

Program Curriculum

The minimum number of credits required to complete the Bachelor of Science in Engineering with major in Industrial Engineering is 124 credits. Industrial Engineering program curriculum is summarized in the following Table: .

Industrial Engineering Curriculum

Year; Semester	Course (Department, Number, Title)	Category (Credit Hours)				
		Math & Basic Sciences	Engineering Topics	General Education	Engineering Design	Other
Freshman Semester 1	Math 231 Calculus and Analytic Geometry	4				
	Ind Eng 111 Introduction to Engineering		3		X	
	Chem 105 General Chemistry for Engineering	5				
	GER General Education Requirements, Art/Humanities, or Social Science			3		
Freshman Semester 2	CompSci 201 Introductory Computer Programming					3
	Math 232 Calculus and Analytic Geometry	4				
	Natural Science Elective	3				
	GER General Education Requirements, Art/Humanities, or Social Science			3		
	Ind Eng 112 Engineering Drawing and CAD/Drafting		3		X	
Sophomore Semester 1	Civ Eng 201 Statics		3			
	Physics 209 Physics I	4				
	MatlEng 201 Engineering Materials		4			
	Math 233 Calculus and Analytic Geometry	4				
	EAS 200 Professional Seminar					1
Sophomore Semester 2	Civ Eng 202 Dynamics		3			
	GER General Education Requirements, Art/Humanities, or Social Science			3		
	Elec Eng 234 Analytical Methods in Engineering	4				
	Physics 210 Physics II	4				
	GER General Education Requirements, Art/Humanities, or Social Science			4		

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Industrial Engineering Curriculum (continued)

Year; Semester	Course (Department, Number, Title)	Category (Credit Hours)				
		Math & Basic Science	Engineering Topics	General Education	Engineering Design	Other
Junior Year Semester 1	Ind Eng 350 Manufacturing Process		3			
	Ind Eng 360 Engineering Economic Analysis		3			
	Ind Eng 370 Introduction to Operations Analysis		3			
	Ind Eng 455 Operations Research I		3			
	Ind Eng 467 Introductory Statistics for Physical Science and Engineering Students		3			
Junior Year Semester 2	Elec Eng 301 Electrical Science I		3			
	Ind Eng 465 Operations research II		3		X	
	Ind Eng 580 Introduction Ergonomics		3		X	
	Ind Eng 475 Introduction to Simulation Methodology		3		X	
	GER General Education Requirements, Art/Humanities, or Social Science			3		
Senior Year Semester 1	Ind. Eng 470 Methods Engineering		3		X	
	Ind Eng 583 Facility Layout and Materials Handling		3			
	Technical Elective		3			
	Technical Elective		3			
	Free Elective					4
Senior Year Semester 2	Mech Eng 301 Basic Engineering Thermodynamics		3			
	Ind Eng 571 Quality Control and Design of Experiments I		3		X	
	Ind Eng 485 Senior Design Project		3		X	
	Technical Elective		3			
	technical Elective		3	3		
TOTALS-ABET BASIC-LEVEL REQUIREMENTS		32	70	15		7
OVERALL TOTAL FOR DEGREE	124 credits					
PERCENT OF TOTAL		26%	56%	12%		6%
Totals must satisfy one set	Minimum semester credit hours	32 hrs	70	15		
	Minimum percentage	25%				

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Industrial Engineering Curriculum (continued)

	Course (Department, Number, Title)	Category (Credit Hours)				
		Math & Basic Science	Engineering Topics	General Education	Engineering Design	Other
Technical Electives	EAS 001 Co-op Work Period		3			
	Ind Eng 390 Senior Thesis		3			
	Ind Eng 450 Computer Aided Manufacturing and Robotics		3			
	Ind Eng 540 Expert Systems for Engineering Applications		3			
	Ind Eng 572 Reliability Engineering		3			
	Ind Eng 575 Design of Experiments		3			
	Ind Eng 787 Lean Production Systems		3			
	Ind Eng 590 Topics in Industrial Engineering		3			
	Ind 671 Quality Control and Design of Experiments II		3			
	Ind Eng 699 Independent Study		3			
	Mech Eng/Elec Eng. 474 Introduction to Control Systems		3			
	Bus Adm 330 Organizations					3
	Bus Adm 473 Business Logistic Management					3
TOTALS-ABET BASIC-LEVEL REQUIREMENTS			12			
OVERALL TOTAL FOR DEGREE	124 Credit Hours					
PERCENT OF TOTAL			9%			
Totals must	Minimum semester credit hours		12			
satisfy one set	Minimum percentage					

Evidence of Minimum Credit Hours as Required by Criterion

As shown in the above Table the program requires 32 credit hours (26%) in math and basic science, 70 credit hours in engineering topics, 15 credit hours in general education and 8 credit hours in other category.

