This course provides a strategy framework -- drawing upon the economics of technical change -- for high-technology businesses. The emphasis is on the development and application of conceptual models clarifying the interactions between competition, patterns of technological and market change, and the structure and development of internal firm capabilities. The aim of this course is to provide a solid foundation for students interested in managing innovation in high-technology industries. The course teaches you (a) how to ask the right questions about high-technology markets and organizations, (b) analyze the structure and develop strategies for these markets, and (c) link analysis and strategy development to technology and innovation management. Throughout, key conceptual frameworks are linked to applications in a variety of industry and case settings.

While the course has no formal prerequisites (except for enthusiasm), students are expected to have familiarity with frameworks from “core strategy” (MGMT 431). If MGMT 463 is your first strategy course, please contact me prior to Class 2. The class is designed to be particularly appropriate for those who anticipate taking positions as:

(a) a manager in a technology-intensive firm
(b) an analyst or investor in technology markets
(c) an employee with business contact in technology-driven firms and industry segments

You should be prepared for every class, including the introductory lecture. The class is highly interactive. To prepare readings, summarize the problem addressed by the article, outline its core points and recommendations, and assess the strengths & weaknesses of the reading's central argument. For cases, identify the key problem facing the protagonists, evaluate alternative approaches to these problems, and think about the course of action you would recommend and why. Group works (and study groups) are critical; effective group cooperation is crucial to a valuable class experience.

Assigned readings are available at Norris and Downtown. As well, Blackboard will be used extensively as a course website. The site is a critical complement to the lectures. Before each class, Blackboard will include links to points of interest (e.g., company websites), as well as supplementary reading materials and reading guides for several of the cases included in the course. I will also post the slides within 48 hours after each lecture. Finally, Blackboard will include key course information such as the syllabus, assignments, due dates, and updates. You should check the site on a regular basis; material on Blackboard for a week will be assumed to have been reviewed and downloaded.
REQUIREMENTS, GRADING, AND DUE DATES

• **Active Class & Group Participation (25%+).** Participation consists of 3 distinct components:
  • **Weekly Class Environment (10%).** For each class, each student is expected to prepare readings and case studies, listen closely to class discussion, and share their ideas. Class will begin and end on time. Repeated lateness will count against the class participation grade. Though absence is discouraged, please inform by advance email of any that arise.

  • **Class Participation Leadership Opportunity (10%).** Each student will take responsibility for “leading” the discussion for one class during the quarter. This provides an opportunity for each student to “stand out” and get specific feedback on participation during the quarter. A sign-up sheet and further details will be distributed in Class 1.

  • **360 Group Evaluation (5%+).** Each group member will be evaluated by all group members at the end of the quarter. Substantial evidence that group work has been unevenly completed will count against the class participation grade.

• **Group Homeworks & Final Paper (35%).**
  • **Group Homeworks (10%).** Three group homework assignments will be given in the first half of the quarter, **due January 20, January 27, and February 3.** Each homework group should be composed of 4-5 individuals. Each assignment will be designed to further understanding of the management and strategy issues which arise in high-technology markets. Grading will be on a pass/fail basis. In addition, there will be one non-graded group case preparation in conjunction with the January 13 class session.

  • **Group Final Paper (25%).** This fifteen-page paper will analyze the development of a specific innovation or an aspect of the innovation process, with particular focus on a current or emerging issue usefully analyzed with the tools and frameworks developed in the course. Guidelines and examples will be provided. A one-page outline is due on February 24; comments will be provided promptly. The paper is due on March 13.

• **Individual Mid-Term & “Final” Homework (40%).** While group discussion is encouraged for all assignments, two assignments must be “written up” individually.
  • **Mid-Term Reality Check (10%).** A take-home mid-term (similar to the group homeworks) is due on February 13. Though not a key part of the overall grade, feedback will allow you to assess your progress in the course up to that point and identify potential areas for improvement.

  • **“Final” Homework (30%).** A “final” homework assignment is due March 3. This case analysis will require you to develop an overall strategy recommendation for a high-technology company. While the Group Homeworks will focus on individual frameworks and tools in isolation, the goal of this final assignment is to develop your ability to offer an integrated analysis and implementation plan for innovation management.

