



Undergraduate Handbook

2011 – 2012

**The Harold and Inge Marcus Department of
Industrial and Manufacturing Engineering
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1. Introduction

The world's first industrial engineering program was established at Penn State by General Beaver, then Governor of Pennsylvania, in 1908. Since that time, the Department has graduated more 7000 students making it the largest I E alumni group in the world. Despite this rich tradition, many people in Pennsylvania and the rest of the world, have little or no idea what an Industrial Engineer does. What follows below will give you a brief picture of what an Industrial Engineer (I E) does and the work opportunities available to the I E Graduate.

What Does an Industrial Engineer Do?

To start to answer the above question one might first consider what an Engineer does. Simply put, engineering is the application of scientific and practical knowledge in order to solve problems. For certain engineering disciplines, such as civil and electrical, we have a reasonable understanding of the type of problems solved. Even though industrial is an engineering discipline, the problems they solve are very often interdisciplinary in nature.

The Institute of Industrial Engineers defines its members as “engineers concerned with the design, improvement and installation of integrated systems of people, materials, equipment, and energy. They draw upon specialized knowledge in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design to specify, predict, and evaluate the results to be obtained from such systems.” Industrial Engineers differ from the other engineers in that they must be concerned with people as well as things, which makes them a prime source of management talent.

One of the confusing things about Industrial Engineering is the discipline's name. The name implies that you would expect to find these engineers in Industry. Indeed you do. But you also find them in banks, hospitals, government, at all levels, transportation, construction, social services, etc. There are currently some 200,000 Industrial Engineers employed in enterprises throughout the United States. The Engineer's Joint Council (Publication 224) predicted that “Industrial Engineering will grow more rapidly than any other engineering group.” On average, there are some 7000 job openings occurring annually with less than 5000 new I E graduates per year to claim them. According to the College Placement Council “Industrial Engineers are sought after by more types of employers than is true for any other formal curriculum.” Thus, as an Industrial Engineer you could be concerned with the quality of cookies coming off a production line, the scheduling of a hospital's operating room, the location of the next motel for a motel chain, the installation of a welding robot in an automobile fabrication line, the tracking of inventories for a food distributor, the designing of an automatic material handling system for an airfreight carrier, or the ergonomic design and layout of an airplane's cockpit. The combinations of the I E's talents and the variety of problem areas seem endless. The challenges and opportunities are there for those who become I E graduates. How does the I E curriculum at Penn State prepare you for these challenges and opportunities? The answer to this question is given below.

2. The I E Curriculum

Based on the feedback received from the current students and alumni, the department faculty modified the curriculum in 2005, so that students are provided with a broader domain of applicability and the objective of educating the world class Industrial Engineer is met. In addition, it was also decided to give the students the option of specialization through tracks in the modified curriculum. The emphasis of this curriculum is educating students on the principle, tools and techniques of the industrial engineering profession which can be applied to the tracks. The revised curriculum builds a strong foundation for the development of a professionally competent and versatile industrial engineer, able to function in a traditional manufacturing environment as well as in a much broader economy, including careers in financial services, communication, information technology, transportation, health care or consulting.

During the student's first two years, courses in the basic sciences and engineering are taken. These courses are, in general, common to all engineering majors. In addition, the student completes many of the university's general education requirements during this time. This includes courses in the humanities, social sciences, arts, (refer to the University guidelines for General Education) communications and physical education. A student can complete the freshman and sophomore years at a Commonwealth Campus, Behrend College or University Park.

The students start taking I E courses during the junior year. The required I E courses are designed to introduce the student to basic Industrial Engineering fields of interest which include management systems, manufacturing engineering, management controls, human factors engineering, information technology and design. The required courses are also taken during the student's senior year. After completing courses required for the core and fundamental competencies in the major, students can choose one of the following three tracks for specialization:

Manufacturing Systems Engineering, Engineering Services Systems or Engineering Information Systems.

A total of nine course credits in one of the three tracks from the approved list is required, in addition to the three-credit capstone design course. A list of the required and elective courses are given in sections 7 and 8, respectively. The required courses are grouped by fields of interest and a table in section 9 gives the applicability of elective courses to the three tracks. By reading each course's brief description of content, one can obtain a better understanding of the nature of Industrial Engineering.

3. Educational Objectives

PROGRAM EDUCATIONAL OBJECTIVES

We prepare our graduates to:

- 1) Participate in and lead cross-functional teams, designing, implementing and improving processes and systems in the manufacturing, service or government sectors.
- 2) Work effectively in managerial and leadership positions.
- 3) Work and communicate effectively with internal and external team members in the global environment.
- 4) Engage in continuous learning through varied work assignments, graduate school, professional training programs and independent study.

COURSE OUTCOMES

Objective 1.0 Participate in and lead cross-functional teams, designing, implementing and improving processes and systems in the manufacturing, service or government sectors.

- 1.1 Analyze and design both the job and the worksite in a cost-effective manner, as well as measure the resulting output.
- 1.2 Understand and apply cognitive systems engineering; identify visual, auditory, cognitive, perceptual and environmental aspects of human performance; perform task analysis and evaluate human-computer interfaces.
- 1.3 Understand information contained in typical specifications and methods of product verification and conformance to specifications.

- 1.4 Program flexible manufacturing equipment and system controllers; design logical manufacturing layouts and implement contemporary systems issues.
- 1.5 Perform work measurement; develop an MTM analysis and carry out a work sampling study.
- 1.6 Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

Objective 2.0 – Work effectively in managerial and leadership positions.

- 2.1 Ability to apply time value of money and select cost-effective engineering solutions; understand cost-accounting principles.
- 2.2 Ability to apply probability concepts to solve engineering problems, including reliability issues.
- 2.3 Ability to apply statistical concepts to solve real life problems, such as hypotheses testing, design of experiments and statistical quality control methods such as process capability and control charts.
- 2.4 Formulate, solve and analyze the results of linear programming models of real-world applications.
- 2.5 Formulate, solve and analyze real problems using Markov chains, network models, dynamic programming, queuing theory and inventory models.
- 2.6 Gain an in-depth knowledge of the implemental issues and theoretical aspects of data bases and web-based operations related to industrial engineering.
- 2.7 Ability to create simulation models of manufacturing and service systems and analyze simulation output.

Objective 3.0 – Work and communicate effectively with internal and external team members in the global environment.

- 3.1 Present engineering study results in technical reports and orally.
- 3.2 Demonstrate life-long learning by synthesizing information from several sources.

