Minor in Innovation, Entrepreneurship, and Economic Development (I Double E)

The pace of technological change has been steadily increasing over the last 100 to 200 years, if not longer. The ability of nations to grow and prosper economically is dependent on their ability to harness the forces of technological change. Today it is common to speak of the knowledge economy in which the success of firms depends on their ability to manage innovation and technological change. Regions all aspire to be the next Silicon Valley and enact all kinds of policies to lure and support innovative firms. Technological change pervades our lives, entering nearly every decision we make. The goal of the minor in Innovation, Entrepreneurship, and Economic Development is to equip students to understand the forces underlying and unleashed by technological change in order to become better decision makers, managers, policy analysts, and researchers.

The minor will begin in the Fall of 2007. It will involve courses offered by faculty in H&SS, the Heinz School of Public Policy and Management, and Carnegie Institute of Technology. A customized version of the minor will service students in each of the participating units. In H&SS the minor, which will service upper-level undergraduates, will be based in the Department of Social & Decision Sciences. Eight courses, enumerated below, define the core of the minor. Students will also be eligible to select from a roster of other courses, some of which are offered in the Department of Social & Decision Sciences and some elsewhere. A selected list of these courses is also presented below.

The eight courses that define the core of the minor are:

Technology and Economic Growth (88-391/90-756)
Technology Entrepreneurship: Principles for Practice and Policy (88-390)
The Strategy and Management of Technological Innovation (19-682/90-880)
The Rise of Industrial R&D (79-440/88-345)
Industries and Technological Innovation (19-163)
Science, Technology, and Innovation Policy (19-605/88-714)
The Global Economy: A User's Guide (88-410/90-749)
The Rise of the Asian Economies (88-411/90-752)

Other courses that may be used to supplement courses from this list include:

Policy Analysis I (88-220)
Policy Analysis II (88-221)
Policy Analysis III (88-222)
Economic Theory (73-251)
Industrial Organization (73-365)
Organizations (88-260)
Managerial Decision Making (88-385)
Behavioral Economics (88-360)

Complex Technological Systems (79-358/88-347)

Students completing the minor will be required to take a total of six courses from the above two lists. All students will have to take Technology and Economic Growth (88-391/90-756). Additional courses are required depending on the student's focus in the minor. At this point, we envision three areas of study within the minor: Management of Innovation, Technology Policy, and Economic Development. The required courses for each of these areas, in addition to Technology and Economic Growth, include:

- **Management of Innovation**—Technology Entrepreneurship: Principles for Practice and Policy, The Strategy and Management of Technological Innovation, and The Global Economy: A User's Guide.

- **Technology Policy**--Rise of Industrial R&D, Technology Entrepreneurship: Principles for Practice and Policy, and Science, Technology, and Innovation Policy.

- **Economic Development**-- The Global Economy: A User's Guide, The Rise of the Asian Economies, Industries and Technological Innovation.

For each of the three areas of study within the minor, four required courses are specified. Students must take two other related courses to complete the minor. These courses can be from the above eight courses that define the minor, the other courses listed above, or other courses nominated by the student. Over time, the list of "other" courses that can be counted towards the minor will be expanded. For now, students are free to nominate up to two courses that they feel relate to their course of study in the minor that will be accepted toward the six courses required for the minor.

The rest of this document provides a description of both existing and new courses that constitute the eight courses enumerated above that are the core of the minor. Students will need to check the schedule of classes to determine the availability of these courses each semester. They will also need to complete the prerequisites for any course as specified by the instructor.

- Technology and Economic Growth (88-391/90-756): Broad themes concerning the determinants and consequences of technological change will be covered. The main topics include the modern theory of economic growth, the role of technological change in the historical growth of major economies, why some countries are rich and others poor, the nature of technological change and its economic implications, the diffusion and adoption of new technology, and industrial competition and technological change.
- Technology Entrepreneurship: Principles for Practice and Policy (88-390): The way new firm creation promotes the development and commercialization of emerging technologies is explored. Topics include how start-ups earn economic profits, how regions prosper from local start-ups, the role of universities and researchers in entrepreneurship, and the financing of entrepreneurial ventures.

Students will participate in a practicum in which the prospects for technologies developed within the university are evaluated.

- The Strategy and Management of Technological Innovation (19-682/90-880): The application of conceptual models for the interaction between market forces, technological change, and internal firm capabilities in high-tech industries will be explored. Topics include the relationship between market structure and innovation, the organization of industrial research, patenting and intellectual property strategies, standards and network externalities, and competition and pricing strategies. Theories will be applied to business cases drawn from a variety of industries and countries.
- The Rise of Industrial R&D (79-440/88-345): The origins, organization, and achievements of industrial R&D will be considered. Topics covered include the factors that led to the establishment of modern R&D laboratories, the effect of industrial R&D laboratories on the character of science, technology, and business, how government, science, and technology shapes industrial R&D, the role of universities in industrial R&D, the globalization of industrial R&D, and the future of industrial R&D in the 21st century.
- Industries and Technological Innovation (19-163): A comparative analysis of how different industries develop, manage, and disseminate new technologies will be conducted. Topics include what is product and process innovation, competition and intellectual property, coping with radical versus incremental technological change, and the management of knowledge. Sectors emphasized include biotechnology, information technology, and manufacturing.
- Science, Technology, and Innovation Policy (19-605/88-714): The relationship between science, technology, innovation, and policy will be considered. Topics include balancing market failure and government failure, managing tradeoffs under uncertainty, assessing and using scientific information, and promoting economic development through science, technology, and innovation policy. Cases examining intellectual property rights, strategic trade, R&D promotion, and standards across a range of industries and countries will be analyzed.
- The Global Economy: A User's Guide (88-410/90-749): The ongoing process of international economic integration – popularly referred to as globalization – has fundamentally transformed the way firms and governments pursue their interests. This course will analyze the fundamental aspects of the global business environment that influence business decisions and behavior. Topics include the influence of structural economic factors on the decision to locate particular economic activities in particular countries, the way government policies both promote and restrain the integration of national economies with the global economy, and the impact of volatility in the global macroeconomic environment on international business strategy. These issues will be studied using the analytical tools and concepts of international economics, and case studies will be used to relate these concepts to actual business and policy problems.
- The Rise of the Asian Economies (88-411/90-752): From the dawn of the industrial revolution in Britain in the late 18th Century through 1980, the locus of global industrial development remained concentrated in Western Europe and North America. Over the last 25 years, the global economy has undergone a

historic shift, with East Asia now accounting for an increasingly important fraction of global manufacturing, international trade, and technological progress. How did this happen? What lessons can be derived from this experience for the rest of the world? What opportunities and challenges does the emergence of the East Asian economies create for firms outside the region? What lies ahead? Analytical tools drawn from several fields of economics and finance, business cases, and guest lectures by expert practitioners will be used to analyze the strengths that sustained economic growth in East Asia for decades, the weaknesses that undermined that growth in the late 1990s, and future prospects for continued growth. Considerable attention will be paid to recent developments in the Chinese economy and the prospects for continued growth in China over the next decade.