REQUIRED TEXT

RECOMMENDED TEXT
I. COURSE OVERVIEW & THE EVOLUTION OF TECHNOLOGY MARKETS

CLASS 1. Course Overview: Managing Innovation in an Uncertain World January 6


*Please come prepared to discuss the reading.*

What are the key strategic challenges in using technological innovation as the basis for competitive advantage? What firms have been able to secure extraordinary returns from technological innovation? Why do you think these firms have been able to prosper? Rosenberg highlights the importance of uncertainty in the process of technological change. What managerial challenges (and opportunities) arise in the face of inherent uncertainty?

CLASS 2. The Nature and Evolution of Technology Markets January 9


*Supplementary Reading*


*Supplementary Online Reading (Available on Blackboard)*


What is the relationship between science and technology? How does science contribute to the development and diffusion of new technologies (and when does technology itself spur new scientific discoveries)? What are some different types of innovation, and how does the nature of innovation change as a technology matures?

Moore claims that the key challenge in managing innovation is the ability to understand how strategy must respond to the staging and timing of technology diffusion. Make a list of factors you believe are most important in determining the diffusion rate. What determines the relative importance of different factors? How should a firm change their tactics and their product development activities as technology diffuses?
Fernando-Cornejo, J. and M. Caswell (2006). *The First Decade of Genetically Engineered Crops in the United States*, USDA ERS Electronic Information Bulletin No. 11: Summary and pages 8-14 only; also see Ag Biotech Hand-Out (Blackboard).

In-Class Video Excerpt

*Harvest of Fear*, PBS Frontline and NOVA

Online Reading (Available on Blackboard)


Supplementary Online Reading (Available on Blackboard)


The rate of adoption of different agricultural biotechnology products varies widely, and there are significant differences in adoption rates by crop type, genetic traits, and region. What are the key elements of an effective diffusion strategy for a new agricultural biotechnology product? Is there a “Chasm”? How did Monsanto adjust their diffusion strategy as they learned more about this emerging market and technology?
II. PATTERNS AND SOURCES OF TECHNOLOGICAL INNOVATION

CLASS 4. Technology Dynamics: The “Two” Technology S-Curves January 16


Online Reading (Available on Blackboard)


General Motors: Live Green or Die, Business Week, May, 2008.

Foster claims that the key challenge in managing innovation is the ability to take advantage of improvements over time in technology performance, and making the transition between different technology generations. Make a list of those factors which you believe are most important in determining improvements in technological performance. What are the key challenges in taking advantage of the process of changing technological performance over time?

General Motors introduced the EV-1, the first modern production electric vehicle in 1996, yet has been unable to build on this early advantage as the market for alternative energy vehicles has evolved. Why was GM unable to immediately exploit the rise in demand for “green” cars over the last few years? What are the key lessons that Rick Wagoner might draw from the EV-1 experience as GM prepares to “go green”?

CLASS 5. The Co-Evolution of Technology, Markets & Firms: January 20

The Dominant Design Framework

Online Reading (Available on Blackboard)


Supplementary Online Reading (Available on Blackboard)


These readings develop a model of the co-evolution of technological innovation, competition, and organizations and relate them to the classic “static” frameworks from MGMT 431. What are the managerial implications of integrating static and dynamic strategic perspectives?
III. PROFITING FROM INNOVATION

CLASS 6. The Drivers of Commercialization Strategy January 23


Supplementary Online Reading (Available on Blackboard)


The economic return on innovation depends on both the underlying value of the technology as well as the organization’s control of resources which ensure some degree of insulation from competition. Effective commercialization strategy must be premised on a clear understanding of these commercialization drivers. What are the key drivers of the ability to capture value from innovation? How do different industries and sectors differ in terms of commercialization environment and strategy?

CLASS 7. Value from Intellectual Property: Patents & Beyond January 27


Online Reading (Available on Blackboard)


Supplementary Reading


Intellectual property laws are intended to enable inventors to protect the knowledge embodied in their products. How well do they do the job? What avenues are available for protecting one's ideas? How do you choose among intellectual property instruments to protect a new invention? How does the probabilistic nature of the patent system impact effective strategic management of intellectual property?
NOTE: CLASS 8 IS SCHEDULED FOR WEDNESDAY, JANUARY 28

CLASS 8.  The Gale of Creative Destruction  January 28


Online Reading (Available on Blackboard)


What do you think are the drivers of “Creative Destruction”? What do you consider to be the key management challenges to maintain technological and market leadership? Why do some firms find it so difficult to adapt in the face of new technology?

CLASS 9.  The Attacker’s Advantage  February 3


Supplementary Reading


Why do managers find it so difficult to anticipate and respond to disruptive innovation? How important are organizational barriers? How important are customer relationships? What are the crucial elements of an effective strategy for managing the Attacker’s Advantage? How important are organizational barriers for implementation?