Objective 4.0 – Engage in continuous learning through varied work assignments, graduate school, professional training programs and independent study.

- 4.1 Work effectively in groups on case studies and projects.
- 4.2 Demonstrate knowledge of contemporary issues.
- 4.3 Understand professional and ethical responsibilities.
- 4.4 Understand the impact of engineering decisions in a global and societal context.

4. Student and Faculty Responsibilities

Responsibilities of the Faculty

- To be prepared for every class.
- To develop a comprehensive syllabus covering topics to be studied, exam timing, policies, office hours, etc. for distribution during the first week of class.
- To treat students and staff with respect and courtesy.
- To administer courses in a fair manner and in accordance with University policy.
- To assign meaningful homework.
- To provide meaningful feedback on graded material in a timely manner.
- To post and hold sufficient office hours, so as to be accessible to most students, and be available during those times.
- To do everything possible to enhance and enforce academic integrity.
- To develop fair assessment instruments which will be impartially and fairly graded.
- To cover the prescribed topics in each course as published in the **I E Student Handbook**.
- To encourage student professional growth and participation in preparation for future careers.
- To provide an atmosphere conducive to learning.
- To instruct, as needed, on the use and safety of equipment.
- To provide informed advice on academic matters (such as course selection, scheduling, etc.).
- To inform students when classes or office hours cannot be met.
- Display enthusiasm in courses taught and be concerned about student learning.

Responsibilities of the Student

- To attend every class unless extenuating circumstances occur (such as illness, emergencies, etc.).
- To treat faculty and staff with respect and courtesy.
- To come to class prepared to actively listen and participate (having completed reading and other assignments).
- To exhibit academic integrity.
- To respect other students and faculty in class through appropriate conduct (such as on-time attendance, attention to class activities, etc.)
- To exhibit academic integrity.
- To respect other students and faculty in class through appropriate conduct (such as on-time attendance, attention to class activities, etc.)
- To put forth an honest effort to understand material and prepare specific questions for faculty or teaching assistants when problems arise.
- To provide prior information and documentation for situations meriting special attention (such as illness, athletic team travel, etc.).
- To meet with their advisor regularly to ensure that all academic requirements are met.
- To follow the stated policies of each course.
- To plan for their professional development and future.
- To review prerequisite material as needed.
- To properly and safely use and care for all department facilities and equipment.
- To equally participate in all group labs, assignments, and projects.
- To take SRTEs seriously and provide a fair assessment, of course and faculty.
- Display enthusiasm for courses with a real concern for learning.

5. Areas of Emphasis

Manufacturing Design

Design for Assembly, Concurrent Engineering, Mechanism Configurations, Optimization of Clamping Systems, Flexible Fixturing, Computer-aided Pattern Design, Feature Base Design, Workplace Design, Engineering Design Optimization, Optimization of Tolerance Specification, Automated Fixture Design

Manufacturing Systems and Automation

Group Technology, Computer-aided Process Planning, Manufacturing Database Design, Intelligent Computer-aided Manufacturing, Material Handling, Automated Inspection, Numerical Control, Adaptive Control and Machine Monitoring, Cell Control

Manufacturing Process

Material Casting Processes, Welding Processes, Machining Processes, Soldering, Mechanics of Deformation, Intelligent Processing of Materials, Sensor Systems and Nondestructive Evaluation, Electronic Assembly, Robotic Welding, Cutting Tool Development

Human Factors

Ergonomics, Cumulative Trauma Disorders, Workplace Analysis, Visual Inspection, Mental Workload Evaluation, Human/Computer Interface, Biomechanics of Back Injuries, Modeling Crash Impacts, Agricultural Safety, Human Reliability Modeling, Safety Planning, Human-Computer Interaction, Cognitive Modeling

Artificial Intelligence and Expert Systems

Expert Systems for Fixture Design, Process Diagnostics in Manufacturing Processes, Expert Systems in Production Scheduling, Neural Networks for Sensor Based Diagnostics, Learning Through Examples, Rule Based Systems with Sampled Data, Knowledge Based Design, Sensor Data Fusion, Robotic Task Planning

Machine Vision and Inspection

Image Processing, Model Based Inspection, Algorithms for Surface Identification, Inspection of Compound Profiles, Component Insertion, Off-line Programming of Coordinate Measuring Machines, Neural Network Based Vision

Operations Research and Optimization

Location Theory, Network Optimization, Discriminant Analysis, Linear Programming, Integer Programming for Logical Deduction, Communication and Computer Networks, Network Equilibrium, Nonlinear Optimization, Optimization of Traffic Networks, Queuing, Stochastic Processes, Decision Theory

Production Planning and Control

Material Handling Systems, Material Requirements Planning, Facility Planning, Capacity Expansion, Adaptive Forecasting, Economic Order Quantity, Multi-stage Sequencing, Just-In-Time

Simulation

Production Modeling, Operational Scheduling, Plant Design and Layout, Process Flow Analysis, Robust Optimization

Productivity Engineering

Productivity Improvement, Incentive Design, Technological Forecasting, Methods Improvement, Wage Payment Systems, Resource Planning and Control

Quality Engineering

Statistical Process Control, Total Quality Systems, Process Improvement Strategies, Design for Quality, Inspection Algorithms, Engineering Design of Experiments, Reliability Modeling, Design of Supplier Qualification Procedures, Statistical Modeling of Tolerances, Taguchi Loss Functions, Continuous Improvement Reliability Assessment

