



Manufacturing Leadership Courses

Fall 2015

MGT 6114 – Leadership Development

This course fosters personal reflection and inquiry that enhances students' ability to influence others and make a positive impact on their organizations. Based on the authentic leadership concept developed by Bill George, former CEO of Medtronic and current clinical professor at Harvard Business School, the course's purpose is to help students to prepare themselves to become organizational leaders, exercise leadership, and embark on paths of personal leadership development. The class requires curiosity, reflection, and a willingness to share during class discussions and in leadership development groups.

Learning Outcomes:

- Recognize their leadership journeys and crucibles.
- Understand why leaders lose their way and the self-awareness needed to avoid derailment.
- Gain clarity about their leadership principles, values, and ethical boundaries, and how they and others might respond under pressure.
- Understand what is motivating them, both extrinsically and intrinsically, and to find leadership paths that enable them to use their capabilities.
- Know how to build support teams and oversee their integration.
- Comprehend the purpose of their leadership and enable other leaders to optimize their effectiveness.

ISYE 6380 – Production Planning & Control

This course focuses on methodologies for planning and controlling production systems. It covers popular production management paradigms, such as materials requirements planning (MRP), enterprise resources planning (ERP), and just-in-time (JIT) concepts, as well as logistical planning techniques, including economic order quantity (EOQ) and other statistical inventory-control policies. The course also exposes students to push- and pull-productions systems, shop-floor control policies, production planning and scheduling, and capacity management.

Learning Outcomes:

- Understand the structure of production systems and techniques for performance measurement.
- Comprehend the structure and dynamics of push- and pull-production systems, including material requirements planning and just-in-time.
- Know how to develop reliability test plans.
- Develop skills and in-depth understanding of methods used for shop-floor control, production scheduling and dispatching, workforce planning, and throughput analysis.

Spring 2016

MGT 6753 – Principles of Management for Engineers



The objective of the class is to provide engineering and science students with an accelerated introduction to the basics of management and the language of business. It is taught as a series of business disciplinary modules. The professors who teach the modules represent diverse functional areas including: accounting, finance, operations management, marketing, international marketing, industry analysis, and organizational behavior.

Learning Outcomes:

- Be able to understand and analyze GAAP financial statements; calculate and use key financial ratios; and determine operational metrics, such as inventory turnover and average collection period.
- Know how to use accounting data to determine product costs and make critical managerial decisions, comprehend the difference between departmental- and activity-based costing and the impact on product costing, and know how to determine and explain operational variances from standard.
- Know the difference between accounting profits and economic value added (EVA), the significance of capital costs, and how to determine the financial attractiveness of future project investments.
- Understand how market research drives customer identification and segmentation, the importance of target marketing and product positioning, the significance of the 4 Ps of marketing (e.g., product, price, place, and promotion), and the issues related to international marketing.
- Know how individual attitudes are shaped and reshaped, as well as what the seven basic motivational theories are and how to apply them.
- Understand techniques for managing innovation and know when to apply each one.
- Know how to create a business strategy and how to apply systems thinking to align functional (for example plant) strategies to the overall strategic business unit and corporate plans.

ISYE 6381 – Manufacturing Reliability

This course covers major topics in reliability and maintainability engineering. It introduces students to fundamental reliability concepts and metrics, such as lifetime distributions, hazard/failure rates, and mean-time-to-failure, and teaches them to evaluate the reliability of single components as well as multi-component systems. Students also learn about reliability lifetime testing strategies, different types of data censoring, and ways to analyze failure data. The course also addresses how to plan for and manage maintenance programs, and explores the goals, benefits, and challenges of total productive maintenance (TPM).

Learning Outcomes:

- Understand basic concepts of component reliability, failure distributions, and mean-time-to-failure.
- Develop skills for evaluating reliability of complex systems.
- Understand how to develop reliability test plans.
- Understand various maintenance models, including preventive and predictive styles.
- Develop skills for analyzing failures data, including censored and uncensored data.

Summer 2016



MLDR 6701 – Foundational Topics in the Manufacturing of Forest Bioproducts

The objective of this course is to enhance technical skills related to the forest bioproducts manufacturing industry. The course provides comprehensive, foundational knowledge of the industry, enabling students to understand the role of different manufacturing operations in the overall process and to strategically plan for process improvement. To master the technical content, several case studies challenge students to identify aspects of leadership that enable technology and/or product development.

Learning Outcomes:

- Know the technologies deployed in the forest bioproducts industry.
- Be well-versed in the processes, equipment and unit operations for pulping; chemical recovery; bleaching; recycled fiber/deinking; paper, board, and tissue manufacturing; and converting.
- Understand wood chemistry, and tree- and fiber-morphology to comprehend the impact of factors on paper-product properties and end-use performance.
- Obtain fundamental knowledge of surface chemistry as it applies to wet-forming processes and the supply side of chemical applications that are prevalent in the forest products industry.
- Understand the environmental issues and safety considerations associated with operating a forest bioproducts facility.

