

Course Overview

This course examines the technical and managerial challenges presented by emerging and evolving technologies. Particular consideration is given to the forces affecting the nature and rate of technological innovation and the managerial options available to both established and entrepreneurial organizations. In doing so, we explore both internal and external sources of innovation as well as the appropriate strategies and processes for capitalizing on them.

Time: Monday/Wednesday 1:30-3:00 p.m.

Place: JMHH F55

Instructor: Prof. Saikat Chaudhuri
3463 SHDH; saikatc@wharton.upenn.edu; 215-898-6387

Office Hours: Monday 3:30-5:30 p.m. (or by appointment)

Course Assistants: Tanusri Balla, Moksh Jawa, Isaac Schrof, Spencer Weiss, Jason Xian

Canvas Web Page: <https://canvas.upenn.edu/courses/1489388>

Course Requirements

The course will be taught in seminar fashion with substantial class discussion. Thorough preparation and active class participation and attendance are essential. Assigned and supplementary readings will be augmented by cases and occasional guest lectures. Students will prepare a variety of written assignments, including case analyses and two research papers dealing with selected technologies, firms and industries. Research topics will be selected by students with instructor approval. The final course grade will be based on: (a) case analyses, annotated bibliographies, and the course concepts and perspectives assignment (30%); (b) research papers and presentations (45%); and (c) class participation (25%).

Course Materials

Text (T): Strategic Management of Technological Innovation, Sixth Edition, Melissa A. Schilling, McGraw-Hill Education, © 2020.

Bulk Pack (BP): Assigned Articles and Cases on Study.Net

Canvas (C): Assigned Articles, Cases, and Videos on Canvas

Library Websites: <http://guides.library.upenn.edu/mgmt237> (General Resources)
<http://gethelp.library.upenn.edu/PORT/> (Research Guidelines)

RULES OF COURSE CONDUCT

I will be expecting a lot from each of you in this course, just as you should be expecting a lot from me. Together we can make this a very positive and valuable excursion into the intersection of Management and Technology. Toward that end, please review and observe the following:

1. Be on time and well prepared.
2. Participate actively and constructively in class discussions – whether offering observations, answering questions or challenging other’s positions (including mine!). You may find this to be a challenge in a large class and this will be more difficult for some than for others.
3. Bring your name card to every session to help ensure that the class is highly interactive.
4. Do not open your laptops when class is in session – I have found that computer use distracts from the learning experience and active interaction during class.
5. Pay careful attention to what is going on in each class and be alert to opportunities to participate. This includes not only what is being presented from the front, but also what your classmates are contributing.
6. Eating food is absolutely forbidden once each class session begins. I realize that this may impose some hardship on those of you whose schedules preclude a lunch period. The only exception is if you bring enough for every one! Water and other drinks are permitted.
7. In the rare event that you are forced to miss a class, be sure to alert me IN ADVANCE by email with an explanation. It will be your responsibility to obtain class notes and/or handouts from your classmates and/or the M&T office. Only in exceptional circumstances will make-ups be arranged for missed unannounced quizzes.
8. Written assignments are due on the date indicated unless prior approval has been granted. Late assignments will receive a minimum of a one grade reduction.
9. All written assignments in this course are to be your individual work – unless explicitly indicated otherwise. And, while most of you are aware of the accepted conventions for citing material and ideas, this has occasionally posed problems in the past. Anything reproduced verbatim should be indicated by quotation marks with the source appropriately cited. Anything drawn from others but not quoted verbatim, such as ideas or concepts, must also be appropriately cited. See <http://gethelp.library.upenn.edu/PORT/> and/or consult the Lippincott Library staff for further guidance if needed.

