

## CRSP 503

### INNOVATION AND ENTREPRENEURSHIP

Instructors: Dr. Scott Shane  
Office: Room 282  
Peter B. Lewis Building  
11119 Bellflower Road  
Case Western Reserve University  
Cleveland, OH 44106  
Telephone: (216) 368-5538  
e-mail: sas46@cwru.edu  
Class Hours: Mondays 12:30 pm – 3:30 pm  
Office Hours: By appointment

#### Required Text

Shane, S. 2005. Finding Fertile Ground: Identifying Extraordinary Opportunities for New Ventures, Upper Saddle River, NJ: Wharton School Publishing,

Shane, S. 2004. Academic Entrepreneurship: University Spinoffs and Wealth Creation, Aldershot, UK: Edward Elgar Publishing

Course pack available from <http://Xanedu.com>

#### Course Description

The purpose of this module is to acquaint and ultimately engage clinical researchers with the business of innovation and entrepreneurship. Goals include: (1) to provide researchers with many of the skills that they would need to translate academic research into commercial uses; (2) to sensitize clinical researchers to the goals of the business community and facilitate their ability to work with the private sector on technology development; and (3) to make clinical researchers aware of the processes of academic technology development and transfer. Sessions consist of lectures and case discussion facilitated the instructor. Some sessions include members of the business community as guest lecturers. As an example, students will discuss the financing of new companies with local venture capitalists. Student products include the evaluation of the commercial potential of a university technology in which they apply their new knowledge about commercialization of scientific discoveries.

This course will meet for a total of 27 hours, organized into nine three-hour periods between January and March, 2007.

#### Learning Objectives:

By taking this course, you will learn how:

1. The university and broader institutional environment affects university entrepreneurship.
2. To evaluate university technology and determine whether it is appropriate for a spin-off company.
3. University technology transfer works, and how to negotiate technology transfer agreements.
4. To manage academic research for commercial potential.
5. To management the ethical and conflict of interest issues in academic entrepreneurship.

6. To assess customer needs, manage the evolution of technologies and markets, and forecast demand.
7. To protect intellectual property and to appropriate the returns to innovation.
8. To analyze new technology companies from the point of view of investors.
9. To manage the risk and uncertainty inherent in starting new technology companies.
10. To develop an effective venture team for a biomedical startup.

### **Class Format**

The course is comprised of lectures (by the instructor and guests), exercises, and case discussions. The combination of these three activities allows us to bring together theoretical frameworks garnered from academic research (instructor lectures) with hands-on process knowledge developed by engaging in high technology entrepreneurship (guest lectures) and analysis of entrepreneurial situations (case discussions).

The purpose of joining the components is to allow students to use theoretical frameworks from readings and lectures as tools to analyze the cases. Because the value of the case discussion lies in your efforts to apply theoretical frameworks to the situation being analyzed, it is very important that you read both the case and assigned readings and that you participate in the discussion of the cases.

To encourage participation, class discussion counts for one third of the grade. Students start off with zero participation points (i.e., an “F”) and accumulate points through their contributions to classroom discussions. Attendance does not equate to participation.

Students will be randomly called upon to identify the key issues in assigned cases. Class presentation points are based on the quality (not simply quantity) of the student’s discussion of those issues.

### **Assignments**

In addition to class participation, there will be three assignments in this class: a book review, a written evaluation of one of the cases, and the analysis of an actual Case Western Reserve University, University Hospitals, or Cleveland Clinic technology.

#### *Book Review*

You are required to choose a book on a topic related to technology commercialization and write review of it. (The review needs to be no more than three pages single spaced in 12 point font with one inch margins). Your review should highlight the key points in the book and analyze its strengths and weaknesses. You may suggest a book and have your selection approved by the instructor or you may choose one of the books listed below:

Bok, Derek. 2003. Universities and the Marketplace: The Commercialization of Higher Education, Princeton, NJ: Princeton University Press.

Geiger, Roger. 2004. Knowledge and Money: Research Universities and the Paradox of the Marketplace. Palo Alto, CA: Stanford University Press.

Gross, Clifford and Allen, Joseph. 2003. Technology Transfer for Entrepreneurs: A Guide to Commercializing Federal Laboratory Inventions, New York: Praeger.

Jaffe, Adam and Lerner Josh. 2004. Innovation and Its Discontents: How Our Patent System is Endangering Innovation and Progress and What to Do About It. Princeton, MJ: Princeton University Press.

Krimsky, Sheldon. 2003. Science in the Private Interest: Has the Lure of Profits Corrupted Biomedical Research? New York: Rowman and Littlefield.

Landes, William and Posner, Richard. 2003. The Economic Structure of Intellectual Property Law. Boston: Belknap Press.

McSherry, Corynne. 2003. Who Owns Academic Work? Cambridge, MA: Harvard University Press.