CLASS 10.  Managing Competence-Destroying Innovation  February 6

The Crisis at Encyclopaedia Britannica, Kellogg Case 5-306-504.

This class will focus on how different companies have addressed competence-destroying innovation in different industries. Why were firms in photolithography and photography susceptible to disruptive innovation? Why did a digital product pose such challenges for Encyclopaedia Britannica? Would you have managed the transition to a digital encyclopaedia differently?
CLASS 11.  **Acquiring and Leveraging External Innovators**  February 10


Bunnell, D. and A. Brate (2000). *Making the Cisco Connection*.  Chapter 4 only.

*Supplementary Online Reading (Available on Blackboard)*


Start-up innovators and established firms can benefit from commercialization through the “market for ideas.” However, effective acquisition of start-up technology has eluded many established firms. What are the crucial implementation issues associated with technology acquisitions? What is the difference between a “people” versus a “product” acquisition?

CLASS 12.  **Mid-Term Review & Reflection**  February 13

*NO READINGS.*

*Please review your readings, notes, and homework. What main lessons have you learned so far? What frameworks are most effective for managing innovation?*

IV.  **MANAGING TECHNOLOGY STANDARDS**

CLASS 13.  **Strategy in Standards-Oriented Technology Markets**  February 17


*Online Reading (Available on Blackboard)*


*Supplementary Online Reading (Available on Blackboard)*


The importance of standards and networks changes the nature of competition in many technologically dynamic sectors. What are the key managerial dilemmas posed by standards? Can you think of one company that you think has taken advantage of standard-setting? How about a company that has yielded competitive advantage by mismanaging standards?
CLASS 14.  **The Browser Wars**  

CASE: Browser Wars, 1994-98, HBS Case 9-798-094

*Online Reading (Available on Blackboard)*


*In class video Excerpt*

Selections from *Nerds 2.0.1, A Brief History of the Internet*, PBS Home Video, 1998.

*Supplementary Reading*

CASE: Double deal making in the Browser Wars (A), HBS case 9-800-050

We will focus on the standards battle more commonly known as the “browser wars” between Netscape and Microsoft. How effective were the standards strategies of Microsoft and Netscape?

V.  **MANAGING PRODUCT PLATFORMS**

CLASS 15.  **Technology Platforms**  


*Supplementary Reading*


Successful innovation management often depends on the design and commercialization of a technology platform rather than on the development of a single “piece” of technology. Indeed, managing the reconfiguration of technology platforms is a key problem for maintaining market leadership. Why is managing a technology platform different than managing a single innovation? When is platform management most important?
CLASS 16.  **Putting Development Strategy to Work**  February 27

CASE:  We’ve Got Rhythm!  Medtronic Corporation’s Cardiac Pacemaker Business, HBS Case N9-698-004.

*Online Reading (Available on Blackboard)*


If you were managing Medtronic, what would you do and why?  What would you do first?  Do Wheelwright and Clark provide guidance?  How did the different groups in the bakeoff differ in their approach to product development?  When would you choose each different type of team?

VI.  **THE EXTERNAL ENVIRONMENT FOR INNOVATION**

CLASS 17  **Final Homework Review**  March 3

This class will be a case discussion reviewing the final individual homework assignment. As time permits, we will also begin our discussion of how to take advantage of the external innovation environment.

CLASS 18.  **Managing External Innovation:**  March 6

*Open Innovation and Strategic R&D Alliances*


While traditional approaches towards the management of innovation focus on internal factors and the nature of technology markets, the external innovation environment is at least as important. How does location impact the innovation and the nature of commercialization? Does intense innovation-driven local competition enhance or detract from competitive advantage?

The external innovation environment increasingly involves horizontal and vertical innovation networks. Strategic alliances and platform leadership strategies have become increasingly important tools for managing external innovators. What are the key benefits and hazards in initiating an alliance?  What are the key management issues that arise?
The Potential for External Innovation: Open Source and Knowledge Networks


Supplementary Online Reading (Available on Blackboard)


What is the promise of the “open source” movement in software and other sectors? When does an “open” approach to innovation make sense, and when might a more proprietary approach be in a firm’s interest? What are the benefits and challenges of participating in an innovation network, as in biotechnology?

WRAP-UP!


Review your notes and your thoughts. What are the most important management lessons which you will bring from the course? How is information technology (and the Internet in particular) changing the management of technology itself?

Have a great Spring Break!!