Course Syllabus**I. UNDERSTANDING TECHNOLOGICAL INNOVATION**

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|----|---------|---|--|
| 1. | WE 1/15 | THE NATURE OF TECHNOLOGICAL INNOVATION
Introduction (<i>Skim</i>)
Sources of Innovation (<i>Skim</i>)
Innovation in Industry (<i>Skim</i>)
Out of the Dusty Labs (<i>Skim</i>)
This Way to the Future (<i>Skim</i>)
The Unexpected Science to Come (<i>Skim</i>)
10 Breakthrough Technologies 2019 (<i>Skim</i>)
Century of the Sciences (<i>Skim</i>) | T: 1
T: 2
BP: 1
BP: 2
C: 1
C: 2
C: 3
C: 4 |
| | MO 1/20 | Martin Luther King, Jr. Day (No Class) | |
| | WE 1/22 | Time for RP #1 Work (No Class) | |
| 2. | MO 1/27 | THE STRATEGIC IMPACT OF TECHNOLOGICAL CHANGE
Avoiding Innovation's Terrible Toll (<i>Skim</i>)
Types and Patterns of Innovation
Why Good Companies Go Bad (<i>Skim</i>)
Timing of Entry
Technological Innovation in the Photographic Industry (<i>Skim</i>)
Outside the Box (<i>Skim</i>) | C: 5
T: 3
C: 6
T: 5
BP: 3
C: 7 |
| 3. | WE 1/29 | INNOVATION PATTERNS AND EMERGING VS. ESTABLISHED TECHNOLOGIES
Patterns of Industrial Innovation
The Dynamics of Technology and Strategy (<i>Skim</i>)
Timex Corporation (A) and (B) | BP: 4
BP: 5
<u>BP: 6, 7</u> |
| 4. | MO 2/03 | TECHNOLOGICAL INNOVATION AND STRATEGIC MANAGEMENT
Defining the Organization's Strategic Direction
Technology Leadership Can Pay Off
Technology and Competitive Advantage: The Role of General Management
Managing Technology as a Strategic Asset (<i>Skim</i>) | T: 6
BP: 8
BP: 9
C: 8 |
| 5. | WE 2/05 | TECHNOLOGY POLICY AND REGULATION
<u>Guest Resource:</u> Dr. Michael Mandel, Chief Economic Strategist, Progressive Policy Institute and Senior Fellow, Mack Institute for Innovation Management
This Was the Decade the Commercial Spaceflight Industry Leapt Forward (<i>Skim</i>)
Better Policies and Incentives to Revitalize R&D for New Antimicrobial Drugs (<i>Skim</i>)
Tech Giants Want Rules on Facial Recognition, But Critics Warn... (<i>Skim</i>)
Illinois Employers Must Comply with Artificial Intelligence Video Interview Act (<i>Skim</i>)
No One Is Ready for California's New Consumer Privacy Law (<i>Skim</i>)
Converting Permissionless Innovation into Public Policy: 3 Reforms (<i>Skim</i>) | <u>RP #1 Proposal</u>