Fall 2016

ISYE 6383 – Fundamentals of Manufacturing Supply Chain Operations

This course focuses on manufacturing supply chain operations, including approaches for the design and planning of such systems. It covers key supply chain components, performance measurement for supply chain operations, and approaches to designing and planning supply chain systems and their components. In addition, procurement, supply chain inventory management, freight transportation, warehousing, and distribution systems are introduced and analyzed.

Learning Outcomes:

- Understand the structure of manufacturing supply chains, and techniques for supply chain system performance measurement.
- Know how to perform quantitative analysis of demand management, inventory management, warehousing, distribution, and freight transportation systems, including how to use software tools, such statistical analysis and optimization applications.
- Design manufacturing supply chains to meet performance criteria or optimize performance metrics.

MGT 6107 – Leadership and Organizational Change

The objective of this course is to help students develop an advanced understanding of how to exercise leadership as organizations and industries evolve. It covers the unique and compelling challenges posed by changes in the business and non-profit environment, as well as the frameworks and skills that are critical to leading and managing organizational change. Students study scenarios through the lens of various viewpoints, including formal leaders, informal leaders, and those with inadequate resources. Discussions also dissect individual, organizational and societal change perspectives as they relate to leading and experiencing change.

Learning Outcomes:

- Establish and run organizations that are capable of adapting to changing conditions in the environment.
- Know how to effectively manage organizational change.
- Demonstrate leadership, teamwork, and communication skills across a diverse set of circumstances.
- Know how to work effectively and creatively in diverse groups.
- Be able to analyze current problems in organizational and societal change and use suitable concepts and frameworks in decision-making.
- Identify and solve problems, pursue opportunities for organizational growth or improvement, and implement problem-solving activities with a commitment to quality improvement.
- Be able to listen, speak, and write effectively, present information professionally, and give and take criticism in a constructive manner.

Spring 2017

ISYE 6383 – Fundamentals of Manufacturing Supply Chain Operations

This course focuses on manufacturing supply-chain operations, including the design and planning of such systems. It covers key supply chain components, performance measurement for supply chain operations, and ways to design and plan supply chain systems and their components. Procurement, supply chain inventory management, freight transportation, warehousing, and distribution systems are introduced and analyzed.

Learning Outcomes:

- Understand the structure of manufacturing supply chains, and techniques for supply chain system performance measurement.
- Be able to apply quantitative analysis to demand management, inventory management, warehousing, distribution, and freight transportation systems, including how to use software tools such statistical analysis and optimization applications.
- Know how to design manufacturing supply chains to meet performance criteria or optimize performance metrics.

MLDR 8803 – Emerging Markets for Forest Bioproducts

This course examines the development and manufacturing of nontraditional products that contain forest bioproducts and other biomass. It builds upon foundational knowledge in the manufacturing of forest bioproducts to analyze and assess emerging mass-production markets. Topics include the processes necessary to produce raw materials as well as materials' construction and characterization. To master the technical content, students examine case studies that challenge them to identify aspects of leadership that enable technology and/or product development.

Learning Outcomes:

- Know the emerging technologies that are being deployed and will be deployed in the coming decade.



- Be well-versed in the processes, equipment, and unit operations for biorefining, nanocellulose manufacturing, and applications into marketable materials and products.
- Understand lignin chemistry and the current barriers to its value-adding applications.
- Comprehend the forest products industry's market dynamics and impending trends.
- Understand the anticipated public policy and regulatory changes that would impact manufacturing decisions.

MLDR 6800 – Manufacturing Leadership Capstone Design Challenge

In this course, students work in teams to complete a capstone project that addresses a request for proposal they receive at the beginning of the semester. Successful completion of the project requires integration of the topics mastered in the other Manufacturing Leadership business, leadership, manufacturing, and concentration courses.

Learning Outcomes:

- Understand the types of design and organizational decisions that challenge operations teams.
- Be able to design a forest bioproducts or chemical manufacturing process.
- Know the environmental issues and safety considerations associated with operating a mill.
- Appreciate the importance of maintaining high ethical principles in process design and mill management.
- Function effectively on diverse teams of mixed ability and be able to evaluate both their own and their team members' contributions to the overall process design.
- Understand process simulators and be able to use them in process design, equipment sizing and costing, staffing requirements, profitability analysis and optimization.
- Be able to apply heuristics when selecting chemical reactors or reactor trains, and when choosing separation processes for liquids, vapors, vapor-liquid mixtures and vapor-liquid-solid mixtures.
- Be familiar with the most widely-used industrial separation processes and their basis for separation.
- Understand the concepts and application of heat- and power-integration to minimize energy requirements for forest bioproducts or chemical manufacturing plants.