Technology Leadership Course Descriptions

ENG BE 700 A1 – Advanced Biomedical Design and Development (two semesters, eight credits)
Significant advances in medical technology require a profound understanding of clinical needs, the engineering skills to design and develop innovative solutions, and the appropriate management strategies to safely and effectively bring these advances into routine clinical practice. This two-semester, eight credit course provides students with a complete experiential opportunity to work directly with the clinical community to identify real-world medical needs, design novel and innovative engineering solutions, reduce their concepts to practice, and develop realistic implementation plans for commercializing their products. *This course is open to MEng students only and fulfills 4 credits of technology leadership and 4 credits of technical electives.

ENG ME 502 – Intellectual Assets: Creation, Protection, and Commercialization
This course provides students with the knowledge and tools necessary to create, protect, and commercialize engineering and scientific intellectual assets. Students will first make use of creativity tools to attack posed engineering problems, then turn to means for protecting their solutions. Rapidly growing areas that are affecting nearly all businesses (e.g., software and the internet) as well as "high-tech" areas including microelectronics, communications, and bioengineering will be emphasized. Extensive patent searches and analysis will be carried out to develop skills for quickly ascertaining the protected technical content of patents, and for recognizing what intellectual property (IP) should be and can be protected. Legal aspects for protecting creative ideas will be studied at a level appropriate for engineers to interact easily and smoothly during their technical careers with IP lawyers. Various business models for the commercialization of intellectual assets will be analyzed. Extensive class exercises and projects will explore in depth all three of these important areas of IP, with emphasis on key contributions during engineering and scientific research and development activities.

ENG ME 517 – Product Development
Introduction to the leadership practices required for world-class product and process development in manufacturing companies. 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.

ENG ME 525 – Technology Ventures
An introduction to the formation and management of technology-based enterprises for engineers and scientists. Modules include opportunity recognition and evaluation, gathering financial and human resources, and managing and harvesting ventures. Goals include an understanding of basic start-up finance and accounting, writing business plans, presenting venture ideas to industry experts, and venture leadership skills. Students become familiar with fundamental technical and engineering issues in a wide variety of high-tech industries, especially information technology, life sciences, biotechnology and telecommunications. Case studies, lectures, workshops, and projects are utilized.
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ENG ME 550 – Product Supply Chain Design
Integrated design of systems to deliver quality products to customers. Lean manufacturing with hard automation. Worker empowerment with active learning. Creation of lean supply chains with control of logistics and information. Creating customer value in a world of excess capacity. Industry project required.

ENG ME 583 – Product Management

ENG ME 584 – Manufacturing Strategy
Strategic decision-making for technical people in manufacturing companies. Provides practice in applying financial, organizational, and operational concepts through analysis and discussion of case situations. Topics include process alternatives and their implications; interactions among product design, process design, worker skill and worker motivation; supplier relationships; interfaces with marketing and finance; introduction of new technology; capacity planning; and competitive analysis. Taught principally by in-class discussion plus guest lectures.

ENG ME 703 – Managerial Cost Accounting
This course provides an overview of accounting measures important to manufacturing operations for both engineers and managers. It begins with a summary of accounting fundamentals, including financial reporting and performance measurement. Topics include cost accounting management for job-order, hybrid, and just-in-time operations; activity based costing and management; measuring and managing spoilage; capacity cost; and analysis of new technology investments.

ENG EC 518 – Project Management for Software-Intensive Systems
Planning and control of a software project. Software project economics. Cost factors and cost estimation models; cost/benefit tradeoffs, risk analysis; project metrics for quality, schedule, budget, and progress. Role of the project manager and organization of the development team. Case studies used to illustrate successes and failures in the management of actual projects. Small-team projects involving the development of software project plans.

**The following courses are offered through the School of Management (GSM). Students are required to complete a cross-enrollment form, available here, and receive instructor approval, except where noted. Cross enrollment forms should be emailed to jkeppley@bu.edu, the Graduate Programs office at the School of Management.**

GSM OB 848 E1– The Leadership Challenge (*this section for MEng students only; does not require instructor approval)
This course examines the essence of leadership; its relationship to managing; and the behaviors, attitudes and perspectives that distinguish leaders. Leadership is considered in a variety of ways: leadership in crises, at the top, in the middle, and in groups. Case studies, students' past experiences,
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instruments, and other learning activities provide opportunities for students to assess and develop their leadership talents.

**GSM SI 839 – Managing and Leading Innovation (*does not require instructor approval)**
This class will examine how managers and leaders can create the conditions for innovation at the individual, team and organizational levels and how those conditions differ for startup and mature organizations. Managing innovation includes the generation of ideas; the integration of ideas into new product concepts; and the commercialization of ideas. While core strategy courses address the questions of what innovations to pursue and whether and when those innovations will bring value, this course addresses the question of how managers can create organizations to deliver innovations of value. Thus, the course will focus on the practices and processes that managers need to put in place to enable organizations to execute on an innovation strategy. In doing so, students will evaluate how to balance the challenges of organizing, managing and leading innovation with the need to produce concrete, routine and expected outcomes within the organization. To be innovative, any new idea must resolve the innovation paradox introducing enough novelty to appeal to new markets while retaining enough familiarity to tap into existing behaviors. Because design and innovation are frequently inseparable in managing this paradox, the class will assess how design contributes to innovation in product, process and business models across industry sectors. The course will also consider the role that all sources of innovation play including communities, networks, brokers and other forms of open innovation. Students will be asked to reflect upon innovations that have been critical to their lives, and how these innovations were produced and gained market traction. Final group projects will explore how to rescue innovations in trouble with turnaround teams.

