SIU CARBONDALE Southern Illinois University

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Industrial Management and Applied Engineering

Mission Statement

The mission of the School of Applied Engineering and Technology is to provide value to our stakeholders through innovation in applied engineering education.

The Industrial Management and Applied Engineering major has as its objective the training of qualified personnel who can develop and direct the production and distribution of products and services. The major is designed to prepare management-oriented technical professionals in the economic-enterprise system.

The Industrial Management and Applied Engineering curriculum is flexible enough to provide the means whereby graduates of two-year occupational programs may obtain a Bachelor of Science degree. A graduate of a two-year industrially-oriented occupational program, such as aviation, construction, drafting, data processing, electronics, machine tool, mechanical, and mining may have an appropriate preparation to pursue a Bachelor of Science degree with a major in Industrial Management and Applied Engineering.

Students with work related experience might receive credit toward the degree via IMAE 258. Additional flexibility in earning credit toward the degree is possible through cooperative work experience provided meaningful employment is available.

Program Learning Outcomes (PLOs)

The Industrial Management and Applied Engineering program at SIU Carbondale (SIUC) prepares students to attain the following objectives, 3 to 5 years after graduation:
1. Work professionally in the fields of industrial management and applied engineering in either manufacturing, healthcare or service sectors, working in areas such as quality engineering, production/ manufacturing engineering, lean/six sigma, logistics, supply chain management, or safety.
2. Achieve personal and professional success by assuming positions of leadership and/or increasing responsibility within the organization.
3. Pursue continued life-long learning through further graduate education, certifications, short courses or other training programs in engineering or related fields.
4. Participate in and contribute to professional societies and community services.
5. Utilize teamwork, communication, and engineering management skills.

Bachelor of Science (B.S.) in Industrial Management and Applied Engineering

The Bachelor of Science in Industrial Management and Applied Engineering is designed to prepare graduates for supervisory and technical management positions in manufacturing. Curriculum requirements are broad based to enable the graduate to obtain employment in manufacturing areas such as quality control, processes, safety, methods analysis, and computer-aided manufacturing/robotics. The Capstone Option feature is available for students and is described in the Capstone Option section.

Students are required to earn a minimum of 6 credit hours of any combination of laboratory, hands-on, and/or practical experiences prior to completion of the program:

- Laboratory credit hours can be applied only to those laboratory courses that are approved by the program. Laboratory credit hours earned through an A.A.S. program are eligible for consideration.

- Hands-on experiences and/or practical experiences include credit hours obtained through the following courses: IMAE 258, IMAE 358, and IMAE 319.

B.S. Industrial Management and Applied Engineering Degree Requirements

Degree Requirements	Credit Hours	
University Core Curriculum Requirements		39
Foundation Skills	13	
ENGL 101, ENGL 102	6	
UNIV 101	1	
Quantitative Reasoning (substitute Mathematics in major)	3	
CMST 101	3	
Disciplinary Studies	23	
Fine Arts	3	
Human Health	2	
Humanities	6	
Science (substitute Physics in major for 3 credit hours)	6	
Social Science	6	
Multicultural/Diversity	3	
Requirements for Major in Industrial Management and Applied Engineering (IMAE)		(6) + 81-82
PHYS 203A, PHYS 203B, PHYS 253A, PHYS 253B	(3) +5	
MATH 108	(3)	
MATH 140 or IMAE 307	3-4	
PSYC 323 or IMAE 340	3	
Courses: IMAE 110, IMAE 208, IMAE 305, IMAE 375, IMAE 390, IMAE 392, IMAE 442, IMAE 445, IMAE 450, IMAE 465, IMAE 470A, IMAE 470B, IMAE 476 [1]	39	

Degree Requirements	Credit Hours
Technical Electives	15
Electives	16
Total	120-121

[1] *Note: Students approved for entry into the accelerated master's program may apply up to 9 credit hours from the following courses toward both their undergraduate and graduate degrees: QEM 515 and 2 QEM 500-level courses. These courses will also satisfy the prerequisite requirements for the QEM master's program.*

Special Opportunities

Motivated and high-achieving undergraduate students who enroll in the Accelerated B.S.-M.S. Degree program may complete a program leading to a Bachelor of Science degree in Industrial Management and Applied Engineering (IMAE) and a Master of Science degree in Quality Engineering and Management (QEM) in five years. As early as the third-year, a student working with a faculty advisor will develop a program of study consistent with the student's interests and goals. Up to 9 credit hours of coursework can be shared between the undergraduate and graduate degrees. Please refer to the program section of the Graduate Catalog for more details on the accelerated option.

