



MBA 505/LAW 794: Management of Technology

Location and time	Room 3039 Business Instructional Facility Tuesday and Thursday Section 1: 9:30 – 10:50 Section 2: 11:00 – 12:20
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Office Hours	Thursday 2:00 – 3:00 and by appointment

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INTRODUCTION AND COURSE OBJECTIVES

Technology pervades almost every aspect of almost every industry. This course prepares non-technologists to participate effectively in the management of the innovation process. Thus, we will not focus on technology *per se* and the class is *not* focused on any particular technology. By the end of the course, you will be

- Familiar with key concepts of technology management
- Better able to understand how your specialty interacts with innovation and technology processes within a firm

TECHNIQUES FOR LEARNING

To accomplish our objectives, we will use a variety of learning techniques: lectures, outside of class assignments, readings, written reports, presentations, and most importantly, class discussion.

Readings, lecture, and discussions

I will lecture some in class. However, we will all learn more if class is much more of a discussion. In order for us to have a discussion, it is important that you have completed and thought about the assigned reading. The *Class Schedule and Assignments* section includes some key questions to help focus your reading.

Analysis of real world events

Strategic thinking and analysis are best learned through practice. In addition to formal cases, we will also read articles from the recent business press. The articles will cover a variety of technologies, however, this is *not* a course on technology *per se* and you are *not* expected to have any existing knowledge in the technology.

How much you get out of the analyses depends on your preparation and active participation. Each of us must be fully prepared for each class, and there will be assignments throughout the term to help focus our preparation. *Everyone* is expected to participate effectively in each class to comment, question, and analyze.

Exams

There will be a final exam at the end of the semester. The exam will test both your mastery of the concepts in isolation and your ability to apply them.

EXPECTATIONS AND POLICIES

Preparation

I will assume that you have read everything assigned. It is especially valuable if you come with questions about the readings. Poor preparation is a disservice to your fellow learners and will negatively impact your participation grade

Class participation

Most of the learning in our class will occur through discussion. Therefore, we need everyone's active participation. Meaningful participation obviously requires having carefully read and thought about the day's material, but that is *not* enough. You also need to speak up. Brilliant insights are, of course, always appreciated, but you can also contribute by asking questions, politely disagreeing with me or another student, or following up on a fellow student's comments with further insights or evidence. There are usually many valid ways of looking at any issue we study, so don't worry about being "wrong".

Homework

One purpose of homework assignments is to enhance class discussion. Therefore, assignments must be turned in via Compass *before class begins* on the day they are due.

You should bring a copy to class for your own reference during discussion. I will *not* accept assignments in class, in my mailbox, under my door, or via e-mail. There is no credit provided for late assignments.

Teamwork

The two case analyses assignments will be done as team projects. I will assign teams early in the course. Everyone is expected to participate fully in their team's efforts. A confidential peer evaluation will take place at the end of the semester.

Attendance and punctuality

We need to accomplish maximum learning in each session, since we only meet for seven weeks. You cannot contribute to our learning if you are not in class, which will be reflected in your participation grade. Please be on time for class.

Course Organization

Your class assignments are shown in the *Class Schedule and Assignments* section below. While subject to change, this syllabus should guide your work planning for the course. You are responsible for completing assignments as described in the syllabus, even if I do not mention them in advance.

Technology

All mobile phones and pagers should be turned off during class. Please do not leave and re-enter the class. Use of laptops in the class is a privilege and not a right. Laptops are to be used for class activities only. If you are seen surfing or e-mailing during a class, you will lose laptop privileges.

Suggestions

If you have special inquiries or constructive suggestions concerning the progress of the class, please feel free to talk to me.

INSTRUCTOR BIOGRAPHY

I'm particularly excited to be teaching this class because the mix of theory and practice matches my background. From 1994 to 1996, I directed research on Japanese business practices and government policy at the Washington, D.C., offices of the law firm Dewey Ballantine. In this capacity, I founded and managed a team of researchers supporting high technology clients including Eastman Kodak, the Semiconductor Industry Association, and firms in the steel, chemical and electronics industries. Our work was profiled by the *Washington Post* ("‘Dream team’ helps Kodak make its case," June 26, 1995) and by *Wall Street Journal* writer John Fialka in his 1997 book, *War by Other Means*.

In previous positions, I helped U.S. aerospace researchers gain access to leading-edge technology from throughout the world as an international policy analyst for the National Aeronautic and Space Administration's Scientific and Technical Information program. In this position, I supported negotiations with government agencies and aerospace companies in Japan, Australia and India and interacted with U.S. industry and various U.S. government agencies. As Japanese information specialist for SCAN C2C, Inc., I performed research on Japanese technology and commerce for clients including General Electric, IBM, Ford Motor Company, and the U.S. Government. Other consulting and executive education clients have included General Motors, the Japan Technology Evaluation Center, Air Products & Chemicals and Hewlett-Packard.

