

Technology & Innovation Strategy

MGT-414, Fall 2017

Wednesdays, 9:15 - 12:00

4 credits

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COURSE OVERVIEW

This course focuses on the economic and organizational conditions that shape technological innovation by firms. The intent is for students to learn core concepts that can make innovation projects more successful and profitable, and to then apply those concepts to real business cases of known successes and failures. Strategic management differs from other courses in management in that it focuses on the firm as a unit as the level of analysis. Accordingly, the course objectives are threefold: (1) to develop an understanding of how innovations emerge and gain adoption in the marketplace; (2) to gain insights into how firms can transform themselves into effective innovators; and (3) to evaluate strategies and structures that enhance venture success. The course is particularly applicable for students interested in working for, or learning about, technology-oriented companies.

COURSE SCHEDULE

This course is divided into two parts: Strategy Formulation and Strategy Implementation. The first half of the course is focused on economic principles and abstract concepts (strategy formulation), whereas the second half of the course is more focused on a contextual understanding of different applied topics (strategy implementation).

Part I – Strategy Formulation		
Session	Date	Topic
1.	Sept 20	Market Competition
2.	Sept 27	Resource Competition
3.	Oct 4	Technological Change
4.	Oct 11	Dynamics & Options
5.	Oct 18	Entrepreneurship (Lecture by Dr. Liotta)
6.	Oct 25	Invention and Intellectual Property
7.	Nov 1	Theory of the Firm
8.	Nov 8	Midterm Exam
Part II – Strategy Implementation		
Session	Date	Topic
9.	Nov 15	Market Entry (Lecture by Dr. Liotta)
10.	Nov 22	Human Capital
11.	Nov 29	Productivity and Growth
12.	Dec 6	Business Analytics
13.	Dec 13	Team Presentations
14.	Dec 20	Course Review & Synthesis
	T.B.D.	Final Exam

DIDACTIC APPROACH AND CLASS ATTENDANCE

The course will be taught through pre-assigned readings, readings distributed during class, lectures, and case discussions. We will analyze real companies as they learn to identify, generate, manage and exploit new and existing technologies, often in fast changing environments. Students will be placed in the role of key decision makers and asked to address issues related to the management of new business ventures and/or innovative new products and services.

Attendance

Students are expected to attend every class and to read all assigned materials **before** the start of each class; students are also expected to participate in class discussions. As such, class participation is a graded component of the course. Verbal participation will be tracked by the instructor and quizzes may (at times) be administered at the start of class to assess the degree to which students have prepared for the class. Failure to attend a class will result in no credit for the associated quiz or case discussion. If an absence is pre-excused, however, students may submit a two-page written essay (11-pt font, single-spaced, on one piece of paper) reviewing the topic of the missed class and recover (at the instructor's discretion) some or all of the lost participation points for the class. Arriving late to class counts against the class participation grade.

Cell Phones

The use of cell phones detracts from the learning environment. Therefore, please turn off cell phones during class.

Laptops & Tablets

Connectivity in the classroom can both help and hurt the learning environment. On the upside, computers allow real time access to important information. Many students also use their computers to take notes, even as they continue to participate in the class. However, laptops and tablets also can be a distraction to other students, a temptation to let one's attention wander, and a way to avoid engaging in the discussion. Overall, I have found that students using laptops do more poorly in the course than those who engage completely in the discussion. I therefore encourage you to minimize your use of laptops and tablets during class.

Diversity

Each person in the classroom has something of value to contribute. Please take care to respect the different experiences, beliefs and values expressed by students and staff involved in this course. Individuals of all ages, backgrounds, citizenships, disability, sex, education, ethnicities, family statuses, genders, gender identities, geographical locations, languages, military experience, political views, races, religions, sexual orientations, socioeconomic statuses, and work experiences are welcome in this class and encouraged to add their point of view to class discussions. All members of the class bear a responsibility to voice their opinions in such a way as to contribute to the learning objectives of the class and to do so in a positive manner. The instructor may, at times, direct some conversations that do not further the learning objectives of a given day to continue outside of class, but doing so does not lessen our mutual commitment to valuing diversity in the classroom.