6. I E Curriculum Plan (starting at University Park campus)

<u>1st Semester</u>			<u>2nd Semester</u>		
MATH 140	Calculus I	4	Math 141	Calculus II	4
EDSGN 100	Engr. Design & Graphics	3	PHYS 211	Mechanics	4
ENGL 15 or 30	Rhetoric & Composition	3	CHEM 111	Experimental Chemistry	1
CHEM 110	Chemical Principles	3	Econ 2 or 4	(Social Science)	3
Arts, Humanities, Social Sciences		3	Arts, Humanities, Social Sciences		3
		16	First-Year Seminar		1
					16
<u>3rd Semester</u>			<u>4th Semester</u>		
MATH 231	Calculus of Several Variables	2	MATH 250	Differential Equations	3
PHYS 212	Electricity & Magnetism	4	Math 220	Matrices	2
CAS 100A/B	Effective Speech	3	CMPSC 200, 201	Matlab, C++ or FORTRAN	
+E MCH 210^A	Statics and Strength of Materials	5	or 202	Programming	3
Arts, Humanities, Social Sciences		3	Science Elective ^B		3
		17	6 credits of Engineering Electives ^E		6
					17
<u>5th Semester</u>			<u>6th Semester</u>		
+I E 302	Engineering Economy	3	+IE 323	Statistical Methods in I E	3
+I E 305	Product Design, Specification		+I E 405	Linear Programming	3
	& Measurement	3	+I E 330	Information Tech for I E	3
+I E 322	Probabilistic Models in I E	3	Choose a manufacturing processing course ^C		3
+I E 327	Introduction to Work Design	3	Engl 202C	Technical Writing	3
MATSE 259	Materials, Properties & Processing	3	Health & Physical Activity*		1.5
Health & Physical Activity*		1.5			16.5
		16.5			
<u>7th Semester</u>			<u>8th Semester</u>		
I E 425	Intro to Operations Research	3	I E 453	Simulation Modeling for	3
I E 408 or 419	Cognitive Work Design or Work			Decision Support	
	Design-Productivity and Safety	3	I E 470	Manufacturing System Design	3
I E 480W	Capstone Design Course	3		& Analysis	
Specialization Course ^D		3	Specialization Courses ^D		6
Arts, Humanities, Social Sciences		3	Arts, Humanities, Social Sciences		3
		15			15

TOTAL NUMBER OF CREDITS - 129

Courses listed in **boldface italic type** require a grade of C or better for entrance into the major.

+Courses listed in **boldface type** require a grade of C or better for graduation in the major.

^A Students may substitute E MCH 211 and 213 or 213D for EMCH 210.

^B Science Elective: Select from Department List (<http://www.ie.psu.edu/Academics/Undergraduate/Courses/ScienceElectiveList2010.pdf>).

^C Choose one course: I E 306-Machining Process Design and Analysis, I E 307 Rapid Prototyping Processes, I E 311-Principles of Solidification Processing, or I E 497 - Micro/Nano Fabrication.

^D Select from Department List (<http://www.ie.psu.edu/Academics/Undergraduate/Courses/SpecializationElectives.html>).

^E Choose 3 credits from 2 sets of (): (CMPEN 271, E E 211 or E E 212), (M E 201 or 300), (E MCH 212), (3 credits of an approved minor upon completion), (3 credits any combination of Co-op or Internship upon completion of 3 rotations), (3 credits of ROTC upon completion of ROTC program).

* Students may satisfy this requirement with one, 3 credit GHA course or 3 credits of ROTC upon completion of the ROTC program.

7. Required I E Courses Grouped by Fields of Interest

I. Management Systems

- A) **I E 322**—Probabilistic Models in I E—3 lectures per week
Prerequisite: MATH 141
Content: Graphical description of data, probability basics, discrete and continuous probability distributions, expected values and variances, reliability, sampling distributions and estimation.
- B) **I E 405**—Linear Programming—3 lectures per week
Prerequisite: MATH 220
Content: Simplex method, duality, sensitivity analysis, parametric programming, transportation models and assignment models.
- C) **I E 425**—Introduction to Operations Research—3 lectures per week
Prerequisites: I E 322, Concurrent: I E 405.
Content: Project networks, dynamic programming, Markov processes & queuing, inventory theory and supply chain management.
- D) **I E 453**—Simulation Modeling of Decision Support—2 lectures and 1 double lab/week
Prerequisites: I E 323, I E 425, CMPSC 200, 201 or 202.
Content: Basic simulation modeling, modeling advanced system complexities, model verification and validation, experimental design and output analysis.

II. Manufacturing Engineering

- A) **I E 305**—Product Design, Specification and Measurement—2 lectures and 1 double lab per week
Concurrent: MATSE 259
Content: Introduction to product design, manufacturing engineering and production, part definition and qualification, computer aided design and product verification and conformance to specification.
- B) **I E 470**—Manufacturing System Design & Analysis—2 lectures and 1 double lab per week
Prerequisite: A manufacturing process elective-see list on page 10
Content: Manufacturing system organization and modes of product flow, manufacturing system metrics, lean manufacturing systems, automation/integration and information systems for manufacturing systems.

III. Management Controls

- A) **I E 302**—Engineering Economy—3 lectures per week
Prerequisite: MATH 141
Content: Time value of money, basic economic analysis techniques, cost accounting, taxes and depreciation.
- B) **I E 323**—Statistical Methods in I E—3 lectures per week
Prerequisite: I E 322
Content: Estimation, hypothesis testing, simple linear regression, design of experiments, control charts, process capability and gage R & R studies.

IV. Human Factors Engineering

- A) **I E 327**—Introduction to Work Design—2 lectures and 1 double lab per week
Prerequisite: MATH 141, E MCH 211 or E MCH 210
Content: Human information processing, basic auditory and visual displays, basic human-computer information, anthropometry and musculoskeletal principles, cumulative trauma disorders, low back problems, NIOSH lifting guidelines, work measurement and work environment.

B) **IE 408**—Cognitive Work Design—2 lectures and 1 double lab per week

Prerequisite: IE 327

Content: Project management, human factors in the design process, defining users requirements, cognitive task analysis, participatory methodologies, modeling architectures for cognitive tasks, usability design principles, information display, interface programming, usability evaluation, socio-technical systems design and application, organizational design and contemporary issues in HCI.

C) **IE 419**—Work Design—Productivity and Safety—3 lectures per week

Prerequisite: IE 327

Contents: Productivity concepts, methods engineering, work design, work sampling, MTM-2 analysis, wage incentives and learning, accident prevention theories, decision making tools, federal regulations, safety administration and industrial hazards.

V. Information Technology

A) **IE 330**—Information Technology for Industrial Engineering—2 lectures and 1 double lab per week

Prerequisites: MATH 141, CMPSC 200, 201, or 202

Contents: Objects oriented programming, enterprise information modeling, databases, data mining techniques and internet technologies.

VI. Design

B) **IE 480W**—Capstone Design Project

Prerequisite: IE 302, IE 305, IE 323, IE 327, IE 330 and IE 405

Contents: Project management, brainstorming techniques, working in teams, patents and copyrights, codes and standards, engineering ethics, working in global economy, career paths and advancement opportunities and special topics including rapid prototyping and simulation.

8. Elective IE Courses

I. Manufacturing Process Electives

A) **IE 306**—Machining Process Design and Analysis—2 lectures and 1 double lab per week.

Prerequisites: IE 305, IE 322

Contents: Machining processes including milling and turning, basics of CNC machining center operations, cutting tool materials, cutting fluids and selection criteria, process parameter selection, machining forces, tool wear, work piece geometric variation, machining process design, process plan specification and process analysis.

