BACHELOR OF ENGINEERING IN INDUSTRIAL AND SYSTEMS ENGINEERING

Welcome to the Youngstown State University (YSU) Industrial & Systems Engineering program webpage. We offer a Bachelor of Engineering (BE) degree in Industrial & Systems Engineering. This program offers a strong background in mathematics, the sciences, management principles, and principles of engineering analysis and design. Also, in addition to receiving a quality education in this program, many students participate in co-op or internship job assignments during their time with us, making them highly marketable upon completion of their degrees. Graduates of the program enjoy placement in many areas of the diverse industrial engineering job market.

I hope that you find this webpage informative. If you have any additional questions, please contact me.

Martin Cala, Ph.D., P.E.
Professor and Program Coordinator
Department of Mechanical, Industrial and Manufacturing Engineering
Phone: (330) 941-1746
E-mail: mcala@ysu.edu
(330) 941-3016

The industrial and systems engineer functions as a problem-solver, innovator, coordinator, and agent of change in a wide variety of positions in manufacturing industries, service industries, and government. The industrial and systems engineer’s unique background combines a study of science, mathematics, and management principles with the principles of engineering analysis and design to provide access to a wide variety of flexible technical and managerial careers.

The aim of the industrial and systems engineering program is to produce graduates who secure professional engineering positions, practice the profession ethically and effectively, maintain their professional competency throughout their time with us, making them highly marketable upon completion of their degrees. Graduates of the program enjoy placement in many areas of the diverse industrial engineering job market.

Program Educational Objectives

The industrial and systems engineering program at Youngstown State University is committed to offering its students a high standard of educational training. In fulfillment of its mission, as well as the missions of the College of STEM and the University, the program has established educational objectives that ensure graduating engineers have the educational knowledge and skills to practice industrial engineering effectively. The objectives of the Industrial and Systems Engineering Program are for our graduates to be:

- Professionals who are technically competent in modern industrial engineering based careers, as well as other emerging disciplines.
- World citizens who exhibit leadership qualities in their chosen disciplines, and who pursue continuing education through advanced degrees, certifications, licensure, etc.
- Active contributors to their professions, industries and/or communities.

Program Student Outcomes

To achieve the program educational objectives, our students are expected to have attained the required professional, technical, and social experience in the program with the ability to:

1.1. Apply knowledge of mathematics, science, and engineering science to solve engineering problems.

1.2. Utilize their design knowledge, skills, and technical experience to practice engineering.

1.3. Incorporate design of experiments with engineering analysis and design.

1.4. Use design techniques to design systems, components, and processes that satisfy predetermined economic, environmental, manufacturability, ethical, social, health, and safety constraints.

1.5. Recognize technical problems, develop ideas and formulate methods to determine acceptable solutions.

2.1. Work as a member of an engineering team in industrial engineering practice.

2.2. Accept project responsibilities and use problem solving skills.

2.3. Understand their professional roles and ethical responsibilities in the engineering profession and society.

3.1. Communicate their ideas and the application of engineering skills orally and/or in writing.

3.2. Understand the global impact of engineering solutions on societal needs.

3.3. Understand that the technology is constantly changing and industrial engineers must upgrade their knowledge in conjunction with the technological changes.

4.1. Recognize the importance of professional development through involvement and leadership in technical societies such as the IIE.

4.2. Have the broad knowledge to understand contemporary issues pertaining to the interaction between technology and society.

Industrial and Systems Engineering Annual Enrollment and Graduation Data

The Industrial and Systems Engineering BE Program has been accredited by the engineering accreditation commission of ABET, http://www.abet.org

- The last campus visit by ABET was on October 27-29, 2013.
- The next campus visit by ABET will be in the 2019-2020 academic year.

