Program Summary

For more than 20 years, Wayne State University has provided a world-class education to Ford Motor Company through its signature program, the Engineering Management Master’s Program (EMMP). Designed for engineers with high potential on the path to leadership, the program began with the idea that future leadership would require a wide range of business and engineering skills to be globally competitive. Graduates earn a Master of Science in Engineering Management (MSEM) degree from Wayne State University. The program prepares experienced engineers for progressive responsibility within the technical arena, developing them as leaders and change agents. A special emphasis is placed on cultivating knowledge and skills that students can use immediately. Following two years of course work, students execute team-based Leadership Projects over the final year of the program. These projects serve as a capstone to the EMMP educational experience. Students take corporate priorities and translate them into high-visibility projects, providing immediate impact to the student and company.
A LONG-TERM INVESTMENT IN EMPLOYEES AND THE COMPANY

Key Benefits

Real-world Problem Solving:
Students learn to apply EMMP tools such as Decision and Risk Analysis to opportunities arising in the context of their everyday roles. The hands-on student environment, coupled with targeted team projects, makes EMMP unmatched by other engineering management programs.

Business and Engineering Partnership:
The College of Engineering and School of Business Administration have partnered to produce a unique program, specifically focusing on the needs of future engineering managers by integrating the most pertinent ideas and tools from each discipline.

Global Perspective:
Students gain an understanding of best practices for cross-cultural business, communication and negotiations and the global environments of marketing, product development, and manufacturing.

Unique Automotive Focus:
EMMP Advisors and faculty have decades of automotive industry experience and bring expertise to bear in continually refining the program in light of industry changes. The combination of students’ knowledge and WSU’s experience make for a unique and highly-focused synergy.

Leadership Networks:
EMMP draws Ford Motor Company leadership into the classroom for relevant topic discussions. Guest visits by corporate executives such as Alan Mulally, Mark Fields, and Raj Nair, and many others contribute to the student’s learning and networking opportunities.

Immediate Value:
Not only does EMMP provide a quick ROI for the organization through high value team projects, it also provides immediate value to the students through skill development and group networking that can be utilized in the working environment.

Format
EMMP is a lock-step program that students complete in three years. Students attend courses two evenings per week at Ford. The program requires 45 semester hours of graduate study from four principal components:

- Engineering
- Business
- Global Leadership
- Analytics

Who Qualifies?
Admission to EMMP is by Ford Motor Company management nomination only

- Minimum BS in Engineering (preferred), or another discipline with a significant course load in mathematics.
- Minimum 3 years of full-time engineering work experience.
- Meet the admission requirements of the WSU Graduate School and the College of Engineering.

Education for the Working Engineer
Through years of partnership, Wayne State University understands the demand placed on working engineers. To ensure that students are able to focus on the rigorous academic program, the Industrial & Systems Engineering Department provides full administrative support for all students in the program. We also record each class session and live stream it to support students who are on launch or assignment, allowing them to participate in real time or watch the recordings. Teams of students successfully collaborate around the globe to complete project work.
Automotive Engineering Statistics  

This is an introductory course in probability and statistics for engineering students. The goals of this course are to:

- Develop skills in analyzing the random component of a wide range of problems
- Gain an intuitive understanding of probability and statistics
- Learn to recognize opportunities to apply statistics to real world problems
- Develop skills in analyzing data by using MINITAB statistical software

The skills developed during this course can be used immediately by the learners on real world opportunities and problem areas from their own organizations. They will be able to recognize the analytical methodology, apply appropriate tools, and then make decisions that can be presented to their management.

Vehicle Ergonomics  

This course develops an understanding of the basic concepts of ergonomics and human factors: anthropometry, biomechanics, and information processing. The goal is to enable the participants to become educated consumers of ergonomics principles and apply them by using state-of-the-art Ford simulation tools in both the vehicle and work design processes. The first part of the course investigates the ergonomics of the driver with regard to seating, controls, telematics, craftsmanship, exit and entry, loading and unloading and field of view. The second part explores work design and occupational ergonomics in the context of plant operations both in terms of safety and efficiency.