MATERIALS

Business cases will be distributed online via a customized case packet from Harvard Business Publishing. The packet is identified as 'MGT-414: Technology and Innovation Strategy' by Professor Younge.

All other assigned readings are available from the EPFL library or by inter-library loan.

LEARNING OUTCOMES

By the end of the course, students should be able to identify and evaluate strategies and structures that are more likely to lead to success. Students should also be able to apply theory and best practices for assessing the potential for new ideas to convert into new products, technologies and businesses. Students should be able to apply different theoretical perspectives on technology strategy and innovation, think creatively about alternative courses of action, and ask insightful questions.

EXAMINATIONS, ASSIGNMENTS & GRADING

10%	Innovation Report	Analysis of SpaceX - due before start of midterm
10%	Midterm Exam	Administered during class
20%	Analysis of Tesla	Written report due before the start of the last class
20%	Team Project	Case analysis/report due before start of the last class
20%	Class Participation	Tracked throughout the semester
20%	Final Exam	Time & location to be determined

Innovation Report - SpaceX (10%)

Students should research and write a strategic analysis of **SpaceX**. You should produce your own work and **you should not collaborate** on the report. The assignment is not intended to be a full "case study" of SpaceX - instead, the objective is to illustrate one or more of the strategy concepts covered in class. The maximum length for the report is one physical sheet of paper (i.e., the front-side and a back-side of one piece of paper); anything over one physical piece of paper will be ignored, so use the space wisely.

Due: **Email your report to the TA** before the start of the midterm examination.

Format: **PDF** - other formats will not be accepted.

Length: **2 pages**, 11-pt Times Roman font, single-spaced.

Midterm Exam (10%)

The midterm exam will be given during the normally scheduled class session. The midterm exam will cover all material up to that point in the course related to assigned readings, lectures, and handouts.

Consulting Report - Tesla (20%)

Students should prepare their own, in-depth examination of Tesla. You may discuss your arguments with other students, but keep in mind that the objective of the assignment is to stand out and distinguish yourself within the class. **Each student must therefore write their own report**. The maximum length for the report is two physical sheets of paper (i.e., the front-side and a back-side of two pieces of paper); anything over one physical piece of paper will be ignored, so use the space wisely.

Due: **Email your report to the TA** before the start of the last class.

Format: **PDF** - other formats will not be accepted.

Length: **4 pages**, 11-pt Times Roman font, single-spaced.

Team Project / Case Study (20%)

At the start of the 9th session, we will assign students into groups of three to complete a case study of one of the companies on the MIT Technology Review's list of the 50 smartest companies (from the years 2017 or 2016). Consult the most recent list here: <https://www.technologyreview.com/lists/companies/2017/intro/> Each team must pick a different company. To make your selection, send the course TA a rank ordered list of your top 10 choices. Company assignments are on a "first-come-first-serve" basis (based on order email is received) – so don't delay in making your selection. You may not select Tesla, SpaceX, Apple, Amazon, or any other company we already cover in-depth in class.

There are two deliverables for this assignment: 1) a presentation; 2) a report.

1) **Presentation:** Each team should prepare a five-minute presentation of their analysis, which you will then deliver on the penultimate class. Presentations should be approximately 5 to 8 slides in length. After your

presentation, you will field questions from the professor and other students in the class students. The presentation will be graded based on the slides, verbal presentation, and ability to answer questions.

Due: **Email your presentation slides to the TA** before the start of the presentation class.

Format: **PDF** - other formats will not be accepted.