Mowery, David, Nelson, Richard, Sampat, Bhaven, and Ziedonis, Arvids. 2004. Ivory Tower and Industrial Innovation: University-Industry Technology Transfer Before and After the Bayh-Dole Act in the United States, Palo Alto, CA: Stanford University Press.

Razgaitis, Richard. 2002. Valuation and Pricing of Technology-Based Intellectual Property, New York: Wiley.

#### *Case Write-up*

You are required to select one of the cases that we discuss during the semester and provide a written evaluation of it. Your evaluations should make recommendations that answer the discussion questions. You are expected to base your evaluation on the tools and frameworks that are discussed in the readings assigned along with the case. You will need to summarize the relevant facts and assumptions on which your recommendations are based. Your case evaluations are limited to two pages single-spaced in 12 point font with one inch margins.

#### *Technology Evaluation*

The third assignment will require you to apply the knowledge of the concepts developed in the class in the evaluation of an invention disclosure made at Case Western Reserve University, University Hospitals, or the Cleveland Clinic. You may select your own technology or have the instructor provide you with one. You should determine what the best arrangements are to commercialize the technology (license, start-up or further contract research). Your evaluation should also recommend whether or not patent protection be sought for the invention, the expected strength of the intellectual property position of the invention, the likely market applications for such an invention and an estimate of their value, the likely licensees, the activities necessary to bring the invention to a commercial stage, an estimate of the cost of the commercialization, the likely funding source of that commercialization, and expected terms for licensing the invention. Your recommendations need to be justified by both the concepts you have learned in class and the evidence that you have gathered. The evaluation may not exceed 4 pages single-spaced in 12 point font with one inch margins.

#### **Grading Criteria**

Case Evaluation	25%
Book Review	25%
Technology Evaluation	25%
Class participation	25%

#### **Academic Integrity:**

All students in this course are expected to adhere to university standards of academic integrity. Cheating, plagiarism, and other forms of academic dishonesty will not be tolerated in this course. This includes, but is not limited to, consulting with another person during an exam, turning in written work that was prepared by someone other than you, and making minor modifications to the work of someone else and turning it in as your own. Ignorance will not be permitted as an excuse. If you are not sure whether something you plan to submit would be considered either cheating or plagiarism, it is your responsibility to ask for clarification. Either ask me about it or consult credible sources of information on the subject. Two useful internet sites are:

<http://www.indiana.edu/~wts/pamphlets/plagiarism.shtml>

<http://www.unc.edu/depts/wcweb/handouts/apa.html>.

Please remember that you have agreed to Standards Regarding Academic Integrity (a copy of which can be found at:

<http://weatherhead.case.edu/pdpao/policy/policyhome.html>), which outlines your responsibility in greater detail.

## ASSIGNMENTS

January 22

INTRODUCTION TO THE COURSE AND IDENTIFYING OPPORTUNITIES

LECTURE: IDEA GENERATION

*Read:* Chapter 2, Finding Fertile Ground

CASE: THREE DIMENSIONAL PRINTING

*Discussion Questions:*

Why did the entrepreneurs discover opportunities in the 3DP process?

Why did so few people discover opportunities to exploit MIT's 3DP Process?

Why did the different entrepreneurs in the case discover such different business opportunities for the 3DP Process?

How are the entrepreneurial opportunities to exploit 3DP different? What effect do those differences have on the evaluation and pursuit of those opportunities?

January 29

UNDERSTANDING CUSTOMER NEEDS AND DEVELOPING NEW PRODUCTS

LECTURE: UNDERSTANDING CUSTOMERS FOR NEW TECHNOLOGY

*Read:* Chapter 4, Finding Fertile Ground

Note on Market Research, Stanford Business School Note, E165.

CASE: SWEET WATER

*Discussion Questions:*

What are the most important user needs in the water purifier market?

How should Platter gather information about user needs?

How can you structure this user needs data to assist Platter in creating his product concept?

How does Sweetwater's product compare to competitors' products in meeting customer needs?

February 5

## EVOLUTION OF TECHNOLOGY

LECTURE: TECHNOLOGY EVOLUTION, INCREASING RETURNS, NETWORK EFFECTS, AND STANDARDS

*Read:* Chapter 3, Finding Fertile Ground

CASE: THE LANGER LAB: COMMERCIALIZING SCIENCE

*Discussion Questions:*

What is the process of research in the Langer Lab?

What can we learn from Langer's example that we can apply to other science labs?

Does Langer do "science"? What is "science"?

If you were a postdoc, would you take a job in the Langer lab? Why or why not?