Prior to joining the faculty at Illinois in 2001, I earned a Ph.D. in international business and a Masters of applied economics degree at the University of Michigan. I previously earned an M.S. in library and information science from the University of Illinois and a B.A. in Japanese studies and mathematics from Earlham College. I also studied advanced Japanese at Middlebury College's Summer Language School.

I'm currently the Julian Simon Faculty Fellow in Business and an associate professor in the College of Law and the Institute for Genomic Biology. I am also Director of the Center for International Business Education and Research.

My research interests include buyer-supplier relationships, the management of innovation in industries including flat panel displays and personal computers, and competitive intelligence.

I'm lucky to have a wonderful wife and two great kids, ages ten and thirteen. In my spare time, I enjoy weight-lifting, eating good food, and biking.

COURSE TEXTS AND CASES

- Textbook:** *Strategic Management of Technological Innovation*, Melissa Schilling, 3d edition.
- Readings:** *BA 505 (Management of Technology) Readings*, available at TIS.
Other readings, as noted below

COURSE REQUIREMENTS AND GRADING

	Points
(1) Warm-up exercises (2 exercises, 25 points each)	50
(2) Class participation	100
(3) One-page write-ups (4 write-ups, 50 points each)	200
(4) Case analyses (team assignment, 2 cases, 175 points each)	350
(5) Peer evaluation by team members	50
(6) Final exam	250
Total	1,000

The final grading schedule is based on your points out of 1000, as described below.

FINAL GRADING SCALE

<u>Course Points</u>	<u>Grade</u>	<u>Honor Points</u>
980 - 1000	A+	4.00
930 - 979	A	4.00
900 - 929	A-	3.67
870 - 899	B+	3.33
830 - 869	B	3.00
800 - 829	B-	2.67
770 - 799	C+	2.33
730 - 769	C	2.00
700 - 729	C-	1.67
650 - 699	D	1.00
Below 650	F	0.00

EXPLANATION OF ASSIGNMENTS

Warm-up exercises (50 points total)

Sessions 6 and 12 include extensive in class exercises. In order to maximize our learning, it is important that you come to class familiar with the mechanics of the exercises. Prior to class, you will need to complete an online exercise on Compass meant to familiarize you with those mechanics.

Class participation (100 points)

Active participation in the class is an essential part of the learning experience. Meaningful participation means making a contribution to our discussion, not merely talking, and it does not mean merely repeating facts or simply agreeing with what others have already said. Case discussion demands that we listen carefully to the statements of others, ask them to explain or defend controversial points, and expect to defend our judgments as well.

One-page write-ups (200 points total)

The *Class Sessions and Assignments* section lists five one-page write-ups (sessions 2, 4, 8, and 10). Each asks you to respond to a question based on the assigned readings for that day in one page or less (12 point or larger, single-spaced). It is important that you respond *in your own words*, rather than copying from the readings—the goal is for you to synthesize and apply the material, not just repeat it. The assignments will be graded for accuracy, completeness, and insight.

Case analysis (400 point total)

Peer evaluation (50 points)

Team members will confidentially rate the contribution of their teammates.

HP: Flight of the Kitty Hawk (175 points)

Following the failure of the Kittyhawk project, you have been hired by Dick Hackborn to provide a “post-mortem” analysis of the failed project. He has asked you to address three questions.

1. What did we do right and what did we do wrong in how we structured and supported the Kittyhawk Development team?
2. What do you think of the way the team set out to find a market for the Kittyhawk? What did they do right and what did they do wrong?
3. In hindsight, what should we have done differently and why?

I'm leaving the length and format of the memo up to you. However, I'm going to take the part of Dick Hackborn and will, just as he would, stop reading when I get bored or frustrated. The Kittyhawk failure is important to Hackborn (me), but there are a lot of other issues demanding my attention. Perfect English is not the issue. Organization is.

Obviously, you should draw upon our discussions to date to develop and support your answers.

Nucleon (175 points)

Prepare a memo to CEO Jeff Hurst regarding options for the manufacturing of CRP-1. In particular, be sure to address the following immediate questions.

1. What are your recommendations regarding the manufacturing of CRP-1 for Phase I and Phase II clinical trials?
2. What are your recommendations regarding manufacturing for Phase III clinical trials and commercialization?
3. How would you justify your recommendation to would-be investors in the company?

Again, I'm leaving the length and format of the memo up to you, and will read it like an over-worked, over-stressed executive would.

Important: This is a sizable piece of analysis. You do NOT want to wait until February 28 to start it. After session 10 (February 18), we will have covered most of the relevant material for you to begin your analysis.

Final Exam (250 points total)

The final exam will be closed-book and closed-notes. It will take place during the week of March 8, time and place TBD.

