

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: Tuesday/Thursday 1:30-3:00 p.m.

Place: JMHH F60

Instructor: Dr. Saikat Chaudhuri
Assistant Professor of Management
2029 SHDH; saikatc@wharton.upenn.edu; 215-898-6387

Office Hours: Tuesday/Thursday 4:30-6:00 p.m. (or by appointment)

Course Assistants: Akshay Amin, Shahaab Bhanji, Parth Doshi, Nora Turek, Dillon Wexler

Canvas Web Page: <https://wharton.instructure.com/courses/916068>

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://gethelp.library.upenn.edu/guides/business/mgmt237.html> (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. | TH 1/10 | 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 Emerging Technologies 2012 (<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 |
| 2. | TU 1/15 | 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>) | C: 18 T: 3 C: 5 T: 5 BP: 3 |
| | TH 1/17 | Sick Day (No Class) | |
| 3. | TU 1/22 | 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. | TH 1/24 | TECHNOLOGY POLICY <u>Guest Resource:</u> Dr. Graham Mitchell, formerly U.S. Assistant Secretary of Commerce for Technology Policy, U.S. Department of Commerce Office of Technology Policy Report "The Global Context for U.S. Technology Policy" 2013 Global R&D Funding Forecast Report The Fading Lustre of Clusters | <u>RP #1 Proposal</u> C: 7 C: 8 C: 9 |
| 5. | TU 1/29 | 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: 6 |
| 6. | TH 1/31 | PERSPECTIVES ON EMERGING TECHNOLOGY | <u>AB #1</u> |

II. MANAGING TECHNOLOGICAL INNOVATION AND NEW PRODUCT DEVELOPMENT

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| 7. | TU 2/05 | TECHNOLOGY AND COMPETITIVE ADVANTAGE Standards Battles and Design Dominance (<i>Skim</i>) The Art of Standards Wars The Mobility Wars: iOS vs. Android (vs. Windows 8/RT) (<i>Self-research</i>) | T: 4 C: 10 |
| 8. | TH 2/07 | 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: 12 C: 13 |
| 9. | TU 2/12 | 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. | TH 2/14 | 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 Lessons from Apple Radical Collaboration: Lessons from IBM's Innovation Factory | BP: 16 BP: 17 BP: 18 BP: 19 C: 14 C: 15 C: 16 C: 17 |
| 11. | TU 2/19 | WINDOW ON TECHNOLOGICAL INNOVATION <u>Guest Resource:</u> Dr. Terry Fadem, Director, Corporate Alliances, University of Pennsylvania School of Medicine, Consultant and Senior Fellow, Mack Center for Technological Innovation | |
| 12. | TH 2/21 | TECHNOLOGICAL INNOVATION, ENTREPRENEURSHIP, AND ORGANIZATION Organizing for Innovation Entrepreneurship (<i>Skim</i>) Hermes Systems | T: 10 BP: 20 <u>BP: 21</u> |
| 13. | TU 2/26 | EMERGING TECHNOLOGIES—PAST, PRESENT, FUTURE | <u>RP #1</u> |

III. LEVERAGING EXTERNAL SOURCES OF INNOVATION: STRATEGIC PARTNERSHIPS

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| 14. | TH 2/28 | 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 3/04 – 3/08

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| 15. | TU 3/12 | 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. | TH 3/14 | 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. | TU 3/19 | ENGAGING IN STRATEGIC OUTSOURCING | |
| | | <u>Guest Resource</u> : Sandeep Kishore, Executive Vice President and Global Head of Sales & Practice, Engineering and R&D Services, HCL Technologies | |
| 18. | TH 3/21 | ENGAGING IN CORPORATE VENTURING | <u>RP #2 Outline</u> |
| | | Making Sense of Corporate Venture Capital | BP: 34 |
| | | Intel Capital: The Berkeley Networks Investment | <u>BP: 35</u> |
| 19. | TU 3/26 | PERSPECTIVES ON STRATEGIC TECHNOLOGY MANAGEMENT | <u>AB #2</u> |

IV. LEVERAGING EXTERNAL SOURCES OF INNOVATION: MERGERS AND ACQUISITIONS

20. TH 3/28 **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. TU 4/02 **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. TH 4/04 **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. TU 4/09 **GLOBAL M&A BY EMERGING-MARKET MULTINATIONALS**
 What Have We Learned About Emerging-Market MNEs? *(Skim)* BP: 45
 China's Track Record in M&A *(Skim)* BP: 46
 Lenovo Evolves with Its IBM PC Unit in Tow BP: 47
 Big Deal? *(Skim)* BP: 48
 Merger, Indian Style: Buy a Brand, Leave It Alone BP: 49
 Global Integration the Cemex Way BP: 50
 No Small Beer Empire BP: 51

V. PROJECTS AND REVIEW

24. TH 4/11 **RP #2 PRESENTATIONS (1/2)**
25. TU 4/16 **RP #2 PRESENTATIONS (2/2)**
26. TH 4/18 **WINDOW ON TECHNOLOGICAL INNOVATION**
Guest Resource: Ken Glass, Angel Investor (M&T, '82)
27. TU 4/23 **KEY ISSUES & OPTIONS IN TECHNOLOGY MANAGEMENT** **C&P**
- FR 4/26 **Research Papers Due by 5:00pm** **RP #2**

Bulkpack 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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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&A's 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?
46. China's Track Record in M&A
47. Lenovo Evolves with Its IBM PC Unit in Tow
48. Big Deal?
49. Merger, Indian Style: Buy a Brand, Leave It Alone
50. Global Integration the Cemex Way
51. No Small Beer Empire

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1. This Way to the Future
2. The Unexpected Science to Come
3. 10 Emerging Technologies 2012
4. Century of the Sciences
5. Why Good Companies Go Bad
6. Managing Technology as a Strategic Asset
7. Office of Technology Policy Report "The Global Context of the U.S. Technology Policy"
8. 2013 Global R&D Funding Forecast Report
9. The Fading Lustre of Clusters
10. The Art of Standards Wars
11. ~~Battle for Cloud Productivity: Office 365 vs. Google Apps~~
12. Revving Up
13. Growing Through Innovation
14. 3M's Innovation Crisis
15. The World's Most Innovative Companies
16. Lessons from Apple
17. Radical Collaboration: Lessons from IBM's Innovation Factory
18. Avoiding Innovation's Terrible Toll