Capstone Design Experience

The Industrial Engineering Senior Design Project (490-485) is a comprehensive, hands on, applied design course taught in conjunction with a sponsoring company. A senior Industrial Engineer, employed by the sponsoring company, teaches the course. The course consists of both on campus lecture and off campus fieldwork. Lecture is used to teach applied concepts such as business considerations in a global economy, ethics, professionalism, project management, defining goals and objectives, etc; and to meet with the teams for continuous updates on their projects. Fieldwork is done on site at the participating company under the supervision of the course instructor.

Currently, the course is sponsored by a commercial lighting assembly company and is taught by their Industrial Engineering manager. The class is broken into teams consisting of 2, 3 or 4 students depending on the overall class size and the types of projects available. The team members are assigned by the instructor. The course instructor identifies projects that are available and the teams choose the project they would like to complete. Project scope is designed such that each student will spend an average of 10-12 hours per week directly working on the project. Currently all projects are located on the primary production floor. Most, but not all projects, are tied to a given production line. Teams may be challenged to increase production, reduce the labor required or reduce the floor space required, etc. Other objectives may be to improve the safety (ergonomics) of the workers while not reducing production, or studying a process to find more efficient work techniques, or processes.

Regardless of the project, approximately the first eight weeks of the semester the teams work to identify and assess the problems associated with their projects and look for opportunities for improvement. This comprehensive analysis requires many of the concepts and tools learned in their other prerequisite Industrial Engineering courses. During this process, the course instructor mentors the teams so that each team is able to tackle difficult decisions such as which problems they will be able to solve in the limited time they have, and, given the profitability of the product, and the lifespan of the product, which problems they will likely be able to find cost effective solutions for.

At mid-semester, a 'milestone' must be met where the teams present their findings and seek a budget and approval to complete their work. Teams must study multiple feasible designs and evaluate each of those designs using quantitative methods such as economic analysis, operations analysis, simulation, etc. Teams present their findings to management and representatives of the Industrial Engineering Department, where their project is approved and is awarded a budget. Also, their oral presentation technique, content and skill are evaluated in detail. Following each presentation, the course instructor and a representative from the Department meet with the team for 45 minutes to discuss what worked and what did not during their presentation, any weaknesses in the work done so far, and what needs to be done to improve the project, and the presentation of their work prior to the final presentation. Teams also submit a written draft of their project report that contains all the work done to date. The course instructor reviews those reports and provides written and verbal feedback to each team individually during scheduled meeting times.

During the last eight weeks of the semester, the teams use their budget to implement their designs. In addition to a cash budget (ranging from \$5,000 to \$25,000 depending on the project) the students may augment the skills of their teams by drawing upon other company resources such as maintenance workers to assemble equipment, machinists to build tooling and fixtures.

During this implementation stage, teams typically learn hard lessons about time and resource management, oversights and/or insufficient thought and planning in their designs, the difficulty in integrating human labor into their new designs. The implementation phase is a fantastic opportunity for the students to directly experience the consequences of poor planning and/or design during the design phase. As always, the course instructor mentors the teams and helps them to identify ways to overcome any shortcoming(s) their design(s) may have. The instructor also helps the teams recognize the importance of staying focused and completing the project at hand. It is during this phase that the students get a true feeling of the concept and importance of 'continuous improvement' where we reach ultimate goals in small, workable steps, as opposed to 'continuous development' where we may never reach a workable goal at all.

At the conclusion of the course, the students make a final oral presentation of their project to representatives of the company. Faculty members of the Industrial Engineering Department, members of Industrial Advisory Board and other Industrial Engineering students are invited. Students also submit their final report that contains all the documentation related to the project.

The Senior Design Project is an excellent environment for the students to learn how to work on teams in demanding situations, work on projects that have genuine impact, and real consequences, incorporate many of the tools and concepts they learn in their other Industrial Engineering courses, and do so under the watchful eye of an experienced industrial engineer who can teach them real-life lessons while mentoring them through their project.