B) **IE 307**—Rapid Prototyping Processes—2 lectures and 1 double lab per week.

Prerequisite: IE 305

Rapid prototyping processes, reverse engineering and rapid tooling.

C) **IE 311**—Principles of Solidification Processing—2 lectures and 1 double lab per week

Prerequisites: IE 305

Content: Arc welding, other welding processes, sand casting, cast metal and solidification, soldering, powder and polymer processing.

D) **IE 497**—Micro/Nano Fabrication—3 lectures per week

Prerequisite: IE 305

Content: History and fundamentals, electron microscopy, atomic force microscopy, properties and fabrication at the micro/nano scale, micromachining.

Courses not taken to meet the 3 credit requirement are applicable to the Manufacturing Systems Engineering track.

II. Track Electives. (Please see the table on page 13 for the applicability of these courses towards the three tracks: Manufacturing Systems Engineering, Engineering Service Systems and Engineering Information Systems)

- A) **IE 402**—Advanced Engineering Economy—3 lectures per week
Prerequisites: IE 302, IE 322, IE 405
Content: Capital budgeting models, overhead cost allocation, Leontief input and output models, methods of comparing risky projects, activity-based costing.
- B) **IE 418**—Human/Computer Interface Design—2 lectures and 1 double period lab per week
Prerequisite: IE 330
Content: Characteristics of users and usability, screen design principles, software lifecycle, usability evaluation.
- C) **IE 428**—Metal Casting—2 lectures and 1 double lab per week
Prerequisite: IE 311 or IE 312 or METAL 408
Content: Patterns and tooling, sand molding and coremaking, gating and risering, foundry equipment and automation.
- D) **IE 433**—Regression Analysis and Design of Experiments—3 lectures per week
Prerequisite: IE 323
Contents: Simple and multiple regression models and analysis, planning and implementation of experiments, single and two factor experiments, single and two factor experiments, 2^k full and fractional factorial experiments, incomplete block designs and Taguchi's orthogonal arrays.
- E) **IE 434**—Statistical Quality Control— 3 lectures per week
Prerequisite: IE 323
Statistical techniques for univariate and multivariate monitoring of independent and autocorrelated processes; foundations of quality control and improvement.
- F) **IE 436**—Six Sigma Methodology—2 lectures and 1 double lab per week
Prerequisites: IE 323
Statistical techniques for structured problem-solving to improve the quality and cost of products and processes.
- G) **IE 454**—Applied Decision Analysis—3 lectures per week
Prerequisite: IE 322
Content: Theory and practice of decision analysis applied to engineering problems.
- H) **IE 456**—Industrial Robotics Applications—3 lecturers per week
Prerequisites: ME 360 or IE 305, MATH 220, MATH 250 or 251
Content: Production and Economics of Automation, Flexible Manufacturing Systems and Robots, Applications of Robots, System Integration and Control.
- I) **IE 460**—Service Systems Engineering - 3 lectures per week
Prerequisites: IE 322 and IE 405
Content: Design, analysis and control of service enterprises, quality of service, multiple criteria optimization, data envelopment analysis, financial engineering, supply chain engineering and revenue management.
- J) **IE 462**—Introduction to Expert Systems—3 lectures per week
Prerequisite: CMPSC 200, 201 or 202, IE 323
Contents: Intelligent manufacturing systems, foundations of C(C++) syntax, manufacturing databases, modeling and analysis, knowledge based systems and current and future trends in computing and manufacturing.
- K) **IE 463**—Computer Aided Design and Manufacturing—2 lectures and 1 double lab per week
Prerequisite: Manufacturing Processes Elective
Content: Drawing elements for CAD, 3D modeling techniques and basics, data issues in CAD/CAM.
- L) **IE 466**—Concurrent Engineering—3 lectures per week
Prerequisites: MATH 141, MATH 220
Content: Concurrent engineering methods for product/process development, capturing customer requirements, insuring manufacturability and serviceability.

- M) **I E 467**—Facility Layout and Material Handling—3 lectures per week
 Prerequisites: I E 302, I E 327
 Content: Plant layout Methodology and Computer-aided planning, Material Handling Concepts, Material Storage and Distribution, Automation of Material Handling, Single and Multi-facility location
- N) **I E 468**—Optimization Modeling and Methods—3 lectures per week
 Prerequisites: I E 405, Math 231
 Content: Guidelines in model building, linear and nonlinear programming, integer programming
- O) **I E 477**—Computer Control of Manufacturing Machines and Processes—3 lectures per week
 Prerequisites: Math 141; CMPSC 200, CMPSC 201, or CMPSC 202
 Content: Elements of computer control and discrete-time modeling. Design and analysis of digital controls for manufacturing machines and processes
- P) **I E 478**—Retail Service Engineering—3 lectures per week
 Prerequisite: I E 330
 Content: Introduction to retail services operations, process models, and application of information technologies to enhance productivity and profitability
- Q) **I E 479**—Human Centered Product Design and Innovation—3 lectures per week
 Prerequisites: I E 408 or I E 419
 Content: Consumer product design for a global market, incorporating human factors principles and user desires in a multicultural perspective

NOTE: The department offers a number of “new” electives every semester. These courses are designated as I E 497x where the x is an alphabetic letter. Please stop by 310 Leonhard Building for more information concerning these courses.

9. Specialization Tracks

Important: Of the nine credits needed for a track, six must be I E courses.

SPECIALIZATION TRACKS				
Course #	Course Title	Manufacturing Systems Engineering	Engineering Service Systems	Engineering Information Systems
I E 306*	Machining Process Design and Analysis	X		
I E 307*	Rapid Prototyping Processes	X		
I E 311*	Principles of Solidification Processing	X		
I E 402	Advanced Engineering Economy	X	X	
I E 408+	Cognitive Work Design		X	X
I E 418	Human/Computer Interface Design		X	X
I E 419+	Work Design - Productivity and Safety	X	X	
I E 428	Metal Casting	X		
I E 433^	Regression and Design of Experiments	X	X	X
I E 434	Statistical Quality Control	X	X	X
I E 436	Six Sigma Methodology	X	X	X
I E 454	Applied Decision Analysis		X	
I E 456	Industrial Robot Applications	X		
I E 460	Service Systems Engineering		X	
I E 462	Introduction to Expert Systems			X
I E 463	Computer Aided Design and Manufacturing	X		
I E 466	Concurrent Engineering	X	X	
I E 467	Facility Layout and Material Handling	X	X	
I E 468	Optimization Modeling and Methods	X	X	
I E 477	Computer Control of Manuf. Machines and Processes	X		X
I E 478	Retail Engineering		X	X
I E 479	Human Centered Product Design and Innovation	X		X
I E 497x	Data Envelopment Analysis	X	X	X
I E 497x*	Micro/Nano Fabrication	X		
BIOE 402	Biomedical Instrumentation and Measurement		X	
BIOE 406	Medical Imaging		X	
C E 422	Transportation Planning		X	
C E 424	Optimization in Civil Engineering Systems		X	