<table>
<thead>
<tr>
<th>Term</th>
<th>Enrollment</th>
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<tbody>
<tr>
<td>Fall 2012</td>
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<td>Fall 2013</td>
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<td>Fall 2014</td>
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<td>Fall 2015</td>
<td>46</td>
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<td>Fall 2016</td>
<td>54</td>
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</tbody>
</table>
Bachelor of Engineering in Industrial and Systems Engineering

Industrial and Systems Engineering Laboratories

The industrial and systems engineering laboratory spaces are located in Moser Hall and are equipped with hardware, software and networks to serve experiences within the curriculum that are hands on, team based, and communications or computational intensive. Laboratory experiences develop capabilities to design detailed components and to integrate solutions into large scale systems. Successively more challenging assignments are taken on throughout the curriculum and culminate in comprehensive experiences in the capstone facilities design sequence.

The industrial and systems engineering program makes optimum use of the Engineering Computing Complex, which is equipped with state-of-the-art computation, design, and communication hardware and software of a multidisciplinary nature.

The ISE Project Laboratory is focused on team-based activities throughout the curriculum and particularly serves the methods engineering, human factors engineering and facilities design areas. At its core is a network of computing stations equipped with modern industrial and systems engineering software. Data collection and processing software supports video analysis of human performance, workspace and manufacturing cell design, facility layout, flow analysis and line balancing. The goal of this laboratory is to be able to cover any topic from the planning of initial resources for a start-up enterprise to the distribution of goods and services in global networks.

The Automation Laboratory Suite is a collection of spaces where students at all levels can learn and achieve together with an opportunity to make sustainable contributions to an initial or on-going project experience. It encompasses programmable robots, programmable logic controllers, vibratory bowl feeders, reciprocating feeders, power conveyors and numerous actuator and sensing devices.

The Manufacturing Laboratory Suite consists of several spaces containing equipment for rapid prototyping, casting processes, plastic injection molding and blow molding processes, CNC machining processes, sheet metal processing and instrumentation for inspection, measurement, and testing.

For more information, visit Industrial And Systems Engineering (http://www.ysu.edu/academics/science-technology-engineering-mathematics/industrial-and-systems-engineering-major).

Cooperative Education

The industrial and systems engineering program strongly encourages its students to actively participate in the optional cooperative education program. The parallel co-op arrangement which combines work and study each semester is recommended. However, full-time employment in the summer can also be included. Students must register for a co-op course and submit documentation as specified by professional practice office. Currently a substitution of one elective course with three co-op experiences is allowed.

Advisement

The industrial and systems engineering program specifies mandatory advisement. Every student in the program is advised every semester before his or her registration. Students cannot finalize their registration without approval of the faculty advisor or program coordinator.

Accreditation

The baccalaureate degree Industrial Engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology (ABET). This process guarantees a quality program of high standards and excellence, evaluated by experts in industry, academia and government. The program was last reviewed with a site visit on campus in 2013, resulting in the maximum 6 year approved accreditation. The next on-campus site review date is scheduled for 2019. This link below offers more information on this accreditation board.

http://www.abet.org/

Industrial & Systems Engineering Program

<table>
<thead>
<tr>
<th>COURSE</th>
<th>TITLE</th>
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<tbody>
<tr>
<td><strong>ISEN Elective (4)</strong></td>
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<td>*STEM Elective</td>
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<td>MATH 1572</td>
<td>Calculus 2</td>
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<td>MATH 2673</td>
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<td>CHEM 1515</td>
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<tr>
<td>PHYS 2610</td>
<td>General Physics 1</td>
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<td>PHYS 2611</td>
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<td>ENGR 1545</td>
<td>Engineering Orientation</td>
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<td>ENGR 1550</td>
<td>Engineering Concepts</td>
<td>2</td>
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<td>ENGR 1560</td>
<td>Engineering Computing</td>
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<td>CEEN 2600</td>
<td>Statics</td>
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<td>ECEN 2614</td>
<td>Basics of Electrical Engineering</td>
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<td>MECH 2641</td>
<td>Dynamics</td>
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<td><strong>Electives</strong></td>
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<td>ENGL 1550</td>
<td>Writing 1</td>
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<td>ENGL 1551</td>
<td>Writing 2</td>
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<tr>
<td>CMST 1545</td>
<td>Communication Foundations</td>
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Degree Awarded

