B.S. IN INDUSTRIAL ENGINEERING

Overview

The curriculum includes required courses in mathematics and the physical sciences that ensure a firm scientific background while advanced departmental courses provide specialization. Required courses in the people and society - humanities and arts give students the social, ethical and ecological awareness needed in their profession. The courses are designed with the prerequisite structure in mind so that students have to draw from previously acquired knowledge to successfully complete upper level course requirements.

The engineering design experience is interwoven in the curriculum throughout the students' four years of study.

- Starting with EGN 114 **Global Challenges in Engineering** and EGN 123 **Digital Solutions for the Future,** students are given a broad introduction to Engineering. In addition they are introduced to a wide variety of topics in the digital realm including Python, Engineering graphics, Auto CAD, Excel, Tableau, Solid Works and AI applications.
- The students then move on to take ISE 201 **Work Design Systems System** where they perform work measurement projects in industry and determine the impact of productivity.   This is applied in a semester project in industry which includes writing a reports, and making oral presentations to management. In the Fall of their Junior year, the students take ISE 363 **Project Management for Engineers** and they are exposed to techniques and tools in project management such as use of network flow and MS Project.
- Students take ISE 380 **Engineering Economic Analysis** where they become aware of the impact of productivity on the economic and social well-being of industry and countries. The students are also introduced to basic models of decision making such as the formulation and evaluation of an economic strategy.
- ISE 406 **Computer-Aided Manufacturing** introduces the students to product design in manufacturing and modern concepts of CAD/CAM/Automation.
- ISE 441 **Deterministic Models in Operations Research** focuses on the formulation of linear programming problems and solutions by the simplex method. Related topics include sensitivity analysis, duality theory and network programming. Engineering applications are emphasized.
- ISE 442 **Stochastic Models in Operations Research** focuses on basic concepts and techniques of random processes that are used to develop models for a variety of engineering and managerial problems. Topics include the Poisson Process, Markov chains, renewal theory, queuing models, and reliability.
- ISE 465 **Inventory and Supply Chain Systems** provides a thorough treatment of modern production and inventory management policies, and their ramifications on supply chain management. ISE 568 **Facilities Planning and Logistics** focuses on the analysis and design of production and service facilities, warehousing, and logistics.
- **ISE 224Python for Engineers** will introduce programming and coding as a tool for analysis of industry systems. Theory and applications of decision support systems in industrial engineering are covered in ISE 524 **Decision Support Systems in IE**. The topics include the study of model-based data-based, knowledge-based, and communication-based decision support systems.
- In ISE 557 **Ergonomics and Human Factors Engineering** both laboratory projects and real-world projects are designed, discussed, and conducted.
- Industry based projects are embedded into several other courses such as ISE 512 **Quality Management Systems** and ISE 547**Simulation Modeling and Systems Analysis**.
- ISE 493 is the capstone planning course where students will select and plan their capstone project and complete the project in ISE 494. ISE 494 **Senior Design Project** is a capstone project course where the students pool all of their knowledge and previous design experience into one major project integrating all components of the curriculum together. These projects are usually industry-based. Students prepare written and oral presentations. These presentations are made before top management or engineers of the organization where the projects were conducted in the presence of the faculty representatives from the department.

Real world projects are an integral part of most junior and senior level courses. In these courses, communication is emphasized through requirements for oral presentation and written technical reports. This experience provides the graduates with valuable industrial experience and communications skills while studying at the University of Miami.

The teaching laboratories meet current program needs and are constantly being improved. Equipment and experiments are geared to provide instruction in the areas of production system design, work methods and measurement, human factors engineering, manufacturing processes, computer applications in industrial engineering and operations research.

