

Course Information

Time & Location: 6:30-8:15 Monday & Wednesday, PHO 210
Professor: Christie Bielmeier, PhD
Office hours: 730 Comm Ave RM 207. M & W 3:15-6:15 pm (By appointment)
Contact: E-mail: cmb77@bu.edu
Book (Required): Ulrich, K., & Eppinger, Steven D. Product Design and Development (Irwin/McGraw-Hill) Fifth Edition. ISBN: 0073404772 (\$25 Used on Amazon).

Suggested Outside Sources: - Steve Blank. The Four Steps to the Epiphany: Successful Strategies for Startups That Win
- Eric Ries. The Lean Startup
- How I Build This Podcast (NPR)

Course Description

ENG ME 517 Product Development: Introduction to the leadership practices required for product and process development for converting ideas into marketable products. The development process is decomposed and its elements are examined critically using case studies and supplemental reading. Topics covered include: the development process, project leadership, project economics, product and process design practices, service innovation, organizing for success, and managing portfolios and the link to business strategy. Examples are drawn from a variety of markets and industries. A step-by-step methodology for new product development is derived.

Course Assessment

- Grading (Total 100%):

Homework 10%	Final Exam 15%
Projects 50%	Class Participation 10%
Exams 15% (3 Total)	
- The approximate grading scheme is as follows: A>93%, A->90%, B+>87%, B>83%, B->80%, C+>77%, C>73%, C->70%, D+>67%, D>63%, D->60%.

Homework

- Homework is due on Wednesday at the start of class (Hardcopy only). No late home work is accepted.
- Word processor homework is acceptable for long answer questions. Hand written homework must be turned in on engineering paper, 1 problem per page as described on the last page of this document.
- Homework problems are to be by an individual, but study groups are strongly encouraged.
- Student solutions should be original. Plagiarism will not be tolerated.

Exams & Final Exams

- All exams dates are indicated on the course syllabus and are mandatory.
- No exams will be administered after the exam date. As a courtesy, verifiable extenuating circumstances will be considered.

Projects

- Three projects will be completed to complement theory and application presented in the course.
- Projects must be completed in groups of 3-4 people. Projects from individuals will not be accepted. No late projects are accepted.
- All project requirements will be detailed in a project assignment sheet and most follow the layout described within the project assignment sheet. All projects must have cited references.

Case Analysis Assignments

Cases are articles, research papers, website or magazine articles deemed relevant to the course. The majority of the cases are from the Harvard Business School (HBS), which is a leader in business and is a reputable source for current business practices. The selected cases will assist class discussion of (1) practical application, (2) identify disruptive innovation, (3) exposure to new technologies.

For each assigned case, you will be expected to read, understand, and be ready to discuss material. The majority of these cases will require more than one reading and additional research to provide you with clear understanding of the subject matter. Furthermore, you should identify extraneous or irrelevant information that may be included. For some cases, I will provide study questions prior to due date.

Suggested Article Assignment Process

- READ 1 (Quick)
 - o Complete a quick first reading of the case to get the overall article outline. For scholarly articles (such as HBS), read the abstract and results sections first and then read the rest.
 - o Do not try to completely understand the case and its details at this point.
 - o Write down key issues of the case.
 - o Identify the key problems to be addressed
- READ 2 (Detail)
 - o Reread the case in detail.
 - o Selectively highlight information in the case that relates to the key issues/ problem that you have identified.
 - o Identify the key information needed to resolve/ answer the key problem/ issues.
 - o Determine whether this key information is available in the case.
 - o Write an outline of the key tools, techniques, and/or frameworks that you would like to use to “solve” the problem(s). MOST IMPORTANT!
- READ 3 (SCAN)
 - o Scan the case again and apply the appropriate tools/ frameworks to address the issues and problem(s).
 - o For missing information in the case, attempt to (1) indirectly derive it from the case, or (2) make some assumptions.
 - o Verify that you have resolved the problem(s) and issues that you identified.
 - o Clearly identify the key assumptions.

