Georgia Tech Ernest Scheller Jr. College of Business

MANAGEMENT 8803: TECHNOLOGY STRATEGY
Wednesdays, 3:05 pm - 5:55 pm (Room 224)

Professor Marco Ceccagnoli
Phone: 404.385.2233
marcoc@gatech.edu
Course Website:
http://mgt.gatech.edu/ceccagnoli
Scheller College of Business, office 4421 (Suite F-H)
Office Hours: By appointment
http://t-square.gatech.edu/

COURSE MATERIALS
All required cases (except for two cases, which are available on T-Square) can be purchased through www.study.net (http://www.study.net/r_mat.asp?crs_id=30030459). Other required material such as news articles and book chapters will be available in electronic form through the course website in T-Square.

Course Description
Just like financial and human resources, technology has critical importance in organizations, and the management of technology is a basic business function. Just as we need financial or human resource strategies, organizations need to develop a technology strategy, which serves as a basis for the overall company strategy.

In this course, technology strategy will be studied by analyzing the economic and strategic factors that guide – or should guide - firms' decisions regarding the generation, commercialization, protection, and adoption of technological innovations. The emphasis is on the development and application of economic and strategy tools which are critical for insightful long term planning when deciding the sources of innovation (internal vs. external), how much to invest in internal R&D, whether to seek intellectual property protection, whether to develop and commercialize an invention in house or sell it through arm's-length licensing contracts, or other cooperative strategies such as joint ventures or the sale of a technology-based firm's equity. Technology markets are analyzed from both a seller's and buyer's perspective. Internal technology commercialization may entail the exploitation of first mover advantages or specialized downstream capabilities. Other topics covered include the analysis of situations, increasingly observed in several high-tech industries, where firms create and accumulate technological innovations without exploiting them directly, using them rather for technological negotiations with other firms or for preempting potential rivals from entering an industry.

We will use a combination of lectures, cases, readings, and several guests will be invited to discuss specific managerial issues.

Main Learning Objectives
- To develop your capacity to **think strategically** about a company technology decisions related to how much to invest in R&D, how to protect and commercialize innovations, how to improve and sustain a firm's performance through the generation and adoption of technological innovations.
- To build your skills in conducting strategic analyses about technology commercialization in a **variety of industries and competitive situations**, with particular focus on high-tech industries.

- To give you **hands-on experience (through seminars with practitioners and the case study method)** in crafting a technology strategy that is integrated with the overall strategy of the company, reasoning carefully about strategic options, using analytical frameworks to evaluate action alternatives, and making sound strategic decisions.

Outcomes

By accomplishing the learning objectives outlined above, you will leave the class with a greater appreciation for strategic issues in managing technology and innovation. These outcomes are valuable for students interested in technology-driven businesses, entrepreneurship and innovation, as well as consultants and senior executives, because they must make, or help to make, technology strategy decisions affecting the organization as a whole.

Course Structure

We will approach the class material in a variety of formats, especially the case analysis (during the first half of the class) and the discussion with a guest speaker (during the second half). While required readings and occasional lectures will cover concepts, research, and theories relevant to the strategic management of technology, the bulk of the course is concerned with the application of these intellectual tools to real-world situations. Because the development of successful technology strategies is by necessity a collaborative process, we will model that process through our in-class case discussions. It is therefore absolutely essential that each person involved in this class contribute to the process. Accordingly, a significant portion of your final course grade will be based upon your contribution to each class discussion. You will have many opportunities to contribute and you'll be expected to contribute.

Case Analysis: Part of the class discussions will be organized around assigned business cases. They are designed to simulate many of the characteristics of decision making in the real world: there is too much information about certain areas, not enough about others, and there is little real guidance as to what is important and what is unimportant. The first stage in analyzing a case involves sifting through this mass of information to pick out the important patterns and issues. In doing this you will be guided partially by the formal analytic frameworks developed in this class, and partly on your overall judgment about the industry and firm – a judgment that formed by your critical thinking about the case as a whole. Because some important factors will only become obvious when we discuss the case together, you will need to strike a balance between focusing on what you consider to be the crucial points/facts in the case and making sure that you know enough about the other elements of the case to be able to follow the class discussion if it begins to veer into an area different from the one you anticipated.

Class Participation: Because much of this course is organized around case analyses and seminars with guest speakers, much of the action happens in class discussion. For this reason, a healthy part of your grade will depend on your participation in these discussions. Each student is expected to be an active participant in case discussions and to offer meaningful analyses and convincing arguments for the positions you stake out. Your grade on class participation is something to be earned by contributing your assessments and judgments to the discussion. You should therefore make a conscientious effort to be sufficiently prepared to make intelligent, timely comments regarding the managerial issues raised in the cases – this entails reading the assigned cases and preparing several pages of notes to the study questions.