Advanced Writing and Communication Skills: Industrial Engineering students satisfy the University's Advanced Writing and Communication Skills requirement by completing a set of classroom courses, laboratory courses and design courses where they learn effective oral, graphical and technical writing skills. Industrial Engineering students acquire Advanced Writing and Communication skills in the following core courses:

- EGN 114 Global Challenges in Engineering
- ISE 201 Work Design Systems
- ISE 363Project Management for Engineers
- ISE 380Engineering Economic Analysis
- ISE 493

- ISE 494 Senior Project
- ISE 512 Quality Management Systems
- ISE 547 Computer Simulation Systems
- ISE 557 Ergonomics and Human Factors Engineering
- ISE 568 Facilities Planning and Logistics

Industrial Engineering Concentrations

- Engineering Management Concentration
- Financial Engineering Concentration
- Manufacturing Engineering Concentration
- Pre-Medical Concentration

BSIE Curriculum Requirements

Code	Title	Credit Hours
Core Requirement Courses		
EGN 114	Global Challenges Addressed by Engineering and Technology (NEW COURSE: Global Challenges in Engineering)	3
EGN 123	Computing and Digital Solutions for the future (NEW COURSE: Digital Solutions for the Future)	3
ISE 201	Work Design Systems	3
ISE 224	Python for Engineers	3
ISE 312	Foundations of Data Analysis	3
ISE 363	Project Management for Engineers	3
ISE 380	Engineering Economic Analysis	3
ISE 406	Computer-Aided Manufacturing	3
ISE 441	Operations Research and Optimization Methods	3
ISE 442	Stochastic Modeling and Decision Making	3
ISE 465	Inventory and Supply Chain Management	3
ISE 493	Industrial and Systems Engineering Capstone Planning (Industrial and Systems Engineering Capstone Planning)	1
ISE 494	Senior Design Project	3
ISE 512	Quality Management Systems	3
ISE 516	Introduction to Applied Data Analytics	3
ISE 524	Systems Intelligence with Software Applications	3
ISE 547	Simulation Modeling and Systems Analysis	3
ISE 557	Ergonomics and Human Factors Engineering	3
ISE 568	Facilities Planning and Logistics	3
ISE Elective Courses		**9**
Students must take 3 courses in ISE 300 level or above.		
At most 6 credits can be taken from the following courses:		
ISE 570 Engineering Management		
ISE 571 Engineering Entrepreneurship		
ISE 572 Management of Technological Innovation		
Engineering and Technical Elective Courses		
Additional Engineering Credit Hours		3
Additional Technical Elective Credit Hours		3
Other Courses		
Math & Basic Sciences Credit Hours		
ISE 310	Introduction to Engineering Probability	3
MTH 151	Calculus I for Engineers	5
MTH 162	Calculus II	4
MTH 210	Introduction to Linear Algebra	3

or EGN 318	Engineering Mathematics I	
MTH 311	Introduction to Ordinary Differential Equations	3
or EGN 319	Engineering Mathematics II	
PHY 221	University Physics I	3
PHY 222	University Physics II	3
PHY 223	University Physics III	3
or EGN 233	Electromagnetics and Its Engineering Applications	
PHY 106	Physics Laboratory 1	1
Basic Science Elective		3
BIL 150	General Biology	
CHM 121	Principles of Chemistry	
CHM 151	Chemistry for Engineers	
MSC 111	Introduction to Marine Science	
PHY 360	Introduction to Modern Physics	
Basic Science Elective Lab		1
BIL 151	General Biology Laboratory	
CHM 113	Chemistry Laboratory I	
CHM 153	Chemistry Laboratory for Engineers	
MSC 112	Introduction to Marine Science Lab	
PHY 306	Intermediate Laboratory	
General Education Requirements		
Written Communication Skills:		
WRS 105	First-Year Writing I	3
WRS 107	First-Year Writing II: STEM	3
Quantitative Skills:		
MTH 151	Calculus I for Engineers (fulfilled through the major)	
Areas of Knowledge:		
Arts and Humanities Cognate		9
People and Society Cognate		9
STEM Cognate (9 credits) (fulfilled through the major)		
Other Credit Hours		**3**
Total Credit Hours		**129**

BSIE Curriculum Requirements:

Engineering Management Concentration

Code	Title	Credit Hours
Core Requirement Courses		
EGN 114	Global Challenges Addressed by Engineering and Technology (NEW COURSE: Global Challenges in Engineering)	3
EGN 123	Computing and Digital Solutions for the future (NEW COURSE: Digital Solutions for the Future)	3
ISE 201	Work Design Systems	3
ISE 224	Python for Engineers	3
ISE 312	Foundations of Data Analysis	3
ISE 363	Project Management for Engineers	3
ISE 380	Engineering Economic Analysis	3
ISE 406	Computer-Aided Manufacturing	3
ISE 441	Operations Research and Optimization Methods	3
ISE 442	Stochastic Modeling and Decision Making	3
ISE 465	Inventory and Supply Chain Management	3
ISE 493	Industrial and Systems Engineering Capstone Planning (Fundamentals of Financial Engineering)	1

ISE 494	Senior Design Project	3
ISE 512	Quality Management Systems	3
ISE 516	Introduction to Applied Data Analytics	3
ISE 524	Systems Intelligence with Software Applications	3
ISE 547	Simulation Modeling and Systems Analysis	3
ISE 557	Ergonomics and Human Factors Engineering	3
ISE 568	Facilities Planning and Logistics	3
Other ISE Courses		
ISE 570	Engineering Management	3
ISE 571	Engineering Entrepreneurship	3
ISE 572	Management of Technological Innovation	3
Other Courses		
Additional Engineering Credit Hours		3
Total Math & Basic Sciences Credit Hours		
ISE 310	Introduction to Engineering Probability	3
MTH 151	Calculus I for Engineers	5
MTH 162	Calculus II	4
MTH 210	Introduction to Linear Algebra	3
or EGN 318	Engineering Mathematics I	
MTH 311	Introduction to Ordinary Differential Equations	3
or EGN 319	Engineering Mathematics II	
PHY 221	University Physics I	3
PHY 222	University Physics II	3
PHY 223	University Physics III	3
or EGN 233	Electromagnetics and Its Engineering Applications	
PHY 106	Physics Laboratory 1	1
Basic Science Elective		3
BIL 150	General Biology	
CHM 121	Principles of Chemistry	
CHM 151	Chemistry for Engineers	
MSC 111	Introduction to Marine Science	
PHY 360	Introduction to Modern Physics	
Basic Science Elective Lab		1
BIL 151	General Biology Laboratory	
CHM 113	Chemistry Laboratory I	
CHM 153	Chemistry Laboratory for Engineers	
MSC 112	Introduction to Marine Science Lab	
PHY 306	Intermediate Laboratory	
General Education Requirements		
Written Communication Skills:		
WRS 105	First-Year Writing I	3
WRS 107	First-Year Writing II: STEM	3
Quantitative Skills:		
MTH 151	Calculus I for Engineers (fulfilled through the major)	
Areas of Knowledge:		
Arts and Humanities Cognate		9
People and Society Cognate		9
STEM Cognate (9 credits) (fulfilled through the major)		
Other Credit Hours		**6**
Total Credit Hours		**129**

BSIE Curriculum Requirements:

Manufacturing Concentration

Code	Title	Credit Hours
Core Requirement Courses		
EGN 114	Global Challenges Addressed by Engineering and Technology (NEW COURSE: Global Challenges in Engineering)	3
EGN 123	Computing and Digital Solutions for the future (NEW COURSE: Digital Solutions for the Future)	3
ISE 201	Work Design Systems	3
ISE 224	Python for Engineers	3
ISE 312	Foundations of Data Analysis	3
ISE 363	Project Management for Engineers	3
ISE 380	Engineering Economic Analysis	3
ISE 406	Computer-Aided Manufacturing	3
ISE 441	Operations Research and Optimization Methods	3
ISE 442	Stochastic Modeling and Decision Making	3
ISE 465	Inventory and Supply Chain Management	3
ISE 493	Industrial and Systems Engineering Capstone Planning (Industrial and Systems Engineering Capstone Planning)	1
ISE 494	Senior Design Project	3
ISE 512	Quality Management Systems	3
ISE 516	Introduction to Applied Data Analytics	3
ISE 524	Systems Intelligence with Software Applications	3
ISE 547	Simulation Modeling and Systems Analysis	3
ISE 557	Ergonomics and Human Factors Engineering	3
ISE 568	Facilities Planning and Logistics	3
Other ISE Courses		
ISE 505	Robotics	3
ISE 507	Design of Manufacturing Systems	3
Other Courses		
MAE 301	Engineering Materials Science	3
MAE 505	Design for Manufacturability	3
Additional Engineering Credit Hours		3
Total Math & Basic Sciences Credit Hours		
ISE 310	Introduction to Engineering Probability	3
CHM 151	Chemistry for Engineers	3
or CHM 121	Principles of Chemistry	
CHM 153	Chemistry Laboratory for Engineers	1
or CHM 113	Chemistry Laboratory I	
MTH 151	Calculus I for Engineers	5
MTH 162	Calculus II	4
MTH 210	Introduction to Linear Algebra	3
or EGN 318	Engineering Mathematics I	
MTH 311	Introduction to Ordinary Differential Equations	3
or EGN 319	Engineering Mathematics II	
PHY 221	University Physics I	3
PHY 222	University Physics II	3
PHY 223	University Physics III	3
PHY 106	Physics Laboratory 1	1
PHY 108	Physics Laboratory 2	1
General Education Requirements		
Written Communication Skills:		