Attendance & Class Participation

- Attendance is mandatory.
- Attendance will be taken at the beginning of each class. If you are late, you are absent.
- Class participation is based on your professional, active and constructive participation in the solution of the example problems in class, responses to general questions and your regular attendance of the class lectures.
- Absences for extenuating circumstances will be considered on a case-by-case basis and email notification prior to the absence is requested.
- You MUST act in a professional manner to all students while in the classroom and for all group projects. Class discussions can be passionate and opinionated, but should never make other students feel poorly. Bullying or belittling will not be tolerated. Attack the idea, not the person. Being able to take and give criticism is a skill and it will be developed in this class.
- BU's academic Conduct Code: <http://www.bu.edu/academics/policies/academic-conduct-code>

Course Outline and Important Dates

Date 2018	Week No.	Topic	Chap.	Case Study In-Class Discussions	Homework (Due W)
09/05 (W only)	1	Intro & Development Process & Org.	1	50 Smartest Companies / Solving All the Wrong Problems	
09/10	2	Opportunity ID Product Planning Assign Project 1	2-3	BMW/ Sputtering / Ultimate Entrepreneur/ Disruptive Innovation	CH2: E1, E2 CH3: E2, TQ 1-4
09/17	3	Disruptive Technology ID Customer Needs	4-5	Vertex Pharmaceuticals /3D Print/ Autonomous Driving	CH5: E1, E2
09/24	4	Project Manage. 09/24 Exam	18	Darth Vader / Great Projects / Medisys Chapters 1-5 (Weeks 1-3)	CH18:E1-3
10/01	5	Product Specifications Concept Generation Project 1 Due 10/01	6-7	Marketing Strategy / Cyclone Grinder	CH6: E1, TQ2,5 CH7: TQ4
10/09 M Sched	6	Concept Selection & Testing	8-9	TruEarth / Herman Miller / Handpresso	CH8: E2 TQ1-4 CH9: E2
10/15	7	Value Propositions Robust Design, Marketing 10/17 Exam	15	Innovation at Apple Chapters 6-9, 18 (Weeks 4-6)	CH15:E1,2 TQ1-3
10/22	8	Product Arch. / Ind. Design Pricing Assign Project 2	10-12	Atlantic Computer / Four-Letter Code	CH10: E2, TQ1,3 CH11: E1 (Use online store) CH12:E2
10/29	9	DfX/ Design For Manuf. & Sustainability	13-14	Nike / Intel / Solar and Wind Got Cheap	CH13: E1, TQ1 CH14: E3, TQ1,3,4
11/05	10	Quality & Reliability Project Economics 11/07 Exam	17	Study finance/ Insourcing Boom Chapters 10-14,15 (Weeks 7-9)	CH17: E1, TQ1
11/12	11	Writing Business Plans/ Crowdsourcing/ Pitches Project 2 Due 11/12 Assign Project 3		Writing / Wireless Charging / Standards World	Obtain a Pitch Deck (5-10 slides) of a company. Summarize what info is on each slide. Good or Bad?
11/19 (M only)	12	Intellectual Property Open Innovation,	16	Apple vs. Samsung / Dethroning/ LinkAmerica	CH16: E1
<i>Happy Thanksgiving</i>					
12/03	13	In Class Presentations Project 3 Due 12/03			
12/10 (M only)	14	Review for Final			
12/17	15	Final Exam 12/17 6-8 pm	PHO210	Cumulative	