SPECIALIZATION TRACKS				
Course #	Course Title	Manufacturing Systems Engineering	Engineering Service Systems	Engineering Information Systems
E SC 445	Semiconductor Optoelectronic Devices	X		
E SC 450	Synthesis & Processing of Electronic & Photonic Mat.	X		
E SC 475	Particulate Materials Processing	X		
I H S 400	Safety Engineering	X		
I H S 447	Industrial Hygiene Measurement	X		
I H S 450	Environmental Health and Safety	X		
I H S 470	Systems Engineering in Process Safety	X		
IST 441	Information Retrieval and Organization			X
MATH 451	Numerical Computations			X
MATH 455	Introduction to Numerical Analysis I			X
MATH 456	Introduction to Numerical Analysis II			X
MATH-STAT416	Stochastic Modeling		X	
M E 446	Reliability and Risk Concepts in Design		X	
STAT 462^	Applied Regression Analysis	X	X	X

* May be used towards track if not being used as Manufacturing Processing elective
+ May be used towards track if not being used towards Human Factors requirement
^ Only one (IE 433 or Stat 462) can count towards a track; not both.

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10. Prerequisite Listing

The department cannot stress enough the importance of having the proper prerequisites/co-requisites when scheduling courses. At the beginning of every semester, faculty receive a list, from the College, of students enrolled in their courses who do not meet the proper prerequisites/co-requisites. **It is fully within the faculty member's right to disenroll a student from a course** if he/she does not meet the proper criteria (please check the web site <http://www.psu.edu/dept/oue/aappm/C-5.html> for more information). Trying to rearrange your schedule at the beginning of a semester is not easy and a course that you need/want may not be available. **Also, do not assume that if you are taking a prerequisite concurrently, that you will be allowed to stay in the class.** This is not, in general, acceptable! Please use the table below to ensure you meet the prerequisite/co-requisite requirements before scheduling a course.

NOTE: Check with the I E Office for a listing of electives offered under the I E 497.

Course No.	Course Title	Prerequisite	Prerequisite or
I E 302	Engineering Economy	MATH 141	
I E 305	Product Design, Specification and Measurement		MATSE 259
I E 306	Machining Process Design and Analysis	I E 305, I E 322	
I E 307	Rapid Prototyping Processes	I E 305	
I E 311	Principles of Solidification Processing	I E 305	
I E 322	Probabilistic Models in Industrial Engineering	MATH 141	
I E 323	Statistical Methods in Industrial Engineering	I E 322	
I E 327	Introduction to Work Design	MATH 141, E MCH 210 or E MCH 211	
I E 330	Information Technology for Industrial Engineering	MATH 141, CMPSC 200, CMPSC 201, or CMPSC 202	
I E 402	Advanced Engineering Economy	I E 302, I E 322, I E 405	
I E 405	Linear Programming	MATH 220	
I E 408	Cognitive Work Design	I E 327	
I E 418	Human/Computer Interface Design	I E 330	
I E 419	Work Design—Productivity and Safety	I E 327	
I E 425	Introduction to Operations Research	I E 322	I E 405
I E 428	Metal Casting	I E 311 or I E 312, or METAL 408	
I E 433	Regression Analysis and Design of Experiments	I E 323	
I E 434	Statistical Quality Control	I E 323	
I E 436	Six Sigma Methodology	I E 323	

Course No.	Course Title	Prerequisite	Prerequisite or Concurrent
I E 453	Simulation Modeling of Industrial Systems	I E 323, I E 425, CMPSC 200, CMPSC 201, or CMPSC 202	
I E 454	Applied Decision Analysis	I E 322	
I E 456	Industrial Robot Applications	MATH 220, MATH 250 or MATH 251, I E 305 or M E 360	
I E 460	Service Systems Engineering	I E 322 and I E 405	
I E 462	Introduction to Expert Systems	CMPSC 200, CMPSC 201, or CMPSC 202, I E 323	
I E 463	Computer Aided Design and Manufacturing	Manufacturing Process Elective	
I E 466	Concurrent Engineering	MATH 141, MATH 220	
I E 467	Facility Layout and Material Handling	I E 302, I E 327	
I E 468	Optimization Modeling and Methods	I E 405, MATH 231	
I E 470	Manufacturing System Design and Analysis	A manufacturing process elective	
I E 477	Computer Control of Manufacturing Machines & Processes	MATH 141, CMPSC 200, CMPSC 201, or CMPSC 202, I E 305	
I E 478	Retail Services Engineering	I E 330	
I E 479	Human Centered Product Design and Innovation	I E 408 or 419	
I E 480W	Capstone Design Project	I E 302, I E 305, I E 323, I E 327, I E 330 and I E 405	

11. C or Better Rule

For I E, students must receive a grade of C or better in the following courses in order to graduate: E Mch 210 (or E Mch 211 and E Mch 213); I E 302, I E 305, I E 322, I E 323, I E 327, I E 330, and I E 405

12.Minors

Product Realization Minor

-For a complete list, see the I E website for approved minors

This 21 credit interdisciplinary minor is designed for any engineering student who is interested in state-of-the-art practice in integrated product/process design and manufacturing. The program culminates with a one or two semester project involving the design and manufacture of a new product.

Students completing the minor should:

- Understand the interaction of design and manufacturing through practical examples;
- Be familiar with the entrepreneurial skills needed to transfer a new product from initial idea to market;
- Understand the technical and management aspects of concurrent engineering and total quality management; and
- Have hands-on experience in designing and manufacturing a product, organizing and managing the effort, and interacting with the customer.

Program Requirements - 21 credits

General Courses - 9 credits

	Scheduling Recommendation by Semester Standing				
	1-2		3-4	5-6	7-8
M E 288 (Project Dissection)	X	or	X		
ENGR 407 (Entrepreneurship)			X		
I E 466 (Concurrent Engineering)				X	or X

Additional Courses - 12 credits

Select 9 credits in product design, quality engineering, and manufacturing processes, product development courses, quality engineering courses, and laboratory-oriented manufacturing process courses approved by the professor in charge (examples include I E 305, I E 306, I E 311, I E 312, I E 424, I E 428, M E 340, M E 462, E E 310, and E E 418).