Continuous Improvement Minor

A minor in continuous improvement is designed to introduce undergraduate students to continuous improvement methodologies and tools that are applicable across a wide variety of industries from manufacturing to healthcare to service. The minor requires 12 credit hours of coursework, which includes IMAE 450, IMAE 465, IMAE 470A, and IMAE 476. All courses in the minor must be completed with a grade of C or better. All prerequisites for these classes must also be satisfied.
Students must consult the Industrial Management and Applied Engineering Academic Advisor to declare a minor.

Professional Development Sequence (PDS) in Lean Six Sigma

The PDS in Lean Six Sigma is intended to enhance the marketability and training of students who wish to pursue careers in quality management and process improvement. Enrollment in the Industrial Management and Applied Engineering major is not required to complete the program. The PDS in Lean Six Sigma facilitates prospective students to transfer earned program credits to pursue a B.S. degree in Industrial Management and Applied Engineering at SIUC. Students not wishing to pursue a baccalaureate must complete the unclassified undergraduate application.

Professional Development Sequence (PDS) in Lean Six Sigma Requirements

Degree Requirements	Credit Hours
Requirements for PDS in Lean Six Sigma	12
Courses: IMAE 450, IMAE 465, IMAE 470A, IMAE 470B. All courses are offered Face-to-Face and Online.	

Capstone Option for Transfer Students

A Capstone Option may be available in the Industrial Management and Applied Engineering major. Students holding technical associate degrees such as an Associate in Applied Science (A.A.S.) or an Associate in Engineering Science (A.E.S.) of at least 60 credit hours in non-baccalaureate-oriented programs or equivalent certification with a minimum grade point average of 2.0 are qualified. For the Industrial Management and Applied Engineering major, the associate degree or equivalent certification should be in an industry-related field. This option permits qualified students to fulfill their degree requirements by completing 60 credit hours of work approved by the Capstone advisor. Each individual's program of study may differ according to the previous academic work.

The Association of Technology, Management, and Applied Engineering accredits the Industrial Management and Applied Engineering program. For each curriculum, a minimum of 30 credit hours in Industrial Management and Applied Engineering courses must be taken in residence at SIUC.

Industrial Management and Applied Engineering Courses

IMAE110 - Geometric Dimensioning and Tolerancing Geometric dimensioning and tolerancing (GD&T) principles based on industry standards such as ANSI and ASME. Includes terminology, symbol identification feature control frames, modifiers, datums, etc. Selection of datum features, calculation of bonus tolerances, assignment of form, run-out and positional tolerances, and tolerance stack-up. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE200 - Field Experience I-Personal Leadership This is a one week immersion experience that introduces new students to the personal habits practiced by disciplined leaders. Students will learn how to hold themselves accountable, work as a team to solve problems, and the importance of good leadership. At the end of the week they will have gained self confidence and trust in their teammates. Credit Hours: 1

IMAE201 - Lab I-Introduction to STEM Leadership Development This class introduces students to the exemplary leadership practices and the skills necessary to lead. Students will learn how to lead by applying the readings and lectures to their own STEM organization. Credit Hours: 1

IMAE202 - Lab II-STEM Leadership (Team-Building) This course is designed to provide students with knowledge and skills necessary for building a team. They will learn the stages of team development and effective conflict resolution. Prerequisite: IMAE 201 with a grade of B or better. Credit Hours: 1

IMAE203 - Fit to Lead I (Self-Discipline) This course will provide the knowledge and skills for a leader to cope with stress and maintain a healthy mind and body. Students will engage in various intense physical fitness activities while learning important aspects of healthy lifestyles such as nutrition, weight-management, alcohol education, and sex education. Credit Hours: 1