Attendance: Obviously, if you're not in class, you're not able to participate. You also are also unable to learn from the classroom discussion, and insights gained in one case analysis and are likely to come in useful in subsequent ones. Consequently, attendance at all class is strongly recommended.

Communication: I will use both T-Square and the class group email distribution list to post information on class changes, upcoming assignments, grades, and the like. If you do not use your Georgia Tech email address, I suggest that you arrange to have your GT email forwarded to an account that you do check often.

Individual Case Write-up: The case write-up is a tool to facilitate class discussion and to give you an opportunity to apply concepts that you have learned in this class. You are asked to turn in **1** individual case write-up related to one of the following cases:

1. X-IT and Kidde (A).
2. Carrot or stick? Getting paid for innovation at Tessera Technologies;
3. Rambus Inc.: Commercializing the Billion Dollar Idea (A);
4. Time Warner Inc. and the ORC Patents;
5. Fusion Systems Corporation in Japan;
6. "Merck: Open for Innovation?" & "Merck & Co.: Evaluating a Drug Licensing Opportunity."

Your choice will be recorded during the first day of class. The write-up should address the discussion questions related to the chosen case indicated in the next section of this syllabus. The page limit is four pages (typed, 1 ½ line spacing), excluding references and appendices (e.g., graphs, etc). **You will be asked to discuss some of your answers in class and the write-up should be submitted electronically by 9:00am of the Wednesday the class meets.**

Midterm Exam & Final Project: We will have one individual midterm exam (which will require a take-home case write-up) and one group-based final project with in class presentation. These assignments will require an analysis of the current technology strategy of a company, a diagnosis of issues facing the firm, and a set of proposals for moving the company into the future. I will assign the case study and questions for the midterm exam, whereas for the final project groups can pick a subject of their choice, to be approved by the instructor. A one-page description of the final paper topic, including a preliminary list of source material, is due **Wednesday, March 27**. For the final project, you should organize into groups of at least two members, with no group exceeding three members. More details on both assignments will be provided later in the semester.

Academic Honesty/ Honor Code: The instructor and students of this class, as members of the Georgia Tech community, are bound by the Georgia Tech Academic Honor Code. The full text of the honor code may be found at http://www.deanofstudents.gatech.edu/integrity/policies/honor_code.html. Note that the acts that qualify as academic misconduct include, "Submission of material that is wholly or substantially identical to that created or published by another person or persons, without adequate credit notations indicating authorship (plagiarism)." Suspected cases of academic misconduct are investigated by the Office of Dean of Students.

Grading Components

Your course grade will be based on the following components and percentage allocations:

Component:	Weighting
• Class Participation	25%
• 1 Individual Case write-up	10%
• Midterm (Take home) Individual Case Write-up	25%
• Final Group Project and Presentation	40%
Σ =	100%

Sessions' outline, readings, and questions

MODULE I:
CREATING AND CAPTURING VALUE THROUGH INNOVATION

Week 1 **Creating value through Innovation: Introductory Lecture**

Wed, Jan 9

Readings: 1. S. Shane. 2009. Sources of Innovation, Chapter 4, Technology Strategy.

2. "Process Innovation," and "Product Innovation," sections 9.4 & 10.4 in Spulber, D.F., 2009, Economics and Management of competitive strategy.

Week 2 **Capturing value through innovation**

Wed, Jan 16

Case: EMI and the CAT Scanner (A) and (B)
[Available on T-Square]

Questions: 1. It is 1972. Should EMI enter the market alone, through a joint venture, or licensing? What are the benefits and drawbacks of each?

2. Analyze the industry, both in terms of its short- and long-run profitability and structure.

3. It is 1976. What is EMI's competitive position? Characterize its strategy to date. Should EMI build a plant in America? Why or why not?

4. Why do we frequently see innovators lose to imitators?

Readings: 1. Ceccagnoli, M., Rothaermel, F.T, 2007, "Appropriating the returns from innovation," Chapter 1 in Advances in the Study of Entrepreneurship, Innovation, and Economic Growth, Vol. 18.

2. Ceccagnoli, M. 2011. "Complementary Assets." Chapter in Teece, D., Augier, M. (eds.). Palgrave Encyclopedia on Strategic Management.

