

**College of Engineering  
THE UNIVERSITY OF MICHIGAN**

**COURSE NUMBER: ENGR 520**  
**Winter 2009**  
**T/Th 3:30– 5:00pm**  
**Room 1180 Duderstadt Center**

**Instructors: Tim Faley, Ph.D., M.B.A.**  
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## Entrepreneurial Business Fundamentals for Engineers & Scientists

### **COURSE SUMMARY**

You know the science, but do you know how corporate managers weighing the commercial future of your science make decisions? Do you understand how to identify business opportunities that may be enabled by new research? Understanding the business framework beyond “cost” is key to both creating value for the organization—from small entrepreneurial to large corporate organizations—and having that organization understand the value of your efforts. The fundamentals of business, including

- Value Chain Analysis
- Finance
- Strategy
- Marketing
- New Business Design,

will be taught in this class from the perspective of identifying business opportunities that could be enabled by new or yet-undiscovered science. Whether you are the CTO of a large corporation or the CSO of a young entrepreneurial company, you need to understand how to identify the science that can enable emerging market opportunities.

### **COURSE OBJECTIVES**

**Entrepreneurial Business Fundamentals for Engineers & Scientists** is a graduate-level elective designed to provide the fundamental tools to screen business opportunities. These business skills will be used in the course to identify and screen emerging market opportunities and then design new business that have opportunity to create value.

The fundamentals of business will be taught from both a corporate and an entrepreneurial value creation perspective. Case studies will be used to illustrate finance, strategy, marketing and business design aspects. Short, team-based, weekly venture challenge homeworks will be used to reinforce the business principles.

Whereas in this course we will use the IT industry as an example for opportunity identification and new business design, the tools can be applied to any sector of interest to the students. The perspective provided in this course is essential to understand how business value is created in corporations and how value creation drives acquisitions of startup companies.

Other courses are focused on creating a business from a technological discovery (ES715), creating a business plan (ES615), or giving students an overview of entrepreneurship (ENGR 406).

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**ELIGIBILITY & CONTEXT**

This course is open to graduate students from the University of Michigan's College of Engineering.

**COURSE MATERIALS**

This course does not use a single textbook. Instead, we will rely on a set of engaging and informative readings contained in the course pack and materials that can be accessed via CTools.

**Course Pack** – To purchase a copy of the course pack, check CTools for the announcement of when it is ready and how to buy. It contains required readings that you should read prior to each class session. These readings consist of carefully selected magazine/journal articles and excerpts from books, and case studies. These materials are copyrighted by their respective authors/publishers, so the price of the course pack covers any applicable licensing fees as well as printing costs.

**COURSE WEBSITES**

Course materials will be posted on CTools (<http://ctools.umich.edu>).

**GRADING STRUCTURE**

Homeworks (value chain, strategy, finance, marketing): 30%  
Midterm and Final Case Studies: 40%  
Course Participation: 30%

## Sessions

Session 1	Course Introduction
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Sessions 2	The Value Creation Paradigm
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Topics:

Entrepreneurship Overview

New Business Creation Overview

Corporate Entrepreneurship: Comparison with the startup environment

Discuss semester-long projects

Readings:

*Do by January 13*

Faley, Timothy L., "The Process of Business Creation," Inc. Magazine (on-line), August 23, 2005.

<http://www.inc.com/resources/startup/articles/20050801/process.html>

Faley, Timothy L., "Is your Business Idea Feasible?," Inc. Magazine (on-line), October 4, 2005.

<http://www.inc.com/resources/startup/articles/20051001/analysis.html>

Faley, Timothy L. & Kirsch, P.S., "Creating Your Business Plan," Inc. Magazine (on-line), November 3, 2005.

<http://www.inc.com/resources/startup/articles/20051101/bplans.html>

Faley, Timothy L., "Growing Your New Venture," Inc. Magazine (on-line), February 21, 2006.

<http://www.inc.com/resources/startup/articles/20060201/venture.html>

Faley, Timothy L., & Porter, T.S., "Making Your Exit," Inc. Magazine (on-line), March 15, 2006.