**GSM SI 852 – Starting New Ventures (*does not require instructor approval)**
This course focuses on the process of identifying and obtaining the necessary resources to launch an entrepreneurial venture through the development of a business plan. A well-written business plan will communicate the business concept in a way that attracts the various resource providers necessary for the venture’s success. Students will individually develop a business concept and prepare and present a professional business plan.

**GSM SI 855 – Entrepreneurship (*does not require instructor approval)**
The course is a comprehensive introduction to the entrepreneurial process from idea generation through venture launch and later growth. Initial lectures and case studies focus on idea generation and concept feasibility along with the skills, competencies and perspectives entrepreneurs must develop to manage the organization through each phase of development. Later lectures and cases emphasize the issues faced by entrepreneurs in scaling innovative enterprises; use of strategic alliances, attracting funding and managing investors, managing growth expansion and choosing among exit options.

**GSM SI 871 – Strategies for Bringing Technology to Market (*does not require instructor approval)**
Strategies for Bringing Technology to Market is a unique course that guides student teams as they undertake commercial go-to-market strategy for scientific and engineering breakthroughs. By collaborating with faculty and graduate students in the University’s research labs and mentors from the business community, teams will assess the economic and social prospects of recent technology innovations, outline the technical and market risks and the key commercial milestones and make recommendations for the most effective commercialization strategy. Project work is supported by lectures that focus on critical skills required. Guidance will be provided in assessing critical
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commercialization milestones by a combination of faculty and mentors from the business community. The overarching goal of this course is to provide students with the background to appreciate the complicated issues of stewarding business enterprise in diverse geographic and institutional environments.

GSM HM 703 – Health Sector Issues and Opportunities
This course provides a dynamic introduction to the health sector, beginning with the burden and distribution of disease and current patterns of expenditures. While the emphasis will be on the American system, a global context will be developed. The basic elements of insurance and payment, service delivery, and life sciences products will be described, and put in the context of the unique economic structure of the sector. The intense challenges of the sector will be explored, as well as both the ethical issues presented and the opportunities that emerge. Public policy and technological and practice development as drivers of change will be addressed.

GSM HM 801 – Bench to Bedside: Translating Biomedical Innovation from the Laboratory to the Marketplace
This course focuses on the translation of medical technologies into new products and services for the healthcare system. The course begins with a rigorous study of intellectual property, licensing and the core aspects of planning, creating, funding and building new entrepreneurial ventures. Concepts and tools are presented for assessing new technologies and their potential to be the basis for a new entrepreneurial venture. Comparisons will be made of how technologies can be sourced and commercialized out of three very different environments: universities, national laboratories and corporate laboratories. Cross-disciplinary teams of students will be formed which will evaluate translational research projects currently being developed at Boston University and their potential for transformation into a start-up company to commercialize the technology, providing a unique linkage between the scientific research activities of the university and the professional schools. Each week there will be a case study which will discuss examples of both success and failure in technology commercialization. Some of these case studies examine Boston University life sciences spin-out companies, and the founders and CEO’s of these ventures will share their experiences with the class.

GSM PL 870 – Government, Society and Sustainable Development
Government, Society and the New Entrepreneur” is broad and far-reaching course in both scope and range of topics, dealing with such varied issues as economic globalization, international entrepreneurship, and the interplay between democracy and capitalism. Students are asked to take a long perspective of the histories of countries and regions and to study the implications for modern business enterprise. The first major section of the course is a series of country cases that describe the cultural, social, political and economic context in which business enterprise is conducted. These cases support dense and rich discussions of the economics of global enterprise and the challenges of operating in various country settings. The second major section of the course deals with international institutions such as the WTO, World Bank, IMF as well as major trends such as Intellectual Property Rights and Corporate Social Responsibility. The topics in this section cut across country boundaries and enrich the material in part one on competing in country environments. The third major section of the course addresses the challenges of managing enterprises in each of five major global sectors: water, food, health, energy and clean tech/environmental. These industries were selected because of their foundational nature and importance to economic development and national security across many country environments. Cases on large, multinational enterprises are coupled with cases on small
entrepreneurial startups to present the challenges of managing each type of organization – and the implications of competition between them become vivid by the contrast. Throughout the course the themes of creativity, innovation and new organizational architectures are layered over the material allowing students to explore how the new entrepreneur operates without borders; reaching across industries, markets and communities and breaking through language, cultural, geographic, political and economic barriers to launch new businesses on new platforms to serve global markets. In doing, so, they empower people, engage societies, and break political and geographical boundaries to build sustainable, benefit maximizing businesses that solve big problems.