Guest speaker: Sanjay Parekh (founder and organizer of Startup Riot)

Week 3 **Patents: Economic, strategy, and legal aspects**

Wed, Jan 23

Readings: *Focus on the patent-related sections of the following chapter:* Hallenborg, L., Ceccagnoli, M., and Clendenin, M. "Intellectual property in the global economy." Chapter 3 in G. D. Libecap and M.C. Thursby (eds.), "Advances in the Study of Entrepreneurship, Innovation, and Economic Growth," Elsevier, 2008, pp. 63-116.

D. Somaya, D. Teece, and S. Wakeman. "Innovation in Multi-Invention Contexts: Mapping Solutions to Technological and intellectual property complexity." California Management Review 53, Summer 2011.

Guest speakers: Philip Burrus (Chair of the Intellectual Property Section of the Georgia Bar); Elizabeth Ann Lester (Sutherland Asbill & Brennan LLP).

Week 4 **Other IPR (Secrecy, Copyrights, Trademarks): Economic, strategy, and legal aspects**

Wed, Jan 30

Case: X-IT and Kidde (A)

Questions:

1. What are X-IT's strongest legal claims against Kidde?
2. What are the pros and the cons of suing Kidde?
3. If you were Aldo DiBelardino, what would you do?
4. If you were an outside investor of X-IT, would you fund a lawsuit? Why or why not?

Readings: *Focus on the other IPR-related sections of this chapter:* Hallenborg, L., Ceccagnoli, M., and Clendenin, M. "Intellectual property in the global economy." Chapter 3 in G. D. Libecap and M.C. Thursby (eds.), "Advances in the Study of Entrepreneurship, Innovation, and Economic Growth," Elsevier, 2008, pp. 63-116.

Guest speaker: James H. Johnson (Sutherland Asbill & Brennan LLP);
David M. Lilenfeld (IP and business lawyer and the founder of Lilenfeld PC).

Week 5 **Technology licensing**

Wed, Feb 6

Case: Carrot or stick? Getting paid for innovation at Tessera Technologies
[Available on Study.net]

Questions:

1. Consider the challenges Tessera faced in commercializing its chip scale packaging technology. What alternatives did it have for monetizing these inventions? Where there alternative business models that might have been practical for it to pursue?
2. How would a licensee view Tessera's chip scale packaging technology over time, and what might be its motivations?
3. Do you think the silent air cooling technology is amenable to the same licensing model as the chip scale packaging or micro optics? Why or why not?

Reading: 1. Teece, D.J., (2000), "Understanding the licensing option," Ch. 8 in Managing Intellectual Capital, Oxford University Press, pp. 135-155

Guest speakers : Jackie Hutter (CEO, Evgentech, Inc.)
Pete Santora (Founder & CEO at ThundrLizard)

Week 6 **Technology strategy in platform-based industries**

Wed, Feb 13

Case: Rambus Inc.: Commercializing the Billion Dollar Idea (A)
[Available on Study.net]

Questions:

1. How does Rambus attempt to create value? Evaluate Rambus commercialization strategy.
2. How Is it likely that the market will "tip" to a Rambus standard? Why or why not?
3. Why What would you recommend that Rambus do next?

Readings: 1. Arora, A., Fosfuri, A, and A. Gambardella, (2001), "Intellectual property, Fabless

Companies, and the market for technology in semiconductors," par. 3.5, Ch. 3 from Arora, A., Fosfuri, A, and A. Gambardella, Markets for Technology, MIT Press: pp. 76-89

2. Shapiro, C. and Varian, H.R. 1999. Art of Standards Wars, California Management Review.

Guest speaker: Scott M Frank (President and CEO, AT&T Intellectual Property Inc.)

Week 7 **Patent Wars**

Wed, Feb 20

Case: Time Warner Inc. and the ORC Patents
[Available on Study.net]

Reading: F. Warshofsky, "Protecting Chips," The Patent Wars, pp. 111-131.

Questions: 1. From ORC's perspective, what factors should you consider when thinking about the decision to assert your IP?

2. Evaluate the merits of ORC's initial approach to Sony, as well as the way it handled its negotiations with Sony.

3. Evaluate the merits of its decision to file a suit against Time Warner. As of July, 1992, would you recommend that ORC propose a modest settlement to Time Warner?

Guest speaker: Grant Moss (CEO, Adapt IP Ventures)

Week 8 **Technology Strategy in an international setting**

Wed, Feb 27

Case: Fusion Systems Corporation in Japan (A)
[Available on Study.net]

Questions: 1. How would you characterize Fusion and Mitsubishi's sources of competitive advantage? Their product development strategies?

2. What are the key similarities and differences between the U.S. and Japanese patent systems? How do the differences affect firm behavior? How can these differences be explained?