WRS 105	First-Year Writing I	3
WRS 107	First-Year Writing II: STEM	3
Quantitative Skills:		
MTH 151	Calculus I for Engineers (fulfilled through the major)	
Areas of Knowledge:		
Arts and Humanities Cognate		9
People and Society Cognate		9
STEM Cognate (9 credits) (fulfilled through the major)		
Other Credit Hours		**3**
Total Credit Hours		**130**

BSIE Curriculum Requirements:

Pre-Medical Concentration

Code	Title	Credit Hours
Core Requirement Courses		
EGN 114	Global Challenges Addressed by Engineering and Technology (NEW COURSE: Global Challenges in Engineering)	3
EGN 123	Computing and Digital Solutions for the future (NEW COURSE: Digital Solutions for the Future)	3
ISE 201	Work Design Systems	3
ISE 224	Python for Engineers	3
ISE 312	Foundations of Data Analysis	3
ISE 363	Project Management for Engineers	3
ISE 380	Engineering Economic Analysis	3
ISE 406	Computer-Aided Manufacturing	3
ISE 441	Operations Research and Optimization Methods	3
ISE 442	Stochastic Modeling and Decision Making	3
ISE 465	Inventory and Supply Chain Management	3
ISE 493	Industrial and Systems Engineering Capstone Planning (Industrial and Systems Engineering Capstone Planning)	1
ISE 494	Senior Design Project	3
ISE 512	Quality Management Systems	3
ISE 516	Introduction to Applied Data Analytics	3
ISE 524	Systems Intelligence with Software Applications	3
ISE 547	Simulation Modeling and Systems Analysis	3
ISE 557	Ergonomics and Human Factors Engineering	3
ISE 568	Facilities Planning and Logistics	3
Other Courses		
Total Math & Basic Sciences Credit Hours		
ISE 310	Introduction to Engineering Probability	3
BIL 150	General Biology	4
BIL 151	General Biology Laboratory	1
BIL 160	Evolution and Biodiversity	4
BIL 161	Evolution and Biodiversity Laboratory	1
BMB 401	Biochemistry for the Biomedical Sciences	4
CHM 113	Chemistry Laboratory I	1
CHM 121	Principles of Chemistry	4
CHM 205	Chemical Dynamics Laboratory	1
CHM 206	Organic Reactions and Synthesis Laboratory	2
CHM 221	Introduction to Structure and Dynamics	4
CHM 222	Organic Reactions and Synthesis	4
MTH 151	Calculus I for Engineers	5

MTH 162	Calculus II	4
MTH 210	Introduction to Linear Algebra	3
or EGN 318	Engineering Mathematics I	
MTH 311	Introduction to Ordinary Differential Equations	3
or EGN 319	Engineering Mathematics II	
PHY 221	University Physics I	3
PHY 222	University Physics II	3
PHY 223	University Physics III	3
or EGN 233	Electromagnetics and Its Engineering Applications	
PHY 106	Physics Laboratory 1	1
General Education Requirements		
Written Communication Skills:		
WRS 105	First-Year Writing I	3
WRS 107	First-Year Writing II: STEM	3
Quantitative Skills:		
MTH 151	Calculus I for Engineers (fulfilled through the major)	
Areas of Knowledge:		
Arts and Humanities Cognate		9
People and Society Cognate		9
STEM Cognate (9 credits) (fulfilled through the major)		
Other Credit Hours		**3**
Total Credit Hours		**140**