Case Study Names, Links and Study Guides

Week No.	Abbreviated Name	Case Study In-Class Discussions	Be able to answer:
1	50 Smartest Companies	"The 50 Smartest Companies 2016", MIT Technology Review, 2016.	
	Solving All Wrong Prob	"Solving All the Wrong Problems", New York Times Magazine, 2016.	
2	BMW	BMW: The 7-Series Project(A)	1. Identify key success factors & how changing? 2. How serious is the Japan threat & why? 3. Is the design flexibility at BMW good or bad?
	Sputtering	"Sputtering R&D Machine", HBS R0208X-PDF-ENG, 2002.	1. What is the immediate issue that Hal Marden faces? 2. What are the causes? (organization, strategy, marketing efforts, R&D)
	Ultimate Entrepreneur	"The Ultimate Entrepreneur: How DEC Passed Up the PC Boom", Computerworld, 1988.	1. What markets does DEC serve? 2. What products do they offer?
	Disruptive Innovation	"Disruptive Innovation Explained" at http://hbr.org/video/2226808799001/disruptive-innovation-explained , posted 2012.	
3	3D Print	"3D Printing Scales Up", The Economist, 2013.	
	Vertex Pharma	"Vertex Pharmaceuticals: R&D Portfolio Management (A)", HBS 604101-PDF-ENG, 2006.	1. Would you want to be the CEO of Vertex? 2. How would you change Vertex's Portfolio?
	Autonomous Driving	"Ten Ways Autonomous Driving Could Redefine the Automotive World", McKinsey and Co., 2015.	1. What customer attitudes will have to change for autonomous drive to become reality?
4	Darth Vader	"Top Ten Reasons Why Darth Vader was an Amazing Project Manager", https://www.geekwire.com/2011/top-10-reasons-darth-vader-amazing-project-manager/ Posted 2011.	
	What Great Projects	"What Great Projects Have in Common", MIT Sloan Management Review, 2011.	
	Medisys Corp.	"Medisys Corp.: The IntensCare Product Development Team", HBS 4059-PDF-ENG, 2009.	1. What management structure is Medisys using and how does this contribute to the issues? 2. Baio and Mukerjee are worried about testing the new product. Name 3 specifications required for Medical Devices.
5	Marketing Strategy	"Marketing Strategy – An Overview", HBS 500005-PDF-ENG, 2003.	1. What are the 8 Elements to a marketing strategy? 2. List Price depressors & lifters 3. Does the Market Strategy Diagram make sense?
	Cyclone Grinder	"The Cyclone Grinder", Corporate Design Foundation, 1991	1. What made the design successful? What PD planning strategies did the employ? 2. Was the initial meeting objective too broad? 3. Why were the distributors the best people to ask about the customer?
6	TruEarth	"TruEarth Healthy Foods: Market Research for a New Product Introduction", HBS 4065-PDF-ENG, 2009.	1. Who else is TruEarth competition. Why? 2. Does TruEarth have a PD plan? 3. How does TuEarth Define Quality?
	Handpresso	"Handpresso (A)", HBS INS360-PDF-ENG, 2012.	1. Who is the handpresso Customer? 2. What other companies had to flight regulations to get products to market? Is this a good business plan? 3. What is the benefit of using COTS components?
	Herman Miller	"Cradle-to-Cradle Design at Herman Miller: Moving Toward Environmental Sustainability", HBS 607003-PDF-ENG, 2009.	1. How did the fact that Herman Miller was an established company help their R&D efforts? 2. What is the biggest threat to HM market share? 3. What is your assessment of C2C protocol? 4. Why the environmental initiative?
7	Innovation at Apple	"Design Thinking and Innovation at Apple", HBS 609066-PDF-ENG, 2009.	1. What did Apple do differently? What does design thinking mean at Apple?
8	Atlantic Computer	"Atlantic Computer: A Bundle of Pricing Options", HBS 2078-PDF-ENG, 2007.	1. What price would you charge for the Atlantic Bundle? 2. Calculate price for DayTraderJournal.com
	Four-Letter Code	The Four-Letter Code to Selling Just About Anything What makes things cool? Atlantic, Jan/Feb 2017.	

