under uncertainty

R8: 11/20 [TBA]

E-L9: 11/24 **The Role of Techno-Economic Analysis and Other Quantitative Economic Modeling**

- Using cost models to evaluate how advanced energy technologies can be manufactured and deployed at scale
- Understanding the tradeoffs between smaller and larger energy projects, including cost, risk, and scalability
- How economic modeling informs technology and reactor design decisions
- Evaluating how new energy technologies fit within a broader electricity system alongside other generation sources
- Introduction to grid planning models and how they evaluate the role and economics of emerging technologies
- Assessing how complementary technologies, such as thermal energy storage, affect system performance and project economics

11/27 *No Recitation – Happy Thanksgiving!*

E-L10: 12/1 **How to Start an Advanced Energy Technology Company (If You Must)**

- Building the founding team across physics, engineering, and business, securing early funding from government grants, venture capital, and strategic investors, and defining an initial technical and commercial strategy
- Evaluating when to spin out a company versus pursuing a public–private partnership or licensing approach, including navigating DOE IP rules, lab partnership agreements, and institutional conflicts
- Translating scientific vision into a compelling investment thesis—articulating the pathway to a pilot plant, managing investor expectations around long timelines, and structuring equity among founders, early employees, and capital providers

R9: 12/4 *[TBA]*

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