Applicants wishing to enroll in the Product Realization minor must meet prerequisite requirements for each course. Students must obtain a grade of C or better in the specified courses to satisfy the requirements of the minor.

Course Descriptions:

M E 288 Product Dissection (3:2:2) Examines the way in which products and machines work; their physical operation, the manner in which they are constructed, and the design and societal considerations that determine the difference between success and failure in the marketplace.

ENGR 407 Engineering Entrepreneurship (3:2:2) Covers the practical aspects of the startup of a business, with elements of finance, marketing, management, the basics of product manufacturing, and an overview of activities in new product prototyping.

I E 466 Concurrent Engineering (3:3:0) Will investigate engineering and management tools for concurrent product and manufacturing process development.

For More Information Contact: Professor Timothy Simpson, Industrial and Manufacturing Engineering, 314 Leonhard Building, tws8@psu.edu, 814-863-7136.

Minor in IST for Industrial Engineering

Collection and processing of information have increased in all sectors for solving engineering problems, including manufacturing and service related problems. Efficient and timely analysis of data is critical for the survival of companies. There is a need for industrial engineers with a strong background in information technology and systems. The minor in Information Sciences and Technology for Industrial Engineering will augment the skills of students in the Department of Industrial and Manufacturing Engineering in the information systems area. All students pursuing a baccalaureate degree in Industrial Engineering are eligible for this minor.

A one-time, **non-refundable** charge of \$750 will be applied to all students enrolled in the minor.

REQUIREMENTS FOR THE MINOR: 22 credits

PRESCRIBED COURSES (13 credits)

IST 110 (GS) (3) (Sem: 1-2)

IST 210 (4) (Sem: 5-6)

IST 220 (3) (Sem: 5-6)

I E 330 (3) (Sem: 5-6)

ADDITIONAL COURSES: (9 credits)

Select 6-9 credits from I E 418 (3), I E 462 (3) and I E 433 (3) (Sem: 7-8)

Select 0-3 credits from Math 451 (3), MATH 455 (3), MATH 456 (3), IST 441 (3) (Sem: 7-8)

IST 210 and 220 are controlled courses. Students must be officially enrolled in the minor in order to schedule.

A grade of **C** or better is required for all courses in the minor.

For More Information, Contact:

Jeanie Peritz
Lead Counselor
College of Information Sciences and Technology
jperitz@ist.psu.edu
814-865-8947
104 IST Building

Dr. Soundar Kumara
Professor of Industrial & Manufacturing Engineering
College of Engineering
Skumara@psu.edu
814-863-2359
310 Leonhard Building

Six Sigma Minor

Six Sigma is a business management strategy, initially implemented by Motorola, that today enjoys widespread application in many sectors of industry.

Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects and variation in manufacturing and business processes. It provides a framework for quality improvement and innovation that builds upon statistical tools to achieve results.

The Six Sigma Minor is an 18 credit minor designed for any student who is interested in the Six Sigma statistical methodology. Students completing the minor should:

- Be knowledgeable about why organizations use Six Sigma and how they apply its philosophy and goals.
- Gain experience with using the define, measure, analyze, improve, control (DMAIC) methodology for problem solving
- Gain experience with using the define, measure, analyze, design, optimize, verify (DMADOV) methodology for new product innovation
- Understand the links between customer requirements, product specifications, and process capability
- Understand the theory and application of regression analysis, design of experiments, and statistical quality control
- Be familiar with the project selection process including knowing when to use the Six Sigma methodology

Requirements for IME Students

The minor currently requires 18 credits of course work as follows:

- I E 305: Product Design, Specification and Measurement. Principles of product design and specifications and methods for product verification. Contact: **E. A. Lehtihet**
- I E 322: Probabilistic Models in Industrial Engineering. The study and application of probability theory in the solution of engineering problems. Contact: **M. J. Chandra**
- I E 323: Statistical Methods in Industrial Engineering. The study and application of statistics in the solution of engineering problems. Contact: **E. Joshi**
- I E 433: Regression and Design of the Experiments. Theory and application of regression analysis and design of experiments to build models and optimize process and product parameters. Contact: **E. Castillo**
- I E 434: Statistical Quality Control. Statistical techniques for univariate and multivariate monitoring of independent and autocorrelated processes: foundations of quality control and improvement. Contact: **H. B. Nembhard**
- I E 436: Six Sigma Methodology. Techniques for structural problem-solving to improve the quality and cost of products and processes. Contact: **H. B. Nembhard**
- Students must obtain a **C or better** in the specified courses to satisfy the requirements for the Minor.

Note: Students completing the Six Sigma minor **cannot** use 3 credits of minor towards the 6 credits of engineering electives listed in the 4th semester of the curriculum plan.

Contact

- **Erin Ammerman** - Undergraduate Staff Assistant, Phone: 814-865-7602
- **Elena Joshi** - Undergraduate Program Coordinator, Phone: 814-863-3395
- **Dr. Harriet Black Nembhard** - Associate Professor, ASQ certified Six Sigma Black Belt, Phone: 814-865-4210

13. Study Abroad Programs

I. Undergraduate Exchange Program with University of Navarra in San Sebastian, Spain

- Students should meet with Mrs. Joshi and/or Dr. Ventura if they are considering participating. The following courses may be used if approved by Mrs. Joshi and/or Dr. Ventura.

Approved Courses for Exchange Program with the University of Navarra
San Sebastian, Spain
(December 2009)

Ingeniería en Organización Industrial

(<http://www.tecnun.es/oferta-academica/ingenierias-plan-99/organizacion.html>)

Navarra Course	Navarra Credits	PSU I E Course Equivalent	PSU Credits	Offered	
				Fall	Spring
Investigación Operativa I	4.5	I E 405	3	√	
Estadística Industrial	6	I E 323	3		√
Organización de la Producción I	6	I E 470			√
Tecnologías de Fabricación	6	I E 399 – Manufacturing Process elective (students would not be allowed to take I E 306 at PSU)	3		√
Organización de la Producción II	6	I E Manufacturing Track Elective	3	√	
Investigación Operativa II	6	I E 425	3		√
Investigación Operativa III	4.5	I E 453	3		√
Organización del Trabajo y Factor Humano	6	I E 499 – Satisfies Human Factors Requirement	3		√
Laboratorio de CAD/CAM	4.5	I E 463	3	√	√
Laboratorio de Neumatica y Oleohidraulica	4.5	Non-major Elective	3	√	
Sistemas de Gestión de la Información	6	Non-I E course in Information Systems Track	3	√	
Tecnología de Materiales	4.5	I E 311	3		√