BSIE Curriculum Requirements:

Financial Engineering Concentration

Code	Title	Credit Hours
Core Requirement Courses		
EGN 114	Global Challenges Addressed by Engineering and Technology	3
EGN 123	Computing and Digital Solutions for the future	3
ISE 201	Work Design Systems	3
ISE 224	Python for Engineers	3
ISE 312	Foundations of Data Analysis	3
ISE 363	Project Management for Engineers	3
ISE 380	Engineering Economic Analysis	3
ISE 406	Computer-Aided Manufacturing	3
ISE 441	Operations Research and Optimization Methods	3
ISE 442	Stochastic Modeling and Decision Making	3
ISE 465	Inventory and Supply Chain Management	3
ISE 493	Industrial and Systems Engineering Capstone Planning (Industrial and Systems Engineering Capstone Planning)	1
ISE 494	Senior Design Project	3
ISE 512	Quality Management Systems	3
ISE 516	Introduction to Applied Data Analytics	3
ISE 524	Systems Intelligence with Software Applications	3
ISE 547	Simulation Modeling and Systems Analysis	3
ISE 557	Ergonomics and Human Factors Engineering	3
ISE 568	Facilities Planning and Logistics	3
Other ISE Courses		
ISE 570	Engineering Management	3
ISE 381	Fundamentals of Financial Engineering (Fundamentals of Financial Engineering)	3
Other Courses		

Additional Engineering Credit Hours		3
FIN 320	Investment and Security Markets	3
FIN 422	Speculative Markets and Derivatives	3
Approved Financial Engineering Elective		3
Select one from the following:		
FIN 418	Fundamentals of Fintech	
FIN 421	Investment Portfolio Management	
FIN 423	Introduction to Alternative Investment	
FIN 427	Fixed Income Markets and Analysis	
FIN 460	Financial Decisions using Artificial Intelligence and Machine Learning	
Total Math & Basic Sciences Credit Hours		
ISE 310	Introduction to Engineering Probability	3
MTH 151	Calculus I for Engineers	5
MTH 162	Calculus II	4
MTH 210	Introduction to Linear Algebra	3
or EGN 318	Engineering Mathematics I	
MTH 311	Introduction to Ordinary Differential Equations	3
or EGN 319	Engineering Mathematics II	
PHY 221	University Physics I	3
PHY 222	University Physics II	3
PHY 223	University Physics III	3
or EGN 233	Electromagnetics and Its Engineering Applications	
PHY 106	Physics Laboratory 1	1
Basic Science Elective		3
BIL 150	General Biology	
CHM 121	Principles of Chemistry	
CHM 151	Chemistry for Engineers	
MSC 111	Introduction to Marine Science	
PHY 360	Introduction to Modern Physics	
Basic Science Elective Lab		1
BIL 151	General Biology Laboratory	
CHM 113	Chemistry Laboratory I	
CHM 153	Chemistry Laboratory for Engineers	
MSC 112	Introduction to Marine Science Lab	
PHY 306	Intermediate Laboratory	
General Education Requirements		
Written Communication Skills		
WRS 105	First-Year Writing I	3
WRS 107	First-Year Writing II: STEM	3
Quantitative Skills (3 credits)		
MTH 151	Calculus I for Engineers (fulfilled through the major))	
Areas of Knowledge:		
Arts and Humanities Cognate		9
People and Society Cognate		9
STEM Cognate (9 credits)(fulfilled through the major)		
Other Credits		**3**
Total Credit Hours		**132**