IMAE204 - Fit to Lead II (Team-Building) This course will challenge students' problem solving skills and foster teamwork through physical activities of team building. These activities will promote students' personal, psychological, and social development in fostering cooperation and cohesiveness within a team. Prerequisite: IMAE 203 with a grade of B or better. Credit Hours: 1

IMAE208 - Fundamentals of Manufacturing Processes [IAI Course: IND 913] Introduction to the basic processes, equipment, and material used in manufacturing. Includes plastics, metal removal, materials joining, casting, and some of the newer processes. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE209 - Manufacturing Process Laboratory (Same as EET 209) Laboratory experiments to familiarize the student with the theory and operation of manufacturing processes. Laboratory. Prerequisite: IMAE 208 or consent of instructor. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Lab fee: $30. Credit Hours: 3

IMAE258 - Work Experience Credit Credit granted for past work experience while employed in fields related to the student's educational objective. Credit is established by departmental evaluation. Restricted

to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 2-30

IMAE259 - Occupational Credit For occupational credit earned at junior colleges and technical institutes. Credit is established by departmental evaluation. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 2-60

IMAE300 - Field Experience II-Mentor Leadership Second year students will be taught mentoring skills, and then asked to assume team leadership roles where they will mentor first year members. They will employ the mentoring model of: Telling, Showing, Doing, and Correcting, in developing their mentees. Mentors will provide a support system for new students and introduce them into a leadership culture. They will serve as role models and engage in developing new member's organizational values. Prerequisite: IMAE 200 with a grade of B or better. Credit Hours: 1

IMAE301 - Lab III-STEM Leadership (RSO Leadership) Second year students will apply their leadership skills through leading and organizing RSO projects/programs for Southern Illinois University. Examples of projects are ATMAE Robotics Competition, Steel Bridge Competition, Ag-bassadors, Science Ambassadors, Cyber-Dawgs, and other STEM related projects/programs. A faculty mentor will closely monitor their performance during these projects/programs. Prerequisites: IMAE 201 and IMAE 450 with grades of B or better. Credit Hours: 1

IMAE302 - Lab IV-STEM Leadership (Service Leadership) This capstone course is designed to test the student's cumulative knowledge by having them lead a technical team. Students are required to either hold the officer position of president of a technical RSO in a STEM college, or lead a team in a technical community service project. Examples of these projects include mentoring a local high school robotics team, math team, science club, or computer club. Faculty mentors will review the student's project proposal; the student will execute the project, and then provide a report on the project. Prerequisites: IMAE 202 and IMAE 301 with grades of B or better. Credit Hours: 1

IMAE303 - Fit to Lead III (Mentoring) This is a final course in the Fit to Lead series. At this level, students are expected to practice their mentoring skills in promoting the culture of healthy living. They are expected to apply knowledge in wellness programs to encourage the participation of new members in Fit to Lead I (Self Discipline) course. Prerequisites: IMAE 203 and IMAE 204 with grades of B or better. Credit Hours: 1

IMAE305 - Industrial Safety Principles of industrial accident prevention; accident statistics and costs; appraising safety performance; recognizing industrial hazards and recommending safeguards. Includes a study of the Occupational Safety and Health Act and the Coal Mine Health and Safety Act. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE307 - Applied Calculus for Technology Applying mathematical techniques to technology problems, including the analysis, formulation, and problem solutions. Techniques of differentiation, max-min problems, and elementary techniques of integration. Prerequisite: MATH 108 or equivalent with a minimum grade of C. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE315 - Leadership Communications Leadership Communications is designed to introduce students to professional communication. They will learn how to become a better leader by developing their communication abilities and by understanding the role of communication inside and outside of organizations. The course teaches students how to communicate effectively with different audiences and how to use logical, persuasive techniques in writing and presenting. Students develop their written, oral, interpersonal, and team skills while developing an understanding of leadership communication in different contexts, including their own major field of study. Credit Hours: 3