Bachelor of Engineering in Industrial and Systems Engineering

Academic Year | Degree Awarded
--- | ---
2012-2013 | 10
2013-2014 | 15
2014-2015 | 10
2015-2016 | 16
2016-2017 | 14
2017-2018 | 18

Contact Information

For more information, visit Industrial And Systems Engineering (http://www.ysu.edu/academics/science-technology-engineering-mathematics/industrial-and-systems-engineering-major).
Bachelor of Engineering in Industrial and Systems Engineering

Arts & Humanities Elective (2) 6
Social Studies Elective (2) 6
Social & Personal Awareness Elective (2) 6
Total Semester Hours Required 120

*ISEN Required Electives
ISEN 5820 Advanced Quality for Engineers 3
ISEN 5823 Automation 3
ISEN 5830 Human Factors Engineering 3
ISEN 5850 Operations Research 2 3
ISEN 5881 Competitive Manufacturing Management 3

** STEM Recommended Elective
MECH 1560 Engineering Communication with CAD 2
MECH 2606 Engineering Materials 3
CSIS 2610 Programming and Problem-Solving 4
ISEN 5811L Manufacturing Practices I Laboratory 1

***MATH Elective
MATH 3705 Differential Equations 3
MATH 3720 Linear Algebra and Matrix Theory 3

Recommended GER Electives
PHIL 1561 Technology and Human Values 3
PHIL 2626 Engineering Ethics 3
SOC 1500 Introduction to Sociology 3
PSYC 1560 General Psychology 3
FNUT 1551 Normal Nutrition 3
COUN 1587 Introduction to Health and Wellness in Contemporary Society 3

Year 1
Fall
ENGL 1550 Writing 1 3
MATH 1571 Calculus 1 4
CHEM 1515 & 1515L General Chemistry 1 and General Chemistry 1 Laboratory 4
ENGR 1500 Engineering Orientation 1
ENGR 1550 Engineering Concepts 2

Semester Hours 14

Spring
ENGL 1551 Writing 2 3
MATH 1572 Calculus 2 4
PHYS 2610 General Physics 1 4
ENGR 1560 Engineering Computing 2

Semester Hours 13

Year 2
Fall
ISEN 3710 Engineering Statistics 3
ISEN 3724 Engineering Economy 3
MATH 2673 Calculus 3 4
CSIS 2610 Programming and Problem-Solving (others with consent of Program Coordinator) 4
CMST 1545 Communication Foundations 3

Semester Hours 17

Spring
ISEN 3716 Systems Analysis and Design 3
ISEN 3736 Methods Engineering & 3736L Methods Engineering Laboratory 3
PHYS 2611 General Physics 2 4
CEEN 2601 Statics 3

Recommended GER Electives
SOC 1500 Introduction to Sociology (SS) 3
PSYC 1560 General Psychology (SS) 3
PHIL 1561 Technology and Human Values (AH) 3
PHIL 2626 Engineering Ethics (AH) 3
FNUT 1551 Normal Nutrition (SPA) 3
COUN 1587 Introduction to Health and Wellness in Contemporary Society (SPA) 3

Required STEM and Electives

COURSE
ENGR 1500
ENGR 1550
ENGR 1560
CSIS 2610
CEEN 2601
ECEN 2614
MECH 2641
MECH 2606
SOC 1500
PSYC 1560
PHIL 1561
PHIL 2626
FNUT 1551
COUN 1587

TITLE
Engineering Orientation
Engineering Concepts
Engineering Computing
Programming and Problem-Solving
Statics
Basics of Electrical Engineering
Dynamics
Engineering Communication with CAD
Introduction to Sociology (SS)
General Psychology (SS)
Technology and Human Values (AH)
Engineering Ethics (AH)
Normal Nutrition (SPA)
Introduction to Health and Wellness in Contemporary Society (SPA)

S.H.
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2
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3
Bachelor of Engineering in Industrial and Systems Engineering

Math & Natural Science Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 3720</td>
<td>Linear Algebra and Matrix Theory</td>
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<tr>
<td>or MATH 3705</td>
<td>Differential Equations</td>
<td></td>
</tr>
<tr>
<td>Natural Science (various)</td>
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