Ingeniería Industrial

(<http://www.tecnun.es/oferta-academica/ingenierias-plan-99/industrial.html>)

Navarra Course	Navarra Credits	PSU I E Course Equivalent	PSU Credits	Offered	
				Fall	Spring
Termodinámica	7.5	Non-major elective	3	√	
Gestión de Calidad	4.5	I E 434	3		√
Metodos Matematicos II	4.5	Non-I E course in Information Systems Track	3		√

Note: 1.5 Navarra credit = 1 PSU credit

Possible General Education Courses – Must be petitioned in order to be used to meet degree requirements

(<http://www.tecnun.es/oferta-academica/ingenierias-plan-99/asignaturas-libre-eleccion.html>)

Navarra Course	Navarra Credits	Title – English Translation	Possible	PSU Credits	Offered	
					Fall	Spring
Cultura e Historia Vasca	4.5	Basque History and Culture	GH	3		√
Historia del Arte	4.5	History of Art	GA	3	√	
Literatura Universal	4.5	Universal Literature	GH	3		√
Ciencias de la Tierra y del Medio Ambiente	4.5	Population, Ecology and Environment	GS	3	√	
Teologia	4.5	Theology	GH	3	√	√

Other electives may be available and can also be petitioned.

Note: 1.5 Navarra credit = 1 PSU credit

II. Undergraduate Exchange Program with Technion - Israel Institute of Technology, Haifa, Israel

- Students should meet with Mrs. Joshi or Dr. Chandra if they are considering participating.

The academic year at Technion runs from October to February (Winter Semester) and March to July (Spring Semester).

- Penn State students may enroll at Technion for either the Spring Semester or for the entire academic year.
- Beginning in August 2009 and continuing for each year during the period of this Agreement, Penn State and Technion will exchange a maximum of three (3) students per semester, with participants enrolling as non-degree students at the host university for either a single semester or a full academic year.
- Participants in the Exchange aspect of the program will remain registered at their home university, where they will pay tuition and all other required fees, and be exempt from such fees at the host university. **That is, Penn State I E Students who participate in this exchange program will pay tuition and all other required fees at Penn State.**
- This program will be open to all eligible undergraduate students in the I E Department at Penn State.
- Penn State I E department will select qualified participants and will ensure that students selected for the program will
 - be a regularly enrolled undergraduate degree candidate in the I E program with a cumulative grade point average (GPA) of at least 3.00.
 - have successfully completed at least four semesters of study upon admission at Penn State.
 - be a student of good standing.
 - show evidence of maturity, stability, adaptability, self-discipline, and strong academic motivation.
 - have signed a waiver demonstrating their understanding of the risks involved in studying in Israel.
- For Penn State I E students going to Technion, the deadlines for submitting all relevant application materials are May 1 for the entire academic year and November 1 for the Spring Semester. For the academic year 2011 - 2012, students may apply only for Spring Semester.
- At Technion, administrative arrangements for all Penn State incoming students will be the responsibility of the student exchange secretary in the Center for International Academic Relations.
- Each institution will provide academic advising to assist its guest students in the selection of appropriate courses.
- Each institution will endeavor to ensure that students are admitted to courses regarded as essential to their degree progress; however each institution reserves the right to exclude students from any restricted enrollment programs or courses.
- The curriculum will consist of courses from the regular offerings in the respective engineering departments specifically, as well as in the general science departments generally, at Technion. For each semester, Penn State students are required to register for the complete twelve (12) to nineteen (19) credits in subjects of their choosing.

14. Student Societies and Organizations

Alpha Pi Mu (Honor Society)

Dr. Catherine Harmonosky, Faculty Advisor; Phone: 865-2107, e-mail; cmhie@enr.psu.edu

Alpha Pi Mu is the national industrial engineering honor society. Students with at least a 3.2 GPA in their junior year or a 3.0 GPA in their senior year are eligible to join.

American Foundrymen's Society (AFS)

Dr. Robert Voigt, Faculty Advisor; Phone: 863-7290, e-mail; rcv2@psu.edu

The AFS chapter is for students in Industrial Engineering, Metal Science and Engineering, and in other departments who are interested in metal casting. The AFS chapter sponsors a summer internship job fair, provides scholarship support for students interested in metal casting, and provides many opportunities for students to interact with industry engineers and executives. First and second year students are encouraged to participate.

American Society for Quality (ASQ)

Dr. Harriet Nembhard, 865-4210, e-mail; hbn2@psu.edu

Since 1946, ASQ has been a leader in identifying, communicating, and promoting the use of quality concepts, principles, and technologies. ASQ is an excellent source for information on topics ranging from total quality management (TQM) and statistical process control (SPC), to benchmarking and leadership.

Human Factors and Ergonomics Society (HFES)

Dr. Andris Freivalds, Faculty Advisor; Phone: 863-2361, e-mail; axf@psu.edu

The Human Factors and Ergonomics Society is an interdisciplinary organization of professional people involved in the human factors field. The Society promotes the discovery and exchange of knowledge concerning the characteristics of human beings that are applicable to the design of systems and devices of all kinds.

Industrial Engineering Graduate Association (IEGA)

Dr. Jeya Chandra, Faculty Advisor, Phone 863-2358, email; mjc3@psu.edu

IEGA was founded to serve the academic and social needs of graduate students in the Department of Industrial and Manufacturing Engineering at Penn State. All graduate students in the department are automatically members of IEGA.

Institute of Industrial Engineers (IIE)

Dr. Paul Griffin, Phone: 865-7601, email; pmg14@psu.edu

IIE is the professional society for industrial engineers that is devoted to serving the needs of industrial and systems engineering professionals. IIE has chapters and other services, including the *Student IIE Magazine*, designed specifically for students.

Institute for Operations Research and the Management Sciences (INFORMS)

Dr. David Nembhard, Faculty Advisor, Phone 863-2447, e-mail; dan12@psu.edu

The Institute for Operations Research and the Management Sciences (INFORMS) serves the scientific and professional needs of OR/MS investigators, scientists, students, educators, and managers, as well as the institutions they serve, by such services as publishing a variety of journals that describe the latest OR/MS methods and applications and by organizing professional conferences.

