**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: 215 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: Akshay Amin, Shahaab Bhanji, Sneha Keshwani, Nick Liu, Dillon Wexler

Canvas Web Page: [https://wharton.instructure.com/courses/1233176](https://wharton.instructure.com/courses/1233176)

**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**


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](http://gethelp.library.upenn.edu/guides/business/mgmt237.html) (general resources)
[http://gethelp.library.upenn.edu/PORT/](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 everyone! 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

1. WE 1/15  THE NATURE OF TECHNOLOGICAL INNOVATION
   Introduction (Skim) T: 1
   Sources of Innovation (Skim) T: 2
   Innovation in Industry (Skim) BP: 1
   Out of the Dusty Labs (Skim) BP: 2
   This Way to the Future (Skim) C: 1
   The Unexpected Science to Come (Skim) C: 2
   10 Breakthrough Technologies 2013 (Skim) C: 3
   Century of the Sciences (Skim) C: 4

   MO 1/20  Martin Luther King, Jr. Day (No Class)

2. WE 1/22  THE STRATEGIC IMPACT OF TECHNOLOGICAL CHANGE
   Avoiding Innovation's Terrible Toll (Skim) C: 5
   Types and Patterns of Innovation T: 3
   Why Good Companies Go Bad (Skim) C: 6
   Timing of Entry T: 5
   Technological Innovation in the Photographic Industry (Skim) BP: 3

3. MO 1/27  INNOVATION PATTERNS AND EMERGING VS. ESTABLISHED TECHNOLOGIES
   Patterns of Industrial Innovation BP: 4
   The Dynamics of Technology and Strategy (Skim) BP: 5
   Timex Corporation (A) and (B) \textbf{BP: 6}

4. WE 1/29  TECHNOLOGY POLICY
   Guest Resource: Dr. Graham Mitchell, formerly U.S. Assistant Secretary of Commerce for Technology Policy, U.S. Department of Commerce
   2014 Global R&D Funding Forecast Report C: 9
   The Fading Lustre of Clusters C: 10

5. MO 2/03  TECHNOLOGICAL INNOVATION AND STRATEGIC MANAGEMENT \textbf{RP #1 Proposal}
   Defining the Organization’s Strategic Direction T: 6
   Technology Leadership Can Pay Off BP: 7
   Technology and Competitive Advantage: The Role of General Management BP: 8
   Managing Technology as a Strategic Asset C: 7

6. WE 2/05  PERSPECTIVES ON EMERGING TECHNOLOGY \textbf{AB #1}
II. MANAGING TECHNOLOGICAL INNOVATION AND NEW PRODUCT DEVELOPMENT

7. MO 2/10 TECHNOLOGY AND COMPETITIVE ADVANTAGE
   - Standards Battles and Design Dominance *(Skim)*
   - The Art of Standards Wars
   - The Mobility Wars: iOS vs. Android (vs. Windows 8/RT) *(Self-research)*

8. WE 2/12 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

9. MO 2/17 MANAGING TECHNOLOGY STRATEGIES AND THE INNOVATION PROCESS
   - Choosing Innovation Projects
   - Managing Real Options *(Skim)*
   - Managing the New Product Development Process
   - Developing Products on Internet Time
   - Silicon Valley Specialists

10. WE 2/19 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

11. MO 2/24 TECHNOLOGICAL INNOVATION, ENTREPRENEURSHIP, AND ORGANIZATION
    - Organizing for Innovation
    - Entrepreneurship *(Skim)*
    - Hermes Systems

12. WE 2/26 WINDOW ON TECHNOLOGICAL INNOVATION
    - Guest Resource: Dr. Terry Fadem, President, Biomedical Research and Education Foundation, Consultant and Senior Fellow, Mack Institute for Innovation Management

13. MO 3/03 EMERGING TECHNOLOGIES—PAST, PRESENT, FUTURE

*Updated 01/14/2014*
III. LEVERAGING EXTERNAL SOURCES OF INNOVATION: STRATEGIC PARTNERSHIPS

14. WE 3/05  DECIDING BETWEEN INNOVATION STRATEGIES  RP #2 Proposal
Organizing for Innovation: When is Virtual Virtuous? (Skim)  BP: 22
When to Ally and When to Acquire  BP: 23
Monsanto’s March into Biotechnology (A)  BP: 24

SPRING BREAK 3/10 – 3/14

15. MO 3/17  MANAGING STRATEGIC ALLIANCES  BP: 25
How to Make Strategic Alliances Work (Skim)
The Relational View: Cooperative Strategy…  BP: 26
Lipitor: At the Heart of Warner-Lambert  BP: 27

16. WE 3/19  MANAGING ALLIANCE NETWORKS  BP: 28
Constellation Strategy: Managing Alliance Groups
Strategy as Ecology (Skim)  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 3/24  ENGAGING IN CORPORATE VENTURING  BP: 34
Making Sense of Corporate Venture Capital
Intel Capital: The Berkeley Networks Investment  BP: 35

18. WE 3/26  ENGAGING IN STRATEGIC OUTSOURCING  RP #2 Outline
Guest Resource: Sandeep Kishore, Corporate Vice President and Global Head of
Sales & Practice, Engineering and R&D Services, HCL Technologies
HCL Engineering and R&D Services Pre Read Material  C: 18
HCL and Rockwell Collins Business Partnership  C: 19

19. MO 3/31  PERSPECTIVES ON STRATEGIC TECHNOLOGY MANAGEMENT  AB #2
IV. LEVERAGING EXTERNAL SOURCES OF INNOVATION: MERGERS AND ACQUISITIONS

20. WE 4/02  GROWING THROUGH ACQUISITIONS
Capturing the Real Value in High-Tech Acquisitions
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 4/07  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 4/09  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 4/14  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. WE 4/16  RP #2 PRESENTATIONS (1/2)
25. MO 4/21  RP #2 PRESENTATIONS (2/2)
26. WE 4/23  KEY ISSUES & OPTIONS IN TECHNOLOGY MANAGEMENT C&P
27. MO 4/28  WINDOW ON TECHNOLOGICAL INNOVATION
Guest Resource: Ken Glass, Angel Investor (M&T, ’82)
WE 4/30  Research Papers Due by 5:00pm (No Class) RP #2
Bulkpack Readings

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1. Innovation in Industry
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3. Technological Innovation in the Photographic Industry
4. Patterns of Industrial Innovation
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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
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37. The Influence of Organizational Acquisition Experience on Acquisition Performance…
38. Cisco’s Acquisition Strategy
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
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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. HCL Engineering and R&D Services Pre Read Material
19. HCL and Rockwell Collins Business Partnership