

Course Information

Innovation in Science and Engineering

Spring, 2008
Paris, France

Innovation in Science and Engineering is being offered to graduate students and advanced undergraduates in the sciences and engineering and others with an interest in technological innovation. Course enrollment is limited to approximately 40 students. This is being offered in the Spring 2008 in seven classes. Our objective is to use a course on innovation in the sciences to change the methods that are being used to effectively select and solve problems in science and engineering.

More and more, the forces shaping lives, creating value, and driving change emanate from new knowledge in science and engineering. Where does it all begin? How are important problems found, defined, and solved? What are the roles of teamwork and creativity in the process? And how are the methods scientists and engineers use applied to other fields of endeavor? The course will give you an opportunity to explore these and other related questions through a combination of lectures, case discussions, exercises, and interactions with innovators from science, engineering, the arts, and business.

There are no prerequisites for the course, but we require an interest in exploring the factors and conditions that contribute to innovation in science, engineering, and society. As part of the course, students will receive training in techniques to define and solve problems, in both individual and team settings.

Instructor Biographies

The instructors for this course will be **Dr. Tom Esselman, Dr. Corinne Jouanny, Mr. Philippe Van Caenegem & Dr David Ricketts**. They will be joined by other instructors and guests as appropriate. Short biographies of these instructors follow.

Dr. Thomas Esselman is a Lecturer in the Division of Engineering and Applied Science at Harvard. He is the founder and former President of Altran Corporation. Dr. Esselman has over thirty years of experience in consulting on a wide range of topics, including engineering, materials performance, engineering development, and engineering management. He has had responsibility for numerous interdisciplinary task forces, cross-functional problem solving projects, and technology planning activities. He has a Ph.D. in Engineering Mechanics from Case Western Reserve University and a Masters in Business Administration (MBA) from the University of Pittsburgh.

Dr. Corinne Jouanny is Managing Director of Pr[i]me at Altran Technologies. She has a PhD in Materials Science from École des Mines de Paris. She has consulted on a wide variety of projects including issues concerning design, R&D, production, maintenance, standardization, and suppliers' management. Dr. Jouanny has also worked for a variety of industries, including shipyards, electronics, petroleum, aeronautics, energy, paper, automotive, and cosmetics. She leads a business unit called Pr[i]me within Altran Technologies on Innovative Problem Solving and Innovation Management. Dr. Jouanny is also a member of the Altran Foundation for Innovation Board of Directors.

Mr. Philippe Van Caenegem is Managing Partner of Synectics® Corporation, a forty four year old international consulting firm that specializes in fostering innovation in business (www.synecticsworld.com). Synectics operates from seven offices in the United States, Canada, Europe, and Australia. Prior to Synectics he has successfully created and managed the systematic innovation consulting services of De Valck Consultants (Altran Group), working with major clients from automotive, telecom and industrial sectors. Before moving into the consulting business Philippe co-founded and managed Realactor®, pioneering an innovative online 3D graphics technology and gaining global leadership in it's niche by serving prestigious clients

such as Microsoft, Philips and the major studios. Prior to this Philippe was project manager in a leading engineering and architecture firm, specializing in complex and innovative projects. Philippe studied Master of Science in Architecture and Applied Computer Science. He is a member of the French MEDEF Innovation Committee since 2004.

Dr. David Ricketts is professor at Carnegie Mellon. He has received his PhD in June 2006 in Electrical Engineering in the Division of Engineering and Applied Science at Harvard University. He is a Teacher for the course entitled Innovation in Science and Engineering at Harvard. Prior to returning to the graduate program at Harvard, Mr. Ricketts worked in the consumer electronics and semiconductor industry for eight years. Mr. Ricketts also founded three small businesses. He received an M.S. and B.S. in Electrical Engineering from Worcester Polytechnic Institute in Massachusetts.

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Class Details

Class Schedule: The class will be held on selected Tuesdays from April 1 to May 27. The class will begin at 4:00 PM and conclude at 7:45 PM.

Class Location: The location of the class will be announced later.

Class Language: **The class will be conducted in English and all assignments are to be completed in English.** All students must be capable of reading, writing, and speaking in English and may be asked to demonstrate their capability.

Required Texts: The texts that will be required for this class are the following:

- 1) Creativity, Inc., J. Mauzy and R. Harriman, Harvard Business School Press, 2003.
- 2) Creativity in Science, Dean K. Simonton, Cambridge University Press, 2004.
- 3) Double Helix, James D. Watson, Simon & Schuster, 1968 (available in French).
- 4) Rosalind Franklin, Brenda Maddox, Perennial, 2003.

Class Preparation: Activities outside class will be selected to allow the time in class to be optimal and to emphasize the personal learning that is required for such a topic. It is expected that a minimum of five hours per week outside class will be required.

Class Participation: In addition to class attendance, preparation for case studies, and project involvement, each student is expected to actively participate in class. Each student is **required to submit a reflection/summary of the assigned readings** prior to the start of each class. This is an informal writing assignment – concentrate on the content rather than the grammar or length. This short summary is due prior to the start of each class. It is to be submitted by e-mail to the instructors.

Product Project: Students will select a product from a variety of possible sources that will be described in class. The students will investigate the product and the process that led to it. A short report will be prepared.

Final Project: Students will interview a creative engineer or scientist. Using tools provided in class, the person interviewed will be described including applicable history, innovative process, and end result. A paper of approximately six pages will be prepared.

Class Credit: This class is only offered for credit. Grades will be provided to each students sponsoring organization. Specific grading criteria and expectations will be provided at the beginning of the class. Students that desire to audit the course must make a specific request. Auditors will be allowed on a case-by-case basis.