Society of Manufacturing Engineers (SME)

Dr. Edward De Meter, Faculty Advisor, Phone 863-7291, e-mail; ecd3@psu.edu

SME is an international professional society dedicated to serving its members and the manufacturing community through the advancement of professionalism, knowledge, and learning. Its membership is comprised of manufacturing, research, and design engineers and practitioners as well as corporate executives and students.

15. Faculty Areas of Expertise

All phone numbers are in the 814 area code, e-mail addresses follow phone numbers.

D. J. Cannon, Associate Professor. Robotics and control, virtual reality, manufacturing and human-machine systems. (863-2360; djc4@psu.edu).

E. del Castillo, Distinguished Professor. Statistical and time series process control, experimental optimization and response surface methodology, applied statistics. (863-6408; exd13@psu.edu).

M. J. Chandra, Professor. Statistical quality control, applied stochastic processes, advanced engineering economy. (863-2358; mjc3@psu.edu).

E. De Meter, Professor. CAE tools for fixture analysis and synthesis, part location and datum establishment systems, advanced fixturing technology. (863-7291; ecd3@psu.edu).

A. Freivalds, Professor. Biomechanics, ergonomics, cumulative trauma disorders, work physiology. (863-2361; axf@psu.edu)

T. L. Friesz, Marcus Chaired Professor. Transportation network dynamics and complexity, supply chains, logistics, auctions, real options, dynamic pricing of transportation services, mobile electronic commerce. (863-2445; tfriesz@psu.edu).

P. M. Griffin, Peter and Angela Dal Pezzo Department Head, Chair. Health logistics, health access, economic modeling, supply chain coordination and control.

C. M. Harmonosky, Associate Professor. Simulation, manufacturing systems analysis, scheduling, material management pipeline in health care industry. (865-2107; cmhie@enr.psu.edu).

E. Joshi, Senior Instructor. Computer simulation, statistics. (863-3395; ejoshi@psu.edu).

S. Joshi, Professor. CAD/CAM, CAPP, control of manufacturing systems, rapid prototyping and tooling, process planning. (865-2108; sjoshi@psu.edu).

S. Kumara, Allen E. Pearce/Allen M. Pearce Chaired Professor. Artificial Intelligence, product design, process monitoring diagnostics, sensor data fusion, neural networks. (863-2359; skumara@psu.edu).

A. Lehtihet, Professor. Geometric analysis of mechanical assemblies, optimum tolerance allocation, machine tool and discrete parts methodology. (863-2350; lvo@psu.edu).

D. J. Medeiros, Associate Professor. CAD/CAM, manufacturing applications of discrete event simulation, material handling. (863-2364; djm3@psu.edu).

D. A. Nembhard, Associate Professor. Measuring learning / forgetting in industries, quality and productivity improvement measurement, data mining. (863-2447; dan12@psu.edu).

H. B. Nembhard, Associate Professor. Quality and productivity improvement, statistical process control, engineering economics and financial engineering. (865-4210; hbn2@psu.edu).

G. Pang, Assistant Professor. Stochastic Modeling of large scale service systems, (863-1001; gup3@psu.edu).

V. Prabhu, Professor. Distributed systems and control, sensing and control of machines and processes, nonlinear systems and control theory. (863-3212; prabhu@enr.psu.edu).

A. Ravindran, Professor. Supply chain optimization, financial engineering, multiple-criteria decision making, OR models for service systems. (865-7840; aravi@psu.edu).

L. Rothrock, Associate Professor. Real-time interactive simulations, human decision making, human performance modeling, evolutionary computation. (865-7241; lrothroc@psu.edu).

C. Saldana, Assistant Professor. Sustainable and micro/nano-manufacturing, (865-7397; cjs41@psu.edu).

T. W. Simpson, Professor. Engineering design and design methodologies, product family and product platform design, robust design. (863-7136; tws8@psu.edu).

S. Aybat, Assistant Professor, Large scale and convex optimization, medical imaging, (867-1284; nsa10@psu.edu).

J. A. Ventura, Professor. Mathematical programming, communication networks design, network flow analysis, facility layout and location, machine vision. (865-3841; jav1@psu.edu).

R. C. Voigt, Professor. Dimensional control of metal casting, heat treatment quality control, foundry process improvement, emission reductions, machinability of castings. (863-7290; rvoigt@psu.edu).

T. Yao, Assistant Professor, Decision Making under Uncertainty, Real Options, Stochastic Control, Applied Economics, Financial Engineering, Energy and Environmental Policy. (865-8040; ty1@psu.edu).

16. Staff Areas of Responsibilities

Erin Ammerman – Undergraduate Staff Assistant

- Maintain degree audits, process petitions, assign advisors to students
- Enter students' schedules, drop/add classes, print unofficial transcripts
- Maintain the IE jobs web page and notify students of new job postings
- Arrange graduation luncheon or brunch
- Schedule SRTEs each semester

Amanda Bucher – Marketing Manager

- Manage all marketing communication projects
- Develop and implement marketing strategies
- Create and distribute written and electronic marketing materials
- Generate material for and maintain department website content

Olga Covasa – Administrative Assistant

- Outreach and alumni activities
- Approve and process all departmental expenditures
- Provide faculty support for processing proposals, promotion & tenure, salaries, etc.
- Arrange alumni activities & other professional visits/activities
- Supervise office staff assistants

Terry Crust – Multimedia and Computer Specialist

- Maintain department web page
- Prepare department videos
- Provide computer support
- Operate digital camera for department functions

Lisa Fuoss – Graduate Staff Assistant

- Graduate Admissions
- Assistantships
- Graduate Student Information

Angela Harbst – Technical Typist

- Key custodian
- Faculty support for typing, designing presentations, brochures, etc.
- Sort and distribute mail
- Coordinate IE 590 seminar arrangements
- Prepare textbook orders

Scott Heckman – Network Coordinator

- Install and maintain department computers and computer systems
- Maintain student computer labs and PC classroom
- Computer Networking

Michael Immel – Director of Corporate Relations and Facilities

- Solicit and steward Corporate Relations
- Instruct senior capstone design course
- Provide direction for departmental infrastructure

Shelly Regel – Bookkeeper

- Process all departmental purchases
- Handle travel arrangements, including processing of travel forms for reimbursement
- Process petty cash receipts
- Wage Payroll

Dan Supko – Lab Technician

- Metal cutting
- CNC programming

Randy Wells – Lab Technician

- CNC programming
- Welding
- Foundry

Susan Williams – Assistant to Department Head

- Staff Support for Department Head
- Maintain Department Head's calendar
- Arrange travel for Department Head, faculty and visitors
- Arrange alumni and other professional visits/activities