Sample BSIE Plan of Study

Freshman Year		
Fall		**Credit Hours**
EGN 114	Global Challenges Addressed by Engineering and Technology	3
WRS 105	First-Year Writing I	3
MTH 151	Calculus I for Engineers	5
PHY 221	University Physics I	3
	Credit Hours	**14**
Spring		
EGN 123	Computing and Digital Solutions for the future	3
WRS 107	First-Year Writing II: STEM	3
MTH 162	Calculus II	4
ECO 211 or 212	Principles of Microeconomics or Principles of Macroeconomics	3
PHY 222	University Physics II	3
PHY 106	Physics Laboratory 1	1
	Credit Hours	**17**
Sophomore Year		
Fall		
AH Cognate (AH Elective) [1]		3
ISE 201	Work Design Systems	3
MTH 210 or EGN 318	Introduction to Linear Algebra or Engineering Mathematics I	3
PS Cognate (PS Elective) [1]		3
PHY 223 or EGN 233	University Physics III or Electromagnetics and Its Engineering Applications	3
	Credit Hours	**15**
Spring		
AH Cognate (AH Elective) [1]		3
ISE 224	Python for Engineers	3

CAE 210, ECE 205,
    or MAE 303
	Mechanics of Solids I
	    or Principles of Electrical Engineering--I
	    or Thermodynamics
		3

Basic Science Elective		3
Basic Science Elective Lab		1
MTH 311 or EGN 319	Introduction to Ordinary Differential Equations or Engineering Mathematics II	3
	Credit Hours	**16**
Junior Year		
Fall		
ISE 310	Introduction to Engineering Probability	3
ISE 380	Engineering Economic Analysis	3
ISE 441	Operations Research and Optimization Methods	3
Technical Elective [2]		3
AH Cognate (Advanced AH Elective) [1]		3
PS Cognate (Advanced PS Elective) [1]		3
	Credit Hours	**18**
Spring		
ISE 312	Foundations of Data Analysis	3
ISE 363	Project Management for Engineers	3
ISE 406	Computer-Aided Manufacturing	3
ISE 442	Stochastic Modeling and Decision Making	3

ISE Elective		3
PS Cognate [1]		3
	Credit Hours	**18**
Senior Year		
Fall		
ISE 465	Inventory and Supply Chain Management	3
ISE 493	Industrial and Systems Engineering Capstone Planning	1
ISE 512	Quality Management Systems	3
ISE 547	Simulation Modeling and Systems Analysis	3
ISE 557	Ergonomics and Human Factors Engineering	3
ISE Elective [3]		3
	Credit Hours	**16**
Spring		
ISE 494	Senior Design Project	3
ISE 516	Introduction to Applied Data Analytics	3
ISE 524	Systems Intelligence with Software Applications	3
ISE 568	Facilities Planning and Logistics	3
ISE Elective [3]		3
	Credit Hours	**15**
	Total Credit Hours	**129**

[1] To be selected from lists of approved People and Society (PS)/Humanities and Arts (HA) (or applicable cognates). Students take a minimum of 3 courses (9 credit hours) in HA cognate and 3 courses in PS Cognate (9 credit hours).

[2] The Technical Elective is selected from courses at the 300 level or above, offered by one of the following departments: MTH, BTE (except BTE 417), BME (except BME 320), CAE, ECO, EEN, MAE, ACC, FIN (Except FIN 300 or 302), MGT (Except MGT 303), MAS, MKT.

[3] The ISE Elective is selected from any ISE Course at the 300 level or above. At most 2 of the following courses can be taken - ISE 570, ISE 571, ISE 572.

Note: Failure to follow the plan of study may result in a delay of your graduation.

Sample BSIE Plan of Study

Engineering Management Concentration

Freshman Year		
Fall		**Credit Hours**
EGN 114	Global Challenges Addressed by Engineering and Technology	3
MTH 151	Calculus I for Engineers	5
PHY 221	University Physics I	3
WRS 105	First-Year Writing I	3
	Credit Hours	**14**
Spring		
EGN 123	Computing and Digital Solutions for the future	3
ECO 211 or 212	Principles of Microeconomics or Principles of Macroeconomics	3
MTH 162	Calculus II	4
PHY 222	University Physics II	3
PHY 106	Physics Laboratory 1	1
WRS 107	First-Year Writing II: STEM	3
	Credit Hours	**17**
Sophomore Year		
Fall		
ISE 201	Work Design Systems	3
BSL 212 or BUS 202	Introduction to Business Law and Ethics or Introduction to the Legal Environment of Business	3