Length: **5 to 8 slides.**

2) **Report:** Each team should also prepare a two-page final report. Given the page limitation, you will not have space to address every concept covered in the course, or every aspect of the firm. Anything over two pages will be ignored, so use the allotted space wisely. Exhibits, however, do not count toward the page limit – so you may attach as many exhibits, tables, and supporting reference materials as you wish. Final reports should take into consideration questions and answers made after the initial presentation.

Due: **Email your report to the TA** before the start of the last class.

Format: **PDF** - other formats will not be accepted.

Length: **2 pages**, 11-pt Times Roman font, single-spaced.

Class Participation (20%)

You will be evaluated based on how well you prepare for class, and on the quality of the questions and comments you contribute to the class. High quality participation requires you to do all of the readings before class and to prepare a list of questions and comments. Low-quality participation entails listening to the material during class and then asking questions that would have been clear if you had prepared before class. Quality comments possess one or more of the following attributes: (a) Contribute to moving the discussion forward; (b) Offer a different, unique, and yet *relevant* perspective on the issue; (c) Build on the comments of others in the class; and (d) Include evidence or analysis of the inherent tradeoffs between options, i.e., demonstrate reflective thinking.

To make it easier for me to call on you, please use a name card and place it in front of you on your table. Each name card should include your **first name and last initial**. Printing it on card-stock makes it easier to prop up. **Bring your name card with you to every class.** Failure to display a name card may result in a lower class participation grade.

I will attempt to call on every student who wishes to speak in each session. I also will attempt to call on people who have not participated yet before we call on people who have already participated. Please raise your hand in a vigorous manner so that I can see you clearly so I can call on you. Once you have participated, please try and restrain yourself for a while so others may get a chance to speak. If you feel that you wanted to talk and had your hand up but I didn't call on you, please let me know by email so that I may make a note and make an extra effort to include you in the discussion in the next class.

If you have concerns about your ability to participate in class discussions, please contact me immediately – preferably in the first two weeks of the course. We will develop a plan of study for you that will help you to be sure to participate. I also recommend seeing myself, or the TA, on office hours to work out your ideas; in that way you will be better prepared and more motivated to participate when the time is right during class.

If you consistently find yourself unable to participate in the classroom discussion, then you may alternatively prepare a one-page essay on the assigned readings for that week and submit it to me at the beginning of class.

Final Exam (20%)

The final exam is comprehensive, across the *entire* course, and covers all material presented in lectures, assigned readings, and business cases. It will be taken during the assigned winter exam – location and time to be determined by EPFL and announced in class.

Submit assignments by email

Do **NOT print out assignments** and hand submit them. All assignments **must** be submitted electronically to the professor **by email** as an attachment in **PDF format**. Please start your email subject line with **MGT-414** - then include your **last name** - then the **assignment name**. For example, the subject line might read: "MGT-414 - YOUNGE - Consulting Report." Your "sent" email record will serve as proof of submission, so hold on to it. The instructor may use anti-plagiarism tools to check the originality of your assignment.

ABOUT YOUR INSTRUCTOR

Kenneth Younge is an Associate Professor in Technology and Innovation Strategy at the College of Management of Technology (CDM) at the École Polytechnique Fédérale de Lausanne (EPFL). Before joining EPFL, he was an Assistant Professor at Purdue University, a post-doctoral scholar at the University of California Berkeley and a doctoral student and instructor at the University of Colorado Boulder. He is a past winner of the Academy of Management's Business Policy and Strategy Division Outstanding Dissertation Award, the Strategic Management Society's Best Conference Paper Award, several Distinguished Teacher awards from Purdue University, and the Leeds Outstanding Teaching Award for a Doctoral Student. Prior to returning to academia, Professor Younge worked for 14 years in industry in the areas of business development, Director of Development, Chief Technology Officer, and President. He graduated *Magna Cum Laude* and Phi Beta Kappa from Brown University, and then began his career as a Strategic Management Consultant with Mercer Management Consulting (now Oliver Wyman). Later in his career went on to found four firms. Professor Younge's research examines the strategic importance of innovation and employee mobility between firms.