SCHEDULE

Week	Tuesday	Thursday
1	19-Jan (1) Introduction/Non-technologists managing technology	21-Jan (2) Intellectual property
2	26-Jan (3) Industry life cycle	28-Jan (4) Knowledge and its discontents
3	2-Feb (5) Appropriating returns from innovation	4-Feb (6) Network effects
4	9-Feb (7) Timing of market entry	11-Feb (8) Disruptive technology
5	16-Feb (9) Case discussion	18-Feb (10) Markets for technology
6	23-Feb (11) Product development	25-Feb (12) Modularity
7	2-Mar (13) Case discussion	
8	Final exam period - Final exam	

CLASS SESSIONS AND ASSIGNMENTS

Session 1 Tuesday 19-Jan	Introduction/Non-technologists managing technology
Read	Claire McCloud case
Submit	Nothing

Session 2 Thursday 21-Jan	Intellectual property
Read	SMTI, Ch. 9
Submit	<p>One page write-up. Much like Claire McCloud, you may someday find yourself managing a technology that you do not deeply understand. In class today, we argued that you don't need to understand the technology as well as the technical professionals you are managing, but you do need more understanding than the average layperson. Below I've listed five potential sources of technical knowledge upon which you could draw. For each, please list what you perceive to be the pluses and minuses of such a source. In points four and five, please also identify whom you might use as an internal or external informant. Bullet points are just fine.</p> <ol style="list-style-type: none"> 1. Reading technical papers, as Claire was considering. 2. Specialized training, e.g., one or more classes at a nearby university. 3. Professional & scholarly meetings (e.g., the conferences listed at http://www.sid.org/conf/conf.html) 4. Informants within the firm (whom might they be?). 5. Informants outside the firm (whom might they be?).

Session 3 Tuesday 26-Jan	Industry life cycle
Read	SMTI, Ch. 3
Submit	

Session 4 Thursday 28-Jan	Knowledge and its discontents
Read	<p>Case: Solagen</p> <p>Henderson, R. M. and Clark, K. B. (1990) "Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms." <i>Administrative Science Quarterly</i>. 1990; 35:9-30. Read pages 1 to 19. (http://www.jstor.org/stable/2393549)</p> <p>Abernathy, W. and Kim Clark (1985) "Innovation: Mapping the winds of creative destruction." <i>Research Policy</i> 14(1): 3-22. Read pages 1-13. (http://dx.doi.org/10.1016/0048-7333(85)90021-6)</p>
Submit	<p>One-page write-up Using the language of Henderson and Clark, a radical innovation can overturn an existing company's knowledge about both components that make up a product and how they fit together—often creating a new dominant design. Since an architectural innovation actually reinforces existing knowledge about the components, it would seem to be less of a challenge to an existing company. Yet Henderson and Clark argue that architectural innovations can be the hardest type for firms to adapt to. In your own words, why might this be the case?</p>

Session 5 Tuesday 2-Feb	Appropriating returns from innovation
Read	Teece, David J. (1998) "Capturing value from knowledge assets: The new economy, markets for know-how, and intangible assets." California Management Review. 40(3):55-79. (http://search.ebscohost.com/login.aspx?direct=true&db=bsh&AN=738857&site=ehost-live). Focus on pages 62-75.
Submit	

Session 6 Thursday 4-Feb	Network effects
Read	SMTI, Ch. 4
Submit	Warm-up exercise. Network effects

Session 7 Tuesday 9-Feb	Timing of market entry
Read	SMTI, Ch. 5
Submit	

Session 8 Thursday 11-Feb	Disruptive technology
Read	Bower and Christensen, 1995. "Disruptive Technologies: Catching the Waves." Harvard Business Review (http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=537192&site=ehost-live) Wald, M. (2006 Feb 28) "Tiny jets may usher in new era, F.A.A. says" New York Times.
Submit	One-page write-up. The Wald article describes the looming introduction of "tiny jets". Although the article isn't totally clear, these jets are both smaller and slower than current business jets. From the view point of current business jets, are these tiny jets a disruptive technology? Discuss why or why not.

Session 9 Tuesday 16-Feb	Case discussion
Read	Case: Hewlett Packard -- Flight of the Kitty Hawk
Submit	Case analysis (team). Kitty Hawk memo

Session 10 Thursday 18-Feb	Markets for technology
Read	Chesbrough, H. (2003). Open Innovation. Cambridge: Harvard Business School Press. Introduction and Chapter 9.
Submit	One-page write-up. In your own words, explain why "open innovation" has become so much more important than it used to be.

Session 11 Tuesday 23-Feb	Product development
Read	SMTI, Ch. 11 & 12
Submit	

Session 12 Thursday 25-Feb	Modularity
Read	Baldwin, C. & K. Clark (2003) "Managing in an Age of Modularity" in Garud, Kumaraswamy and Langlois, eds. Managing in the Modular Age, 149-161. SMTI, pgs 222-4
Submit	Warm up exercise: Modularity

Session 13 Tuesday 2-Mar	Case discussion
Read	Case: Nucleon
Submit	Case analysis (team). Nucleon memo

Final Exam time and location TBD