

MSENMA Supplemental Information – October 2006

MSENMA Courses:

The following courses form the core of the Engineering Management program curriculum. See the MSENMA web site for additional information (<http://www.marquette.edu/mсенma>)

Course No.	Course Name
ENMA 281	Product and Process Development – Project Management
ENMA 282	Reliability and Failure Analysis
ENMA 283	Innovation and Technology
ENMA 284	High Performance Design and Production Systems
ENMA 285	Technology Portfolio Management
ENMA 290	Strategic Technology Planning and Development
ENMA 295	Independent Study
MEEN 148	Design of Engineering Experiments
MEEN 172	Optimization of Industrial Systems
MEEN 173	Industrial Simulation
BUAD 210	Managerial Economics
BUAD 220	Operations and Supply Chain Management
BUAD 224	Quantitative Decision Modeling and Analysis
BUAD 230	Managerial Accounting
BUAD 240	Marketing Management
BUAD 249	Seminar in Marketing
BUAD 250	Financial Management
BUAD 262	Organizational Behavior
ECON 201	Applied Econometrics I

Current Related Projects:

ENMA (Engineering Management)-listed core courses in the MSENMA program are project-oriented. The following is a brief overview of some of the projects that student teams in ENMA courses are pursuing:

Bone Fracture Rapid Prototyping: The purpose of initial research is to provide a rapid response, low-cost, seamless process for generating bone fracture models from standard CT scan data using commonly-available rapid prototyping technology. While this approach can be applied to a wide range of medical conditions, this project focuses on repair of complex joints. The primary goals of initial efforts are:

- 1) develop a seamless “1-click” system for generating models from CT data,
- 2) establish robust data linkages to local orthopedic surgeons and model fabricators, and
- 3) fabricate models of fractured complex joints to demonstrate benefits of the approach and elicit input from users.

This work constitutes an initial element of a broader research program that will encompass three phases: 1) rapid fabrication of bone fracture models (initial project); 2) design and prototyping of custom joint repair implants - including bone remodeling and implant design optimization; and 3) design and fabrication of bone implants using bio-compatible materials and rapid prototyping technologies. This project is being pursued in cooperation with researchers at the Warsaw Institute of Technology. See www.eng.mu.edu/iere/BoneFractureModel for details.

Current Related Projects (cont'd.)

Green Hydraulics: Hydraulics is the technology of choice for high-power, fast-response energy transfer applications such as motion control. While water-based hydraulics is inherently safer and more environmentally friendly than oil-based systems, oil is a naturally-lubricating material with inherent corrosion protection properties, making oil-based systems generally more reliable and therefore the currently-preferred alternative. Currently, pressure and temperature sensors for hydraulic systems are common, but real-time in-situ corrosion and flow sensors are not commonly available. Development of sensor suites incorporating these elements is key to the expanded use of water-based systems. The purpose of the initial phase of this project is to:

- 1) adapt existing Marquette sensor technologies to this application;
- 2) design and fabricate in-situ corrosion and flow sensor prototypes;
- 3) package these sensors into universal sensor bodies; and
- 4) perform high-pressure testing at the Fluid Power Laboratory at Cracow University of Technology.

See www.eng.mu.edu/iere/GreenHydraulics for additional information.

Native Speaker Recognition Database: Researchers of the Faculty of Information Technology and Management at Poznan University of Technology are conducting research on speaker identification technology. These researchers desire to create a database of native Spanish speaker recordings which will be used to improve existing speaker identification technology. Marquette University researchers are pursuing automatic speech recognition research in the College of Engineering's Speech and Signal Processing Laboratory, which maintains high-quality speech recording capabilities. Marquette University is located in Milwaukee, Wisconsin, which has a significant native Spanish speaking population. Initial cooperative research in this area involves Marquette researchers establishing a robust process for creating a database of native Spanish speakers per Poznan's recording protocol, electronically linking the database to Poznan researchers, and creating a database of speakers adequate to support Poznan's research (50-100 speakers). See www.eng.mu.edu/iere/NativeSpeakerRecognitionDatabase.

Engineering Director – Engineering Management Program: Mark H. Polczynski, PhD

Dr. Mark Polczynski serves as the Engineering Director of the MSENMA program. Polczynski entered academia in 2005, having spent 27 years in industry working at Allen-Bradley, Cutler-Hammer, Square D, A.O. Smith, and Eaton Corporation, experience which provides a thorough understanding of the engineering profession and industry needs. Polczynski has conducted electronic hardware and software design and product quality assurance, and supervised electronic manufacturing. He has managed research and development departments, and facilitated new product and technology development in the U.S., England, and Germany. Recently, Polczynski served as Director of Innovation at Eaton Corporation's Corporate Innovation Center, where he led a group of thirty senior engineers and scientists focused on generating innovative technology-based solutions with the commercialization potential in the global marketplace. Recent publications by Polczynski related to the MSENMA program include:

- Polczynski, M.H., "An International Engineering Research and Exchange Initiative", Proceedings of the 36th ASEE/IEEE Frontiers in Education Conference, San Diego CA, October 28-31, 2006.
- Polczynski, M.H., "Expanding Extracurricular Learning Opportunities Through International Engineering Student and Faculty Exchange", Proceedings of the Tenth Annual Conference of the National Collegiate Inventors and Innovators Alliance, Portland Or, March 23-25, 2006, <http://www.nciia.org/conf06/cd/papers/pdf/polczynski.pdf>
- Polczynski, M. H., Jaskolski, S., V., Entrepreneurial Engineering Education, Proceedings of the Ninth Annual Conference of the National Collegiate Inventors and Innovators Alliance, San Diego CA, March 17-19, 2005, <http://www.nciia.org/conf05/cd/papers/polczynski2.pdf>.
- Polczynski, M.H., "Protecting Intellectual Property in a Global Economy", Intellectual Property Journal, V. 18, No. 1, Pp 83-96.
- Borkowski, P., Sowinski, T., Kwiatkowski, K., Skalski, K., Zabicka, M., Polczynski, M., "Geometrical Modeling of Knee Joint Including Anatomical Properties", Proceedings of the International Conference on Biomechanics, Zakopane, Poland, September 6-8, 2006.