C: 9
C: 10
C: 11A
C: 11B
C: 11C
C: 12 |
| 6. | MO 2/10 | PERSPECTIVES ON EMERGING TECHNOLOGY | <u>AB #1</u> |

II. MANAGING TECHNOLOGICAL INNOVATION AND NEW PRODUCT DEVELOPMENT

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| 7. | WE 2/12 | TECHNOLOGY AND COMPETITIVE ADVANTAGE
Standards Battles and Design Dominance (<i>Skim</i>)
The Art of Standards Wars
Battle for the Gaming Monitor: G-Sync vs. FreeSync VRR Technologies (<i>Self-research</i>) | T: 4
C: 13 |
| 8. | MO 2/17 | GLOBAL TECHNOLOGY AND INNOVATION
Strategies for Global R&D
Technology Map of the World
Toyota and Sony: R&D Alone Is Not Enough
India and China Wise Up to Innovation
Revsing Up
Growing Through Innovation | BP: 10
BP: 11
BP: 12
BP: 13
C: 14
C: 15 |
| 9. | WE 2/19 | MANAGING TECHNOLOGY STRATEGIES AND THE INNOVATION PROCESS
Choosing Innovation Projects
Managing Real Options (<i>Skim</i>)
Managing the New Product Development Process (<i>Skim</i>)
Developing Products on Internet Time
Silicon Valley Specialists | T: 7
BP: 14
T: 11
BP: 15
BP: 16 |
| 10. | MO 2/24 | LESSONS FROM INNOVATIVE FIRMS
Masters of Innovation: How 3M Keeps Its New Products Coming
GE Sees the Light
Built for Innovation
Putting the "I" into HP
3M's Innovation Crisis
The World's Most Innovative Companies 2018
Lessons from Apple
Radical Collaboration: Lessons from IBM's Innovation Factory (<i>Skim</i>) | BP: 17
BP: 18
BP: 19
BP: 20
C: 16
C: 17
C: 18
C: 19 |
| 11. | WE 2/26 | TECHNOLOGICAL INNOVATION, ENTREPRENEURSHIP, AND ORGANIZATION
Organizing for Innovation
Entrepreneurship (<i>Skim</i>)
Hermes Systems | T: 10
BP: 21
<u>BP: 22</u> |
| 12. | MO 3/02 | WINDOW ON TECHNOLOGICAL INNOVATION
<u>Guest Resource</u> : Jeffrey Dowds, Former Chief Technology Officer, Vanguard | |
| 13. | WE 3/04 | EMERGING TECHNOLOGIES—PAST, PRESENT, FUTURE | <u>RP #1</u> |

SPRING BREAK 3/09 – 3/20

III. LEVERAGING EXTERNAL SOURCES OF INNOVATION: STRATEGIC PARTNERSHIPS

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| 14. | MO 3/23 | DECIDING BETWEEN INNOVATION STRATEGIES
Organizing for Innovation: When is Virtual Virtuous? (<i>Skim</i>)
When to Ally and When to Acquire
Monsanto's March into Biotechnology (A) | BP: 23
BP: 24
BP: 25 |
| 15. | WE 3/25 | MANAGING STRATEGIC ALLIANCES
How to Make Strategic Alliances Work (<i>Skim</i>)
The Relational View: Cooperative Strategy...
Lipitor: At the Heart of Warner-Lambert | BP: 26
BP: 27
BP: 28 |
| 16. | MO 3/30 | MANAGING ALLIANCE NETWORKS
Constellation Strategy: Managing Alliance Groups
Strategy as Ecology (<i>Skim</i>)
Star Alliance, 2000
Smarter Ways to Do Business with the Competition
Star Alliance Seeks Integration
Star Alliance Cuts Costs to Stay Ahead | BP: 29
BP: 30
<u>BP: 31</u>
<u>BP: 32</u>
<u>BP: 33</u>
<u>BP: 34</u> |
| 17. | WE 4/01 | ENGAGING IN STRATEGIC OUTSOURCING
<u>Guest Resource:</u> Sreedhar Chittamuri, Vice President & Head of Engineering
and Operations for Aerospace and Defense, HCL Technologies
Engineering Services Outsourcing: Unraveling Myths (<i>Skim</i>) | <u>RP #2 Proposal</u>

C: 20 |
| 18. | MO 4/06 | ENGAGING IN CORPORATE VENTURING
Making Sense of Corporate Venture Capital
Intel Capital: The Berkeley Networks Investment | <u>RP #2 Outline</u>
BP: 35
BP: 36 |
| 19. | WE 4/08 | PERSPECTIVES ON STRATEGIC TECHNOLOGY MANAGEMENT | <u>AB #2</u> |

Bulk Pack Readings

TABLE OF CONTENTS:

1. Innovation in Industry
2. Out of the Dusty Labs
3. Technological Innovation in the Photographic Industry
4. Patterns of Industrial Innovation
5. The Dynamics of Technology and Strategy
6. Timex Corporation (A)
7. Timex Corporation (B)
8. Technology Leadership Can Pay Off
9. Technology and Competitive Advantage: The Role of General Management
10. Strategies for Global R&D
11. Technology Map of the World
12. Toyota and Sony: R&D Alone is Not Enough
- ~~13. India and China Wise Up to Innovation~~
14. Managing Real Options
15. Developing Products on Internet Time
16. Silicon Valley Specialists Case
17. Masters of Innovation: How 3M Keeps its New Products Coming
- ~~18. GE Sees the Light~~
19. Built for Innovation
20. Putting the "I" into HP
21. Entrepreneurship
22. Hermes Systems
23. Organizing for Innovation: When is Virtual Virtuous?
24. When to Ally and When to Acquire
25. Monsanto's March into Biotechnology (A)
26. How to Make Strategic Alliances Work
27. The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage
28. Lipitor: At the Heart of Warner-Lambert
29. Constellation Strategy: Managing Alliance Groups
30. Strategy as Ecology
31. Star Alliance, 2000
32. Smarter Ways to Do Business with the Competition
33. Star Alliance Seeks Integration
34. Star Alliance Cuts Costs to Stay Ahead
35. Making Sense of Corporate Venture Capital
36. Intel Capital: The Berkeley Networks Investment
37. Capturing the Real Value in High-Tech Acquisitions
38. The Influence of Organizational Acquisition Experience on Acquisition Performance...
39. Cisco's Acquisition Strategy (1993 to 2000): Value Growth...
40. Buying Innovation: Managing Technology-Based Acquisitions
41. The MegaMicro Jentronix Transaction and Integration Decisions
42. The MegaMicro Jentronix Transaction and Integration Simulation User's Guide
43. What Have We Learned About Emerging-Market MNEs?
44. Don't Integrate Your Acquisitions, Partner with Them
45. China's Track Record in M&A
46. Lenovo Evolves with Its IBM PC Unit in Tow
47. Big Deal?
48. Merger, Indian Style: Buy a Brand, Leave It Alone
49. Global Integration the Cemex Way
50. No Small Beer Empire

Canvas Readings and Videos**TABLE OF CONTENTS:**

1. This Way to the Future
2. The Unexpected Science to Come
3. 10 Breakthrough Technologies 2019
4. ~~Century of the Sciences~~
5. Avoiding Innovation's Terrible Toll
6. Why Good Companies Go Bad
7. Outside the Box
8. Managing Technology as a Strategic Asset
9. This Was the Decade the Commercial Spaceflight Industry Leapt Forward
10. Better Policies and Incentives to Revitalize R&D for New Antimicrobial Drugs
11. A. Tech Giants Want Rules on Facial Recognition, But Critics Warn That Won't Be Enough
B. Illinois Employers Must Comply with Artificial Intelligence Video Interview Act
C. No One Is Ready for California's New Consumer Privacy Law
12. Converting Permissionless Innovation into Public Policy: 3 Reforms
13. The Art of Standards Wars
14. Revving Up
15. Growing Through Innovation
16. 3M's Innovation Crisis
17. The World's Most Innovative Companies 2018
18. Lessons from Apple
19. Radical Collaboration: Lessons from IBM's Innovation Factory
20. Engineering Services Outsourcing: Unraveling Myths
21. Robert Iger on Acquisition Decision-Making (Disney)
22. Padmasree Warrior on Acquisition Implementation (Cisco)
23. Charles Giancarlo on Acquisition Implementation (Cisco)
24. Juergen Schrempp on Merger Challenges (Daimler-Chrysler)
25. Dieter Zetsche on Merger Challenges (Daimler-Chrysler)
26. Carlos Ghosn on Alliance Decision-Making and Implementation (Renault-Nissan)
27. Jaan Albrecht on Creating and Managing Ecosystems/Alliance Networks (Star Alliance)