

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: 107 SHDH

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

Office Hours: Monday 4:30-6:30 p.m. (or by appointment)

Course Assistants: Olivia Chen, Pratyusha Gupta, Benjamin Hsu, Alex Sands, Dylan Sun

Canvas Web Page: <https://canvas.upenn.edu/courses/1308846>

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, Fourth Edition, Melissa A. Schilling, McGraw-Hill Irwin, © 2012.

Bulk Pack (BP): Assigned Articles and Cases from Wharton Reprographics

Canvas (C): Supplementary Assigned Articles on Canvas

Lippincott 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 1/13 | 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 2015 (<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 1/18 | Martin Luther King, Jr. Day (No Class) | |
| 2. | WE 1/20 | 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. | MO 1/25 | 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</u> |
| 4. | WE 1/27 | 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 | T: 6
BP: 7
BP: 8
C: 11 |
| 5. | MO 2/01 | TECHNOLOGY POLICY
<u>Guest Resource:</u> Dr. Kevin Werbach, Associate Professor of Legal Studies and Business Ethics, and Founder, Supernova Group
Office of Technology Policy Report "The Global Context for U.S. Technology Policy"
2014 Global R&D Funding Forecast Report
The Fading Lustre of Clusters | <u>RP #1 Proposal</u>
C: 8
C: 9
C: 10 |
| 6. | WE 2/03 | PERSPECTIVES ON EMERGING TECHNOLOGY | <u>AB #1</u> |

II. MANAGING TECHNOLOGICAL INNOVATION AND NEW PRODUCT DEVELOPMENT

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| 7. | MO 2/08 | TECHNOLOGY AND COMPETITIVE ADVANTAGE
Standards Battles and Design Dominance (<i>Skim</i>)
The Art of Standards Wars
Battle for Wireless Power: A4WP vs. Qi Charging (<i>Self-research</i>) | T: 4
C: 12 |
| 8. | WE 2/10 | 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
Revving Up
Growing Through Innovation | BP: 9
BP: 10
BP: 11
BP: 12
C: 13
C: 14 |
| 9. | MO 2/15 | MANAGING TECHNOLOGY STRATEGIES AND THE INNOVATION PROCESS
Choosing Innovation Projects
Managing Real Options (<i>Skim</i>)
Managing the New Product Development Process
Developing Products on Internet Time
Silicon Valley Specialists | T: 7
BP: 13
T: 11
BP: 14
BP: 15 |
| 10. | WE 2/17 | 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 2015
Lessons from Apple
Radical Collaboration: Lessons from IBM's Innovation Factory | BP: 16
BP: 17
BP: 18
BP: 19
C: 15
C: 16
C: 17
C: 18 |
| 11. | MO 2/22 | TECHNOLOGICAL INNOVATION, ENTREPRENEURSHIP, AND ORGANIZATION
Organizing for Innovation
Entrepreneurship (<i>Skim</i>)
Hermes Systems | T: 10
BP: 20
<u>BP: 21</u> |
| 12. | WE 2/24 | WINDOW ON TECHNOLOGICAL INNOVATION
<u>Guest Resource:</u> Dr. Terry Fadem, President, Biomedical Research and Education Foundation, Consultant, and Senior Fellow, Mack Institute for Innovation Management | |
| 13. | MO 2/29 | EMERGING TECHNOLOGIES—PAST, PRESENT, FUTURE | <u>RP #1</u> |

III. LEVERAGING EXTERNAL SOURCES OF INNOVATION: STRATEGIC PARTNERSHIPS

14.	WE 3/02	DECIDING BETWEEN INNOVATION STRATEGIES	<u>RP #2 Proposal</u>
		Organizing for Innovation: When is Virtual Virtuous? (<i>Skim</i>)	BP: 22
		When to Ally and When to Acquire	BP: 23
		Monsanto's March into Biotechnology (A)	BP: 24

SPRING BREAK 3/07 – 3/11

15.	MO 3/14	MANAGING STRATEGIC ALLIANCES	
		How to Make Strategic Alliances Work (<i>Skim</i>)	BP: 25
		The Relational View: Cooperative Strategy...	BP: 26
		Lipitor: At the Heart of Warner-Lambert	BP: 27
16.	WE 3/16	MANAGING ALLIANCE NETWORKS	
		Constellation Strategy: Managing Alliance Groups	BP: 28
		Strategy as Ecology (<i>Skim</i>)	BP: 29
		Star Alliance, 2000	BP: 30
		Smarter Ways to Do Business with the Competition	BP: 31
		Star Alliance Seeks Integration	BP: 32
		Star Alliance Cuts Costs to Stay Ahead	BP: 33
17.	MO 3/21	ENGAGING IN CORPORATE VENTURING	
		Making Sense of Corporate Venture Capital	BP: 34
		Intel Capital: The Berkeley Networks Investment	<u>BP: 35</u>
18.	WE 3/23	ENGAGING IN STRATEGIC OUTSOURCING	<u>RP #2 Outline</u>
		<u>Guest Resource</u> : Sukamal Banerjee, Executive Vice President and Global Head of Hi-Tech & Communications in Engineering Services and IoT WoRKS, HCL Technologies	
		HCL Engineering and R&D Services Pre Read Material	C: 19
		HCL and Rockwell Collins Business Partnership	C: 20
19.	MO 3/28	PERSPECTIVES ON STRATEGIC TECHNOLOGY MANAGEMENT	<u>AB #2</u>