IMAE319 - Industrial Internship Industrial experience includes job skills, manufacturing processes, technical information, and labor-management relationships with supervised instruction, conferences, and examinations. Special approval needed from the instructor. Mandatory Pass/Fail. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 2-16

IMAE340 - Introduction to Supervision Analysis of problems of supervisors. Topics include leadership, motivation, communication, grievances, training, discipline, group and individual effectiveness, and labor relations. This course is designed to introduce the roles and responsibilities of supervisors and managers in the workplace. In addition, this course is designed to prepare persons who are or intend to become supervisors in business, industry, government, or in the service industry. Prerequisites: none. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE351 - Industrial Metrology Methods and equipment of industrial measurement and inspection. Includes 3-D measuring machines, lasers, and non-destructive testing. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE358 - Work Experience Credit Credit granted for past work experience that is principally management and/or supervisory in nature. Students seeking credit must demonstrate an employment history in fields/areas related to the student's educational objective. Credit is established by departmental evaluation. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 1-30

IMAE359 - Occupational Credit Credit will be awarded via program evaluation of upper-level non-accredited occupational education and training related to the student's academic and career objectives. Credit is established by school evaluation. Credit Hours: 2-60

IMAE375 - Production and Inventory Management Includes topics in forecasting, master production scheduling, material requirements planning, capacity requirements planning, inventory management, production activity control, and applicable operations research techniques. Prerequisite: MATH 108 or equivalent with a minimum grade of C. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE390 - Cost Estimating (Same as EET 390) Study of the techniques of cost estimation for products, processes, equipment, projects, and systems. Prerequisite: MATH 108 or equivalent. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE392 - Facilities Planning and Workplace Design Discusses and applies the tools necessary to design a work area (e.g. facility, department, workstation) from various aspects including time standards development and uses, throughput requirements, ergonomics, lean manufacturing, standard work, work environment, safety, material handling, process flow, and cost. Various methods and techniques will be introduced and utilized to analyze the effectiveness and efficiency of a process design. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE442 - Fundamentals of Leadership This course is designed to provide an introduction to leadership by focusing on what it means to be a good leader. Emphasis in the course is on the practice of leadership. The course will examine topics such as: the nature of leadership, recognizing leadership traits, developing leadership skills, creating a vision, setting the tone, listening to out-group members, handling conflict, overcoming obstacles, and addressing ethics in leadership. Attention will be given to helping students to understand and improve their own leadership performance. Not for graduate credit. Restricted to 2nd Year standing or higher. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE445 - Computer Integrated Manufacturing (Same as EET 445) Introduction to the use of computers in the manufacturing of products. Includes the study of direct and computer numerical control of machine tools as well as interaction with process planning, inventory control and quality control. Prerequisite: IMAE 208. Restricted to 3rd Year/4th Year standing. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE450 - Project Management This course is designed to provide students with an overview of the project management process based on the knowledge areas/processes developed by Project Management Institute (PMI). This course further provides an in-depth examination of the activities needed to successfully initiate, plan, schedule, and control the time and cost factors of the project from a technical

management perspective. Course emphasis using the content of the PMBOK prepares a student for the Certified Associate Project Management (CAPM) examination/certification. A grade of C or better is required. Credit Hours: 3

IMAE455 - Industrial Robotics (Same as EET 455) Study of robotics within a wide variety of application areas. Topics covered include classification of robots, sensor technology, machine vision; control systems, including programmable logic controllers (PLCs); robot safety and maintenance; and economic justification of robotic systems. Prerequisite: None. Restricted to 3rd Year/4th Year standing. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE465 - Lean Manufacturing This course will cover the principles and techniques of lean manufacturing. Major topics covered include lean principles, 5S, value stream mapping, total productive maintenance, manufacturing/office cells, setup reduction/quick changeover, pull system/Kanbans, continuous improvement/Kaizen, lean six sigma, lean simulation, and other modern lean manufacturing techniques and issues. Restricted to 3rd Year/4th Year standing. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE470A - Six Sigma Green Belt I Study the knowledge areas of Six Sigma Green Belt. Topics include six sigma goals, lean principles, theory of constraints, design for six sigma, quality function deployment, failure mode and effects analysis, process management, team dynamics, project management basics, data and process analysis, probability and statistics, measurement system analysis, and process capability. Restricted to 3rd Year/4th Year standing. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