MTH 210 or EGN 318	Introduction to Linear Algebra or Engineering Mathematics I	3
PHY 223 or EGN 233	University Physics III or Electromagnetics and Its Engineering Applications	3
AH Cognate (AH Elective) [1]		3
PS Cognate (PS Elective)		3
	Credit Hours	**18**
Spring		
AH Cognate (AH Elective) [1]		3
ISE 224	Python for Engineers	3

CAE 210, ECE 205,
    or MAE 303
	Mechanics of Solids I
	    or Principles of Electrical Engineering--I
	    or Thermodynamics
		3

MTH 311 or EGN 319	Introduction to Ordinary Differential Equations or Engineering Mathematics II	3
Basic Science Elective		3
Basic Science Elective Lab		1
	Credit Hours	**16**
Junior Year		
Fall		
AH Cognate (Advanced AH Elective) [1]		3
ISE 310	Introduction to Engineering Probability	3
ISE 380	Engineering Economic Analysis	3
ISE 441	Operations Research and Optimization Methods	3
PS Cognate (PS Elective) [1]		3
	Credit Hours	**15**
Spring		
PS Cognate (Advanced PS Elective) [1]		3
ISE 312	Foundations of Data Analysis	3
ISE 363	Project Management for Engineers	3
ISE 406	Computer-Aided Manufacturing	3
ISE 442	Stochastic Modeling and Decision Making	3
	Credit Hours	**15**
Senior Year		
Fall		
ISE 465	Inventory and Supply Chain Management	3
ISE 493	Industrial and Systems Engineering Capstone Planning	1
ISE 512	Quality Management Systems	3
ISE 547	Simulation Modeling and Systems Analysis	3
ISE 557	Ergonomics and Human Factors Engineering	3
ISE 571	Engineering Entrepreneurship	3
	Credit Hours	**16**
Spring		
ISE 494	Senior Design Project	3
ISE 516	Introduction to Applied Data Analytics	3
ISE 524	Systems Intelligence with Software Applications	3
ISE 568	Facilities Planning and Logistics	3
ISE 570	Engineering Management	3
ISE 572	Management of Technological Innovation	3
	Credit Hours	**18**
	Total Credit Hours	**129**

[1]   To be selected from lists approved People and Society (PS)/Arts and Humanities (AH) (or applicable cognates). Students take a minimum of 3 courses (9 credit hours) in AH cognate and 3 courses in PS cognate (9 credit hours).

Note: Failure to follow the plan of study may result in a delay in your graduation.

Sample BSIE Plan of Study

Manufacturing Concentration

Freshman Year		
Fall		**Credit Hours**
EGN 114	Global Challenges Addressed by Engineering and Technology	3
MTH 151	Calculus I for Engineers	5
PHY 221	University Physics I	3
WRS 105	First-Year Writing I	3
	Credit Hours	**14**
Spring		
EGN 123	Computing and Digital Solutions for the future	3
ECO 211 or 212	Principles of Microeconomics or Principles of Macroeconomics	3
MTH 162	Calculus II	4
PHY 222	University Physics II	3
PHY 106	Physics Laboratory 1	1
WRS 107	First-Year Writing II: STEM	3
	Credit Hours	**17**
Sophomore Year		
Fall		
AH Cognate (AH Elective) [1]		3
ISE 201	Work Design Systems	3
MTH 210 or EGN 318	Introduction to Linear Algebra or Engineering Mathematics I	3
PHY 223	University Physics III	3
PHY 225	University Physics III Lab	1
PS Cognate (PS Elective) [1]		3
	Credit Hours	**16**
Spring		

CAE 210, ECE 205,
    or MAE 303
	Mechanics of Solids I
	        or Principles of Electrical Engineering--I
	        or Thermodynamics
		3