<http://www.inc.com/resources/startup/articles/20060301/TFaley.html>

Session 3	The Value Chain: Who is Capturing Value and Why?
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Topics:

- Value Chain Analysis
  - Material supply chain
  - PLUS information supply chain
  - PLUS "follow the money"

Readings:

Do by January 15

Visit Hoovers at <http://www.hoovers.com>.

Sessions 4-5

Corporate Finance

Topics:

- Elements of Financial Statements
- Cash Flow
- Ratio Analysis
- Financial Forecasting
- Valuation

Readings:

*Do by January 20*

“Note on Financial Forecasting,” HBS 9-206-048 (1983).

Finance for Managers (Harvard Business School Press, 2006): Chap. 1, “Financial Statements: The Elements of Managerial Finance” (pp. 1-20). Reprint 5788BC.

*Do by January 22*

Corporate Case III: Intel Corp.--1992 (HBR Product#: 502083)

Sessions 6 - 9

Strategy

Topics:

- Introduction to corporate strategy
  - Core competencies
  - Discipline of market leaders
  - Porter's five forces
- Entrepreneurial Business Strategies
  - Positioning your company
  - Leveraging your intellectual property

Readings:

*Do by January 27*

Porter, Michael. “What is Strategy?” HBR reprint 96608 (1996).

Drucker, Peter. “The Discipline of Innovation,” *Harvard Business Review* (1985). Reprint #0208F.

Mullins, John W. *The New Business Road Test: What entrepreneurs and executives should do before writing a business plan* (Prentice Hall 2003): Chap. 1, “My Opportunity: why will or won't this work?” (pp. 2-23).

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*Do by January 29*

Teece, David J. "Capturing Value from Knowledge Assets: The New Economy, Markets for Know-how, and Intangible Assets." California Management Review Reprint CMR 108 (1998).

Cooper, Alan. *The Inmates Are Running the Asylum: Why High Tech Products Drive Us Crazy and How to Restore the Sanity* (Sams, 1999): Chap. 9, "Designing for Pleasure" (pp. 123-148).

*Do by February 3*

Entrepreneurial Case II: ZLI Case Study (unpublished): "Tal Materials." Prepared by Prof. Thomas Kinnear, et al.

*Do by February 5*

Corporate Case II: Intel Corp.--1968-2003 (HBR Product#: 703427)

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**Session 10**

**Intellectual Property**

Guest Lecturer: Mr. Jon E. Shackelford, Dickinson Wright PLLC

Readings:

*Do by February 10*

Hart, Myra & Zaharoff, Howard. "The Protection of Intellectual Property in the United States." HBS #9-897-049 (2000).

MIDTERM EXAM Distribution: ~ February 10.

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**Sessions 11-14**

**Entrepreneurial Finance**

Topics:

- Boot-strapping
  - Loans
  - Grants
- Equity Financing
  - Pre-seed
  - Angel
  - Venture Capital
  - Private Equity
- Valuation Methods
- Exit strategies
- Cap Tables

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Readings:

*Do by February 12*

Faley, Timothy L. *“Entrepreneurial Finance—An Entrepreneur’s Perspective* (Unpublished); December 2008.

Zider, Bob. “How Venture Capital Works” *Harvard Business Review* (Nov. – Dec. 1998); pp. 131-139 (Reprint #98611).

Weiser, Mark. *Venture Capital: A Primer for Understanding Seed and Mid-Stage Funds* (Unpublished); April 2000.

*Do by February 17*

Capital Table Example walk-through

*Do by February 19*

Case study: TBD

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**Midterm Exam**

Due February 19

Spring Break is Week of February 23<sup>rd</sup>.

**Session 15**

**Midterm Report Review**

March 3

**Sessions 16-17**

**Marketing**

Topics:

- Corporate Marketing Elements
  - Introduction to Marketing
  - Basic Quantitative Analysis for Marketing
  - The Marketing Mix
  - Pricing
- Entrepreneurial Marketing Elements
  - Market identification and strategy
  - Product adoption process
  - Value Chain

Readings:

*Do by March 5*

Shapiro, Benson. “An Introduction to Marketing.” HBS 9-584-124 (1986).