IMAE470B - Six Sigma Green Belt II The objective of this course is to provide the student with a complete coverage of the statistical and analytical tools used and applied in the "Six Sigma" methodology at the green-belt level. Topics include: discrete probability distributions, continuous probability distributions, statistical process control tools, quality control charts, process capability analysis, gauge and measurement capability studies, cumulative sum control charts and exponentially-weighted moving average control charts. Prerequisite: IMAE 307 or MATH 140 or MATH 150, IMAE 470A or consent of instructor. Restricted to students with 3rd Year, 4th Year or graduate standing in the College of Engineering, Computing, Technology, and Mathematics except when approved by department. Credit Hours: 3

IMAE476 - Supply Chain Management Introduces topics in supply chain management including roles of logistics in supply chains, global dimensions of supply chains, demand management, order management and customer service, managing inventory in the supply chain, transportation, distribution, and other modern supply chain management techniques and issues. Restricted to 3rd Year or 4th Year standing. Restricted to College of Engineering, Computing, Technology, and Mathematics students or school approval required. Credit Hours: 3

IMAE480 - Six Sigma Black Belt The purpose of this course is to provide the student with a comprehensive coverage of the knowledge areas and tools of Six Sigma beyond green-belt training, focusing on descriptive and analytical methods to deal with variability including point and interval estimation, hypothesis testing, and design of experiments. Topics include: confidence intervals, hypothesis testing, regression analysis, analysis of variance, single factor experiments, block design of experiments. Prerequisite: IMAE 307 or equivalent, IMAE 470B with grades of C or better. Restricted to College of Engineering, Computing, Technology, and Mathematics students or school approval required. Restricted to 3rd Year or 4th Year standing. Credit Hours: 3

IMAE492 - Special Problems in Industry Special opportunity for students to obtain assistance and guidance in the investigation and solution of selected industrial problems. Not for graduate credit. Special approval needed from the instructor. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 1-6

IMAE494B - Applied Project-Cost Estimating Selected applied project. Requires the students to apply knowledge learned in various courses to the solution of industrial problems. Not for graduate credit. Special approval needed from the instructor. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 1

IMAE494C - Applied Project-Materials Handling and Plant Layout Selected applied project. Requires the students to apply knowledge learned in various courses to the solution of industrial problems. Not for graduate credit. Special approval needed from the instructor. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 1

IMAE494F - Applied Project-Supply Chain Operations Selected applied project. Requires the students to apply knowledge learned in various courses to the solution of industrial problems. Not for graduate credit. Special approval needed from the instructor. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 1

Industrial Management and Applied Engineering Faculty

Chappanda, Karumbaiah, Assistant Professor, Ph.D., University of Utah, 2013.

DeRuntz, Bruce D., Professor, Ph.D., Southern Illinois University Carbondale, 2005.

Dunston, Julie K., Associate Professor, Ph.D., Florida State University, 1995.

Legier, John Tugaw, Associate Professor, Ph.D., Southern Illinois University, 2007.

Parks, Ronald J., Associate Lecturer, M.S., Southern Illinois University, 1995.

Spezia, Carl J., Associate Professor, Ph.D., Southern Illinois University Carbondale, 2002.

Velasco, Tomas, Professor and Interim Director, Ph.D., University of Arkansas, 1991.

Williams, David, Senior Lecturer, M.S.., Southern Illinois University, 2002.

Emeriti Faculty

Chang, Feng-Chang (Roger), Associate Professor, Emeritus, Ph.D., Ohio State University, 1985.

Marusarz, Ronald K., Associate Professor, Emeritus, Ph.D., Southern Illinois University Carbondale, 1999.

Spezia, Carl J., Associate Professor, Emeritus, Ph.D., Southern Illinois University Carbondale, 2002.

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