Syllabus
Innovation in Science and Engineering
Spring 2008
Paris, France

April 1st	First 1 ½ Hours	Second 1 ½ Hours
	In class: **Course Introduction** – Why is this class important? What are you going to learn? Discussion of goals and objectives of the course, an overview of major themes, requirements and class assignments, expectations, and grading. Describe the complexities of science and engineering. What is the "scientific process"? Pose the questions that they will face and describe how we will address them. Discuss and define creativity, innovation, and their application to science and engineering. **Creativity and Innovation** – Discuss and define creativity, innovation, and their application to science and engineering. What is it? How does it occur? What factors affect creativity?	**In class:** **Problem Selection** – The lecture and discussion will focus on the challenges of selecting a problem. This is a critical part of the innovation process. The methods of selecting and the values that can be used to assess the problem will be described. The role of Problem Selection in Creativity and Innovation will be defined. Examples will be discussed. Initial project (the "Product Project") and final project will be described.

April 8	First 1 ½ Hours	Second 1 ½ Hours
	In class: **Problem Selection (continued)** – The lecture and discussion will focus on methods that could be used to select a problem. This is a critical part of the innovation process. What are the limitations that an individual or a team has in selecting a problem? Examples and class experiences will be used to augment the methods proposed.	**In class:** **Problem Specification** – Once a problem is selected, structure must be placed on the problem prior to moving to a solution phase. This structure will be defined. How do you define and deconstruct the problem? How do you prioritize the constituent parts? What is the best solution strategy to address key questions and roadblocks? What is success?

April 15	First 1 ½ Hours	Second 1 ½ Hours
	In class: **Problem Solution** – Once a problem is selected and specified, a solution must be developed. This process will be defined. Taking risks is a key part of effective problem solution. "Failures" will occur and must be used to obtain an effective solution. How should a problem solution path be prioritized? Individual and Group creativity and problem solving will be discussed.	**In class:** A **Guest Speaker** will be invited to the class to discuss practical issues in Innovation. Questions and answers will follow a short introduction. Assign final project.

May 6	First 1 ½ Hours	Second 1 ½ Hours
	In class: **Creative Processes** – Mr. Philippe Van Caenegem, of Synectics, Inc. consults in innovation processes. He will join us to describe methods that have been used and are well developed to create innovative solutions to problems. How can problems be effectively solved? What methods work and which don't?	**In class:** Teams are frequently used in the solution of challenging problems. Mr. Philippe Van Caenegem will describe how teams function while maximizing their creativity.

May 13	First 1 ½ Hours	Second 1 ½ Hours
	<u>In class</u>: Innovation and Entrepreneurship in France and the US. What are the models for basic and applied research? What are the challenges? What models best facilitate effective problem selection and solution?	**<u>In class</u>:** **Case Study –** The Double Helix will be interactively analyzed and discussed to identify many of the key issues described in the course.

May 20	First 1 ½ Hours	Second 1 ½ Hours
	<u>In class</u>: **Creativity in Science** – Discuss how scientists are creative. What metrics should be used to measure creativity? Is creativity due to genius, process, zeitgeist, or chance? Develop and discuss model proposed by Simonton.	**<u>In class</u>:** **Exercise** – An in-class project will be described that will provide an opportunity to use many of the techniques that have been described to this point in class.

May 27	First 1 ½ Hours	Second 1 ½ Hours
	<u>In class</u>: Complete analysis of the discovery of DNA and the teams involved. An introduction to **"Sell and Create Value"** will be provided. Being able to "sell" your innovation is critical to success. Discuss how to influence the thoughts or behaviors of others. This is particularly challenging when the person "selling" does not have authority.	**<u>In class</u>:** **Guest Speaker** on Innovation in and Research in France. **Final Reports Due.**