DETAILED COURSE OUTLINE

Part I – Strategy Formulation

1. Market Competition
 - a. The 'Five Forces' that shape strategy
Case: Apple Inc. 2012

Porter, 2008
HBS 9-712-490

2. Resource Competition
 - a. The cornerstones of competitive advantage
 - b. Resource accumulation

Case: Mobileye: The Future of Driverless Cars

Peteraf, 1993
Dierickx & Cool, 1989
HBS 5-715-447

3. Technological Change
 - a. S-curves, learning curves, experience curves
 - b. Research & development

Case: SpaceX

Argote & Epple, 1990
Arora, Belezon & Pataconi, 2015
Individual research

4. Dynamics & Options
 - a. Dynamic capabilities
 - b. Real options

Case: HP Kitty Hawk

King & Tucci, 2002
Luehrman, 1998
HBS 9-606-088

5. Entrepreneurship
 - a. Experimentation
 - b. Resource dependency

Case: Angel List

Kerr, Nanda, Rhodes-Kropf, 2014
Litov, Moreton & Zenger, 2012
HBS 9-814-036

6. Invention & Intellectual Property
 - a. Invention
 - b. Patenting
 - c. Complementary assets
 - d. Markets for ideas

Case: Intellectual Ventures

Arrow, 1962
Lemley & Shapiro, 2005
Teece, 1986
Gans & Stern, 2010
HBS 9-710-423

7. Theory of the firm
 - a. Firm boundaries
 - b. The strategy paradox

Case: Nucleon

Seru, 2014
Raynor, 2007
HBS 9-692-041

8. Midterm exam
 - a. Consulting reports due by the start of class.

DETAILED COURSE OUTLINE

Part II – Strategy Implementation

9. Market entry

- a. Open innovation
- b. Judo strategy

Case: Box, Inc.

Felin & Zenger, 2014
Distributed by Professor
BAB723

10. Human capital

- a. Individuals
- b. Teams

Case: Big Spaceship

Mollick, 2012
Wuchty, Jones & Uzzi, 2007
HBS 9-409-047

11. Productivity

- a. Management practices
- b. Economies of scale

Case: Danaher

Bender, Bloom, et al, 2015
Knudsen, Levinthal & Winter, 2014
HBS 5-713-412

12. Business analytics

- a. Big Data
- b. Internet of Things

Case: Amazon Web Services

McAfee & Brynjolfsson, 2012
Porter & Heppelmann, 2014
HBS 9-609-048

13. Team presentations

Each team has 5 minutes to present + Q&A

Q&A: Posing insightful questions will count heavily for class participation.

14. Course review & synthesis

- a. The cornerstones of competitive advantage (*read it again*)