Robust Design & Reliability  

This course builds and enhances the skills of engineering students in the areas of robust engineering and reliability by helping them:

- Develop conceptual understanding of principles of robust design and reliability engineering
- Understand the role of variability and different types of noises and how to minimize variability subject to achieving the target(s) of product quality characteristics.
- Plan, design and conduct experiments efficiently and effectively, and analyze the resulting data to obtain objective conclusions
- Learn the physics-of-failure approach and statistical approach to reliability engineering
- Understand the product development process and how to integrate these methods into it
- Ask appropriate questions in the product development process to design in reliability/quality.
**Engineering Risk & Decision Analysis**

The goal of this course is to develop skills that facilitate the use of quality and efficient decision making processes. The course focuses on complex decisions that involve tradeoffs among objectives or significant uncertainty. The first half of the course focuses on three interrelated tools to:

1) frame decisions involving uncertainty and tradeoffs
2) structure and analyze multiple criterion decisions
3) structure and analyze decisions involving significant uncertainty to enable better management of risk.

The second half of the course provides a broader multi-dimensional perspective on decision making that includes psychological biases, ethics, behavioral economics and group dynamics.

**Automotive Operations Research**

The primary goal of the course is to develop the ability to formulate fairly complex optimization problems, provide an appreciation of the main classes of problems that are practically solvable, describe the available solution methods, and build an understanding of the qualitative properties of the solutions they provide. These models are used to find optimal or near optimal solutions to problems involving as many as tens of thousands of decision variables and thousands of constraints. The class participant will develop skills in recognizing and formulating deterministic optimization models and gain an appreciation for the role of sensitivity analysis in analyzing a problem. The course discusses methods for quantifying the impact of specific constraints on the overall performance of the system. Production scheduling, product mix planning, manpower planning, routing and scheduling, financial planning, and prototype builds are some of the application areas to be discussed.

**Agile Systems**

The Agile Systems course is structured to focus on three very important inter-related modules for an Automotive Manufacturing Enterprise. At the end of the course, the students would:

1) Learn the concepts of Lean, Flexibility, and Agility as applied in automotive manufacturing and supply chain management.
2) Learn Strategies/Methodologies relating to such topics as Production Planning and Control, Factory Dynamics, and Global Supply Chain Management
4) Acquire the ability to apply tools like Production Line Diagnostics and Value Stream Mapping.
Negotiation skills are essential to anyone who works with and through people to achieve objectives. The purpose of this course is to provide students with the analytic and interpersonal skills to negotiate effectively. Analysis is important because negotiators cannot develop effective strategies without understanding the context of the situation, the structure of the negotiations, the interests of the other parties, or their alternatives to a negotiated agreement. Interpersonal skills are important because negotiation is essentially a process of communication, relationship and trust building, and mutual persuasion.

Communication

Communication is a fundamental skill necessary for all aspects of the workplace environment. Whether it is an employee presenting information to colleagues or supervisors, or supervisors communicating organizational changes to employees, strong and precise communication is key to effective leadership and organizational efficiency. In this course, participants engage in the practical and theoretical aspects of communications, both verbal and nonverbal, in leadership and the workplace. This course blends academic theory with real world application of communication practices. Each module includes readings and reflection, surveys and assessments, role playing, lecture, and group discussion.

Management of Technology Change

The Management of Technology Change course examines change processes in the implementation of new ideas, processes, or technology. A diffusion of innovations perspective provides a framework for analyzing the change management issues by focusing on the interaction among technological systems, organization structure and communication channels. The course concentrates on directed change in technologies, such as new processes, products, services, materials, and management frameworks. Students learn about the elements of diffusion and the dynamics of product and process innovation.