February 12

## EVOLUTION OF MARKETS

LECTURE: UNDERSTANDING DEMAND FOR NEW PRODUCTS

*Read:* Chapter 5, Finding Fertile Ground

CASE: FORECASTING THE ADOPTION OF E-BOOKS

*Discussion Questions:*

Assume that you are making a prediction from the time e-books first became available (year 2000). Although early unit sales data for e-books are available, construct your forecast irrespective of these sales?

What do you expect the long-run total adoption of e-books to be?

Do you expect the market for e-books to be guided more by imitators or innovators? Why?

Once you have modeled the first-time adoption of e-books, create a 5-year annual forecast of the overall demand for e-books.

What role will hardware devices play in the adoption of e-books?

February 19

## PROTECTING INTELLECTUAL PROPERTY

LECTURE: PATENTS, TRADE SECRETS, TRADEMARKS, COPYRIGHTS AND DOMAIN NAMES

Read: Chapter 7 Finding Fertile Ground

CASE: CVD VS. A.S. MARKHAM CORPORATION

*Discussion Questions:*

What are the critical legal issues in this case?

As a juror, what decision would you reach on each of these issues? On what facts do your decisions hinge?

With the benefit of hindsight, what could A.S. Markham have done to prevent this case from occurring?

February 26

## THE INSTITUTIONAL ENVIRONMENT FOR UNIVERSITY ENTREPRENEURSHIP

Read: Chapter 5, Academic Entrepreneurship

GUEST LECTURE: BAIJU SHAH, BIOENTERPRISE

CASE: INSTITUT PASTEUR

*Discussion Questions:*

What are the main challenges facing the Institut Pasteur as it attempts to commercialize its technology?

How far along the technology development chain do you believe the Institut should extend its activities? (Basic research only? Proof of concept? Pre-clinical trials? Phase I and II trials? Beyond early-stage trials?) What risks and rewards might it incur at each phase?

What do you believe should be the Institut's preferred vehicle for commercialization? (Itself? New companies? Large pharmaceutical companies?) If startups, what should be the Institut's relationship with

these? (Should it provide seed financing? Should it run an incubator? Should it make equity investments in the start-ups? Should it license technology?)

Leaving aside technology specifics, do you believe that the Institut would be a good partner for a company? Why or why not?

March 5

## ACADEMIC ENTREPRENEURSHIP

*Read:* Chapters 1, 2, 3, 4, and 13 Academic Entrepreneurship

GUEST LECTURE: JOE JANKOWSKI, CASE WESTERN RESERVE UNIVERSITY'S OFFICE OF TECHNOLOGY TRANSFER (Confirmed)

CASE: SPECIALIZED LIMB SALVAGE (To be distributed in paper form)

*Discussion Questions:*

What should the allocation of equity be between the academic inventors, the managers, the investors, and the university?

What factors lead to conflict in the negotiation in the allocation of equity between the parties?

Can you negotiate technology transfer agreements to avoid this conflict? If so, then how? If not, why not?

March 19

## STRATEGY FOR BUILDING TECHNOLOGY COMPANIES

LECTURE: INDUSTRY ANALYSIS, COMPETITIVE ADVANTAGE, AND APPROPRIABILITY

*Read:* Chapters 8 and 9, Finding Fertile Ground

Chapters 6 and 7, Academic Entrepreneurship

Shane, S. 2004. What makes university inventions appropriate for spin-offs? A Report for the Advanced Institute of Science and Technology.

CASE: CENTAGENETIX (A) BUILDING A BUSINESS MODEL FOR GENETIC LONGEVITY

*Discussion Questions:*

Is the core science enough to build a company? Is the core science worth a \$5 million investment?

Is there enough management talent on the venture team to build a company? Why or why not?

Can Centagenetix avoid intellectual property problems? If so, how? If not, why not?

How can the company avoid conflict of interest problems, yet retain the involvement of Perls?

If you were Foley, what would you do?

HAND IN BOOK REVIEW TODAY

March 26

FINANCING TECHNOLOGY VENTURES

*Read:* Chapter 11, Academic Entrepreneurship

New Venture Financing, Harvard Business School Note, 802-131.

Shane, S. 2005. Angel Investing: A Report for the Federal Reserve Banks of Atlanta, Cleveland, Kansas City, Philadelphia, and Richmond

GUEST LECTURE: ALAN MAY, LIFE SCIENCE ANGELS

CASE: THE RENOVO STORY (A): VENTURE CAPITAL AT THE CUTTING EDGE

*Discussion Questions:*

Assess the opportunity. If you were a venture capitalist, would you invest? Why or why not?

Are there risks in delaying the decision to invest? How can you reduce such risks?

What is a fair pre-money valuation for the company? What would the post money valuation be, and how much equity would you hold?

Would you attach any milestones or conditions to the investment? If so, what would they be?

How is financing a university spin-off different from financing a new technology company in general?

**HAND IN TECHNOLOGY EVALUATION TODAY**