Peteraf, 1993

ARTICLES

- Arora, A., Belenson, S. and Pataconi, A. "Killing the Golden Goose? The Decline of Science in Corporate R&D." *NBER Working Paper Series* - <http://www.nber.org/papers/w20902> (2015).
- Argote, L. and Epple, D. "Learning Curves in Manufacturing," *Science*, 247: 4945 (Feb. 23, 1990), pp. 920-924.
- Arrow, K. "Economic Welfare and the Allocation of Resources for Invention." Nelson R (ed.) The Rate and Direction of Inventive Activity. Princeton University Press. (1962). **Pages 609-618.**
- Bender, S., Bloom N., Card, D., Van Reenen, J., Wolter, S. "Management Practices, Workforce Selection and Productivity." *NBER Working Paper Series* - <http://www.nber.org/papers/w22101> (2015)
- Dierickx, I., Cool, K. Asset Stock Accumulation and the Sustainability of Competitive Advantage. *Management Science* 35 (1989), pp. 1504-1510.
- Felin, Teppo, and Todd R. Zenger. "Closed or open innovation? Problem solving and the governance choice." *Research Policy* 43:5 (2014), pp. 914-925.
- Gans, J. and Stern, S. "Is there a market for ideas?" *Industry & Corporate Change* 19: 3 (2010), pp. 805-837.
- Kerr, W., Nanda, R. and Rhodes-Kropf, M. "Entrepreneurship as Experimentation." *Journal of Economic Perspectives*, 28:3 (2014), pp. 25-48.
- King, A., and Tucci, C. "Incumbent entry into new market niches: The role of experience and managerial choice in the creation of dynamic capabilities." *Management Science* 48:2 (2002), pp. 171-186.
- Knudsen, T., Levinthal, D. and Winter, S. "Hidden but in plain sight: The role of scale adjustment in industry dynamics." *Strategic Management Journal* 35:11 (2014), pp. 1569-1584.
- Lemley, M. and Shapiro, C. "Probabilistic Patents." *Journal of Economic Perspectives* 19:2 (2005), pp. 75-98.
- Litov, L., Moreton, P. and Zenger, T. "Corporate strategy, analyst coverage, and the uniqueness paradox." *Management Science* 58:10 (2012), pp. 1797-1815.
- Luehrman, T. "Investment opportunities as real options: Getting started on the numbers." *Harvard Business Review*, 76: (July-August, 1998), pp. 51-67.
- McAfee, A. & Brynjolfsson, E. 2012. "Big Data: The Management Revolution." *Harvard Business Review*. (Oct., 2012).
- Mollick, E. "People and Process, Suits and Innovators: The Role of Individuals in Firm Performance." *Strategic Management Journal*, 33:9 (2012), pp. 1001-1015.
- Peteraf, M. "The cornerstones of competitive advantage: a resource-based view." *Strategic Management Journal* 14:3 (1993), pp. 179-191.
- Porter, M. "The 'Five Forces' that shape strategy." *Harvard Business Review*, (Jan. 2008).
- Porter, M., and Heppelmann, J. "How smart, connected products are transforming competition." *Harvard Business Review* 92:11 (2014), pp. 11-64.
- Raynor, M. "Solving the strategy paradox: how to reach for the fruit without going out on a limb." *Strategy & Leadership* 35:4 (2007), pp. 4-10.
- Seru, A. "Firm boundaries matter: Evidence from conglomerates and R&D activity." *Journal of Financial Economics*, 111 (2014), pp. 381-405.
- Teece, D. "Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy." *Research Policy* 15 (1986), pp, 285-305.
- Wuchty, S., Jones, B., Uzzi, B. "The Increasing Dominance of Teams in Production of Knowledge." *Science* 316 (2007).
- Zenger, T. "Strategy: The Uniqueness Challenge." *Harvard Business Review*. (November, 2013)

CASES

Purchase the following cases here: <http://cb.hbsp.harvard.edu/cbmp/access/65963042>

Apple Inc. in 2012

David B. Yoffie; Penelope Rossano

HBS 9-712-490

Mobileye: The Future of Driverless Cars

David B. Yoffie

HBS 5-715-447

Hewlett-Packard: The Flight of the Kittyhawk (A)

Clayton M. Christensen

HBS 9-606-088

Angellist

Ramana Nanda; Liz Kind

HBS 9-814-036

Nucleon, Inc.

Gary P. Pisano

HBS 9-692-041

Box, Inc.: Preserving Start-Up Culture in a Rapidly Growing Company

Allan Cohen

BAB723

Intellectual Ventures

Andrei Hagi; David B. Yoffie; Alison Berkley Wagonfeld

HBS 9-710-423

Big Spaceship: Ready to Go Big?

Boris Groysberg; Michael Slind

HBS 9-409-047

Danaher Corporation

Bharat Anand; David Collis; Sophia Hood

HBS 9-708-445

Amazon Web Services

Robert S. Huckman; Gary P. Pisano; Liz Kind

HBS 9-609-048