Leadership of the Technical Organization

This course provides students with a global perspective on leadership. It investigates leadership at multiple levels: individual, organizational and societal and within multiple contexts: different organizational cultures, countries and virtually. Topics covered include the leader’s role in developing and changing organizational culture and leadership differences across cultures. Participants explore issues surrounding global leadership competencies such as leading virtually, the new ways of work, leading innovation, workforce diversity and ethics. They also assess of their own cultural intelligence.

Added-Value Negotiation

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Instructor: Hal Stack

Instructor: Nancy Phillippart

Instructor: Jay Johnson

Instructor: Julia Gluesing
Global Automotive Marketing

This class explores marketing strategy. On the one hand, it covers the essentials of marketing strategy, covering issues such as: how to build a marketing plan, how to do key analyses using tools like break-even analyses/ SWOT analyses/ BCG matrices etc., how to pick target segments, position a product and develop a marketing mix (the “4 Ps”), and how to integrate Marketing issues with issues from other disciplines e.g. HR, Ethics. On the other hand, it also covers strategic issues of specific interest to Ford, like (i) launching new products, (ii) utilizing social media, (iii) dealing with crises, and of course (iv) marketing in international contexts.

Finance and Managerial Accounting

The central concepts of finance and managerial accounting are combined in this course. The purpose of the course -- from a financial perspective -- is to demonstrate how engineering decisions can impact the financial goals of the company. The primary goal of financial decision-making is to maximize the price of the company’s common stock, which also maximizes the wealth of its shareholders. In this sense, the course gives managers a macro-vision of what the company is attempting to accomplish, how value is created, and where the engineering function fits in.

Managerial accounting on the other hand -- which will be the primary accounting focus of this course -- is concerned more with providing financial information to users internal to the firm. This course surveys the fundamental principles of managerial accounting used to support decisions for the engineering management control processes. In addition to reviewing the concepts of process costing, planning and control, and budgeting, trends in cost management, cost management in manufacturing, and other control issues will also be discussed.

Project Management

Students take this class at the beginning of their third year in the program. This course provides students with an appreciation for the role and importance that project management has in delivering complex engineering projects on time, within budget, within performance specifications, and satisfying the customer. It provides a review of the fundamental content of the nine knowledge areas of project management and five process groups included in the PMI’s Project Management Body of Knowledge and how they apply to the general stages of a project with a look at some basic techniques and tools. Team assignments and the development of a Project Charter prepare students to plan and then build a Project Management Plan for their EMMP Leadership Projects.
During the third year of the program, teams of four to five students work on strategic issues of major concern to the company as identified by Ford’s senior management. These Leadership Projects require students to apply the skills and knowledge gained throughout the course work to produce a real-world impact at Ford Motor Company. The projects are not just an academic exercise, and are expected to provide significant, demonstrable benefit. Some projects from EMMP have shaped the way that Ford Motor Company does business today, and some have saved Ford tens of millions of dollars. Examples:

- An Integrated Tool for Interior Design Optimization
- Redesigned Prototype Build Process
- Scenario Planning for Powertrain Selection Decisions
- Material Presentation Strategy in Manufacturing Assembly Systems
- Design for Customization in the Product Development Process
- Optimal Prototype Fleet Planning

**Cross-Functional Experience**

EMMP Leadership Projects provide students an opportunity to work outside their normal functional area—to positively impact career development by providing education and experience in areas they might not come into contact with otherwise. The cross-functional nature of EMMP promotes the integration of financial, marketing, engineering, and manufacturing perspectives into the conceptualization and planning of Leadership Projects. In doing so, the projects bring an overview of the company that is often found only at the executive level. Projects also serve to provide students with exposure to senior executive sponsors who oversee the projects from inception to completion.

**Experienced Advisory Committee**

A diverse group of WSU faculty, in their roles as Leadership Project Advisory Committee members, has advised more than 100 Leadership Project teams over the past twenty years. This group provides guidance to teams over the entire course of the year-long projects.
“The EMMP ensures that our employees receive practical knowledge and skills that are not only relevant to automotive technology but are directly applicable to Ford Motor Company objectives.”

Barb Samardzich  
Vice President and Chief Operating Officer, Ford of Europe

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