3. Why did Fusion choose to undertake a media and political campaign? Has the strategy worked? Will such a strategy be viable for other firms?

4. Should Spero accept Mitsubishi's offer?

In class video: Interview with Don Spero, President and CEO of Fusion Systems Corp.

Guest speaker: Barry Brager (Founder and Managing Partner, Perception Partners) TBC

Reading: Breitzman, A.F. and M.E. Mogee. 2002. The many applications of patent analysis. Journal of Information Science, 28 (3), pp. 187–205

Week 9 **Take-home Midterm Exam (due next Wed, March 13)**

Wed, Mar 6

MODULE II
MARKETS FOR TECHNOLOGY

Week 10 **The demand-side of licensing**
Wed, Mar 13

Cases: 1. Merck: Open for Innovation?
[Available on T-Square]

2. Merck & Co.: Evaluating a Drug Licensing Opportunity
[Available on Study.net]

Questions:

1. Analyze Merck's innovation strategy. Does Merck's innovation engine need fixing? Why or why not?
2. Can open innovation help Merck meet the needs of its customers in creative and cost-effective ways that also bring value to its shareholders? Why or why not?
3. Should Merck bid to license Davanrik? How much should they pay? Build a decision tree that shows the cash flows and probabilities at all stage of the FDA approval process.
4. What is the expected value of the licensing arrangement to LAB? Assume a 5% royalty fee on any cash flows that Merck receives from Davanrik after a successful launch.
5. How would your analysis change if the costs of launching Davanrik for weight loss were $225 million instead of $100 million as given in the case?

Readings: 1.Aitken, M. et al. "Winning in pharmaceutical licensing." In Building for value: from discovery to launch. (New York, McKinsey, 1999).

2. Arora, A., Fosfuri, A, and A. Gambardella, (2001), "The division of innovative labor in life sciences," par. 3.4, Ch. 3 from Arora, A., Fosfuri, A, and A. Gambardella, *Markets for Technology*, MIT Press: pp. 63-76.

Guest speaker: Sherry M Knowles (Principal, Knowles Intellectual Property Strategies; previously chief patent counsel at GlaxoSmithKline).

Reading: Knowles, S., Higgins, M., 2011. Vertical disintegration in the pharma industry and the role of IP. Intellectual Asset Management 45, 10-15.

Week 11 **Spring Break**
Mar 18-22

Week 12 **Learning through external research**
Wed, Mar 27

Case: Intel Research: Exploring the Future
[Available on Study.net]

Questions: 1. Evaluate Intel's model for exploratory research

2. Should Intel fund projects like PlanetLab and Sensor Network? How do they generate value?

3. What is the role of corporate venture capital? What is your assessment of Intel Capital?

4. How can Tennenhouse measure the performance of his organization?

Readings: 1. W. Cohen and D. Levinthal, "Absorptive Capacity: A New Perspective on Learning and Innovation," Administrative Science Quarterly, Vol. 35 (1990), pp. 128-138.

2. Short note on absorptive capacity.

Guest speaker: Kevin Wozniak (Associate Director, Office of Technology Licensing, Georgia Tech)

Reading: U.S. Universities and Technology Transfer. HBS note.
[Available on Study.net]

Week 13 **I. Growth and limits of markets for technology**

Wed, Apr 3

Case: The Patent & License Exchange: Enabling a Global IP Marketplace
[Available on Study.net]

Questions:

1. What has prevented the emergence of a larger market for IP?
2. How has PL-X addressed these constraining factors? Are there any that have not been addressed?
3. What issues do you see for PL-X in the Japan launch that might be different from its efforts in the United States?

Blaxill M., Eckardt, R. 2009. A capital idea: The emerging market of intellectual capital. Chapter 9, The invisible edge.

Guest speaker: Al Etheridge (IP2Biz): Technology Scouting and Development - Managing the Innovation Gap

Reading: The Role of the Innovation Capitalist in Open Innovation

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Week 14 **II. Growth and limits of markets for technology**

Wed, Apr 10 (3:05-4:25)

Case: Intellectual Property Exchange (IPX) International.
[Available on T-Square]

Reading: Blaxill M., Eckardt, R. 2009. A capital idea: The emerging market of intellectual capital. Chapter 9, The invisible edge.

Questions: TBA

Mon, Apr 15 (4:25-5:55)
Guest speaker: Robert A. Moore (Managing Director and CFO, IPX International)

Weeks 15-16 **FINAL PROJECT**

Wed, Apr 17 Team work on group project

Wed, Apr 24 Final group project presentations