IV. LEVERAGING EXTERNAL SOURCES OF INNOVATION: MERGERS AND ACQUISITIONS

20. WE 3/30 **GROWING THROUGH ACQUISITIONS**
 Capturing the Real Value in High-Tech Acquisitions BP: 36
 The Influence of Organizational Acquisition Experience... (*Focus on concepts/findings*) BP: 37
 Cisco's Acquisition Strategy (1993 to 2000): Value Growth... BP: 38
21. MO 4/04 **EMBARKING ON INTEGRATION PLANNING**
 Making M&As Work: Strategic and Psychological Preparation BP: 39
 HP and Compaq Combined: In Search of Scale and Scope BP: 40
 DaimlerChrysler Merger: The Quest to Create "One Company" BP: 41
22. WE 4/06 **DETERMINING INTEGRATION STRATEGIES**
 Buying Innovation: Managing Technology-Based Acquisitions BP: 42
 Vermeer Technologies (D), (E), (F) **BP: 43**
 Post-Merger Integration: How IBM and Lotus Work Together (*Skim*) BP: 44
23. MO 4/11 **GLOBAL M&A BY EMERGING-MARKET MULTINATIONALS**
 What Have We Learned About Emerging-Market MNEs? (*Skim*) BP: 45
 Don't Integrate Your Acquisitions, Partner with Them BP: 46
 China's Track Record in M&A (*Skim*) BP: 47
 Lenovo Evolves with Its IBM PC Unit in Tow BP: 48
 Big Deal? (*Skim*) BP: 49
 Merger, Indian Style: Buy a Brand, Leave It Alone BP: 50
 Global Integration the Cemex Way BP: 51
 No Small Beer Empire BP: 52

V. PROJECTS AND REVIEW

24. WE 4/13 **WINDOW ON TECHNOLOGICAL INNOVATION**
Guest Resource: Ken Glass, Angel Investor (M&T, '82)
25. MO 4/18 **RP #2 PRESENTATIONS (1/2)**
26. WE 4/20 **RP #2 PRESENTATIONS (2/2)**
27. MO 4/25 **KEY ISSUES & OPTIONS IN TECHNOLOGY MANAGEMENT** **C&P**
- WE 4/27 **Research Papers Due by 5:00pm (No Class)** **RP #2**

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) and (B)
7. Technology Leadership Can Pay Off
8. Technology and Competitive Advantage: The Role of General Management
9. Strategies for Global R&D
10. Technology Map of the World
11. Toyota and Sony: R&D Alone is Not Enough
12. India and China Wise Up to Innovation
13. Managing Real Options
14. Developing Products on Internet Time
15. Silicon Valley Specialists Case
16. Masters of Innovation: How 3M Keeps its New Products Coming
17. GE Sees the Light
18. Built for Innovation
19. Putting the "I" into HP
20. Entrepreneurship
21. Hermes Systems
22. Organizing for Innovation: When is Virtual Virtuous?
23. When to Ally and When to Acquire
24. Monsanto's March into Biotechnology (A)
25. How to Make Strategic Alliances Work
26. The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage
27. Lipitor: At the Heart of Warner-Lambert
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29. Strategy as Ecology
30. Star Alliance, 2000
31. Smarter Ways to Do Business with the Competition
32. Star Alliance Seeks Integration
33. Star Alliance Cuts Costs to Stay Ahead
34. Making Sense of Corporate Venture Capital
35. Intel Capital: The Berkeley Networks Investment
36. Capturing the Real Value in High-Tech Acquisitions
37. The Influence of Organizational Acquisition Experience on Acquisition Performance...
38. Cisco's Acquisition Strategy
39. Making M&As Work: Strategic and Psychological Preparation
40. HP and Compaq Combined: In Search of Scale and Scope
41. DaimlerChrysler Merger: The Quest to Create "One Company"
42. Buying Innovation: Managing Technology-Based Acquisitions
43. Vermeer Technologies (D), (E), (F)
44. Post-Merger Integration: How IBM and Lotus Work Together
45. What Have We Learned About Emerging-Market MNEs?
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52. No Small Beer Empire

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1. This Way to the Future
2. The Unexpected Science to Come
3. 10 Breakthrough Technologies 2015
4. Century of the Sciences
5. Avoiding Innovation's Terrible Toll
6. Why Good Companies Go Bad
7. Outside the Box
8. Office of Technology Policy Report "The Global Context of the U.S. Technology Policy"
9. 2014 Global R&D Funding Forecast Report
10. The Fading Lustre of Clusters
11. Managing Technology as a Strategic Asset
12. The Art of Standards Wars
13. Revving Up
14. Growing Through Innovation
15. 3M's Innovation Crisis
16. The World's Most Innovative Companies 2015
17. Lessons from Apple
18. Radical Collaboration: Lessons from IBM's Innovation Factory
19. HCL Engineering and R&D Services Pre Read Material
20. HCL and Rockwell Collins Business Partnership