		https://www.theatlantic.com/magazine/archive/2017/01/what-makes-things-cool/508772/	
9	Nike	Governance and Sustainability at Nike	1. What triggered Nike's CSR initiative? 2. What skills/capabilities did they need to develop? 3. Why is CSR central to Nike's profitability? 4. What practices are critical to the success of their CSR efforts?
	Intel	"The Growth of Intel and the Learning Curve", HBS OIT27, 1999.	1. Using Table 3, Plot a learning curve, y-axis is size of transistor and x-axis is time. How do you describe this plot.
	Solar/Wind Got Cheap	"How Solar and Wind Got So Cheap, So Fast". Atlantic Monthly, 2015.	
10	Insourcing Boom	"The Insourcing Boom", Atlantic Monthly, 2012.	
	Study Finance	http://www.studyfinance.com/lessons/finstmt/	
11	Writing	One of the Most Powerful Tools for Hardware Startups: Writing https://blog.bolt.io/one-of-the-most-powerful-tools-for-hardware-startups-writing-25cd261dbe0b	1. Try using the PRD for a product.
	Wireless Charging	"Wireless Charging is Still a Mess, But It Won't be Forever", Wired, 2015.	1. What is the difference between PMA & Rezence? 2. What is missing for wireless charging to universally work across all products?
	Standards World	"A Guide to the Confusing Internet of Things Standards World", Network World, 2014. https://www.networkworld.com/article/2456421/internet-of-things/a-guide-to-the-confusing-internet-of-things-standards-world.html	1. What is a Thread? 2. Why doesn't open source work for this problem? 3. What is IIC?
12	Apple vs. Samsung	"The Great Smartphone War: Apple vs. Samsung", Vanity Fair, 2014.	1. Who will play each character in the movie???
	Dethroning	"Dethroning an Established Platform" MIT Sloan Management Review, 2012.	1. What are the 4 lessons learned from successful dethroners? 2. What are the 2 reasons to leave a platform?
	LinkAmerica	"LinkAmerica: The 18th Time Was the Charm", Fortune, 2014. http://fortune.com/2014/04/10/linkamerica-the-18th-time-was-the-charm/	1. What does it take to be an entrepreneur?

HOMEWORK FORMAT

CHRISTIE BIELMEIER

ENGN 1001

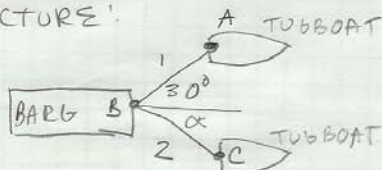
CH1

2 of 6

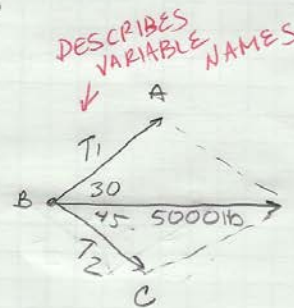
PROBLEM STATEMENT/KNOWN

A BARGE IS PULLED BY 2 TUGBOATS. IF $F_{\text{RESULTANT}}$ BY TUGBOATS IS 5000 lb force DIRECTED ALONG α AXIS OF BARGE, FIND TENSION OF ROPES IF $\alpha = 45^\circ$

PICTURE:



IN CONTEXT



DESCRIBES
VARIABLE
NAMES

FORCES

ASSUMPTION:

THE TRIANGLE RULE CAN BE USED.

$$\frac{T_1}{\sin 45^\circ} = \frac{T_2}{\sin 30^\circ} = \frac{5000 \text{ lb}}{\sin 105^\circ}$$

$$T_1 = 3660 \text{ lb}$$

$$T_2 = 2590 \text{ lb}$$

BOX IN
ANSWER

CORRECT
UNITS

SAME
VARIABLE
NAME AS PICTURE

★ PENCIL

★ 1 PROBLEM PER PAGE (BUT CAN BE MORE THAN 1)

★ NEAT