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Levitt, Theodore. "Marketing Myopia." HBR Reprint R040L (1960).

Corey, E. Raymone. "Note on Pricing." HBS 9-580-091 (1984).

Dolan, Robert. "Basic Quantitative Analysis for Marketing." HBS 584-149 (1986).

Moore, Geoffrey A. *Crossing the Chasm* (Harper Business, 1991); Chapter 1.

Bygrave, William & Zacharakis, Andrew. *The Portable MBA in Entrepreneurship* (John Wiley & Sons, 2004): Chap. 3, "Entrepreneurial Marketing" (pp. 71-106).

*Do by March 10*

Corporate Case IV: Inside Intel Inside (HBR Product#: 292106)

**Sessions 18-21**

**New Business Design**

Topics:

- The Innovation Process
  - Opportunity Identification
    - Exploring technological needs/opportunities
    - Exploring customer needs/opportunities
  - Framing the Business Proposition
    - Business Hypothesis
    - Business Models
- The funding landscape for early stage technology development

Readings:

*Do by March 12*

Cooper, Alan. *The Inmates Are Running the Asylum: Why High Tech Products Drive Us Crazy and How to Restore the Sanity* (Sams, 1999): Chap. 9, "Designing for Pleasure" (pp. 123-148).

*Do by March 17*

Chesbrough, Henry W. *Open Innovation* (Harvard Business School Press, 2003): Chap. 4, "The Business Model" (pp. 63-91).

*Do by March 19*

Corporate Case I: Intel 2006: Rising to the Graphics Challenge (HBR Product#: 607136)

*Do by March 24*

Entrepreneurial Case I: ZLI Case Study (unpublished): "HandyLab (A)," Prepared by Prof. Thomas Kinnear, et al.

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<b>Session 22</b>	<b>Entrepreneurial Roundtable</b>
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Live Case study (Guest Speakers) (March 26)

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<b>Session 23-24</b>	<b>Course Recap</b>
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March 31 & April 2

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<b>Session 25-26</b>	<b>Global Entrepreneurship</b>
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Topics:

- Corporate vs. entrepreneurial
- Myths/realities
- Developed and undeveloped markets

Readings:

*Do by April 7*

Article TBD

Case Study: "Spotfire: Managing a Multinational Startup," prepared by Walter Kuemmerle (HBS Product#: 9-899-078)

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<b>--</b>	<b>Final Report</b>
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Due Thursday April 14

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<b>Sessions 27-28</b>	<b>Final Presentations</b>
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Tuesday April 14 and Thursday April 16



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**INSTRUCTORS**

*Tim Faley, Ph.D., MBA*

Dr. Faley is the managing director of the Zell Lurie Institute for Entrepreneurial Studies and Adjunct Professor of Entrepreneurship at the Ross School of Business. He previously was the managing director of the Wolverine Venture Fund (instructor for ES701 – WVF). Dr. Faley has spent his career creating, valuing and commercializing technologies working in areas ranging from R&D to new business development to technology licensing to venture capital. He was formerly the director of technology transfer for UM's College of Engineering. Prior to his arrival at UM, he spent 15 years with the Dow Chemical Company, his last assignments being in technology licensing and corporate venturing.

*Peter Adriaens, Ph.D., P.E.*

Dr. Adriaens is professor of Civil and Environmental Engineering - Program of Environmental and Water Resources Engineering and Associate Professor of Entrepreneurship in the Ross School of Business. His research on 'flask-to-field' multidisciplinary technology development projects involves industrial partners, and multiple academic institutions. In this capacity, his experience in team management includes Project Directorships of multi-year laboratory and field research projects carried out for the U.S. Environmental Protection Agency (U.S. EPA), the Michigan Department of Environmental Quality-Emergency Response Division (MDEQ-ERD), the U.S. Navy, the U.S. DOD/DOE/EPA-Strategic Environmental Research and Development Program (SERDP), and industry. His consulting experience with multi-national industries (Dow, Alcoa, Holcim, G.E.) emphasizes industrial sustainability issues, including site remediation pollution prevention, and corporate value creation along the water-energy nexus.