ISE 224	Python for Engineers	3
CHM 151 or 121	Chemistry for Engineers or Principles of Chemistry	3
CHM 153 or 113	Chemistry Laboratory for Engineers or Chemistry Laboratory I	1
MTH 311 or EGN 319	Introduction to Ordinary Differential Equations or Engineering Mathematics II	3
AH Cognate (AH Elective) [1]		3
	Credit Hours	**16**
Junior Year		
Fall		
AH Cognate (Advanced AH Elective) [1]		3
ISE 310	Introduction to Engineering Probability	3
ISE 380	Engineering Economic Analysis	3
ISE 441	Operations Research and Optimization Methods	3

PS Cognate (Advanced PS Elective) [1]		3
MAE 505	Design for Manufacturability	3
	Credit Hours	**18**
Spring		
ISE 312	Foundations of Data Analysis	3
ISE 363	Project Management for Engineers	3
ISE 406	Computer-Aided Manufacturing	3
ISE 442	Stochastic Modeling and Decision Making	3
MAE 301	Engineering Materials Science	3
PS Cognate (Advanced PS Elective)		3
	Credit Hours	**18**
Senior Year		
Fall		
ISE 465	Inventory and Supply Chain Management	3
ISE 493	Industrial and Systems Engineering Capstone Planning	1
ISE 505	Robotics	3
ISE 512	Quality Management Systems	3
ISE 547	Simulation Modeling and Systems Analysis	3
ISE 557	Ergonomics and Human Factors Engineering	3
	Credit Hours	**16**
Spring		
ISE 494	Senior Design Project	3
ISE 507	Design of Manufacturing Systems	3
ISE 516	Introduction to Applied Data Analytics	3
ISE 524	Systems Intelligence with Software Applications	3
ISE 568	Facilities Planning and Logistics	3
	Credit Hours	**15**
	Total Credit Hours	**130**

[1] To be selected from lists approved People and Society (PS)/Arts and Humanities (AH) (or applicable cognates). Students take a minimum of 3 courses (9 credit hours) in AH cognate and 3 courses in PS cognate (9 credit hours).

Note: Failure to follow the plan of study may result in a delay in your graduation.

Sample BSIE Plan of Study:

Pre-Medical Concentration

Freshman Year		
Fall		**Credit Hours**
EGN 114	Global Challenges Addressed by Engineering and Technology	3
WRS 105	First-Year Writing I	3
MTH 151	Calculus I for Engineers	5
PHY 221	University Physics I	3
ECO 211 or 212	Principles of Microeconomics or Principles of Macroeconomics	3
	Credit Hours	**17**
Spring		
EGN 123	Computing and Digital Solutions for the future	3
WRS 107	First-Year Writing II: STEM	3
MTH 162	Calculus II	4
CHM 121	Principles of Chemistry	4

PHY 222	University Physics II	3
PHY 106	Physics Laboratory 1	1
	Credit Hours	**18**
Sophomore Year		
Fall		
ISE 201	Work Design Systems	3
BIL 150	General Biology	4
CHM 221	Introduction to Structure and Dynamics	4
MTH 210 or EGN 318	Introduction to Linear Algebra or Engineering Mathematics I	3
PHY 223 or EGN 233	University Physics III or Electromagnetics and Its Engineering Applications	3
CHM 113	Chemistry Laboratory I	1
	Credit Hours	**18**
Spring		
BIL 151	General Biology Laboratory	1
BIL 160	Evolution and Biodiversity	4
BIL 161	Evolution and Biodiversity Laboratory	1
CHM 222	Organic Reactions and Synthesis [2]	4
CHM 205	Chemical Dynamics Laboratory	1
MTH 311 or EGN 319	Introduction to Ordinary Differential Equations or Engineering Mathematics II	3
PS Cognate (PS Elective) [1]		3
	Credit Hours	**17**
Junior Year		
Fall		
BMB 401	Biochemistry for the Biomedical Sciences [2]	4
CHM 206	Organic Reactions and Synthesis Laboratory	2
ISE 310	Introduction to Engineering Probability	3
ISE 380	Engineering Economic Analysis	3
ISE 441	Operations Research and Optimization Methods	3
	Credit Hours	**15**
Spring		
ISE 224	Python for Engineers	3
ISE 312	Foundations of Data Analysis	3
ISE 363	Project Management for Engineers	3
ISE 442	Stochastic Modeling and Decision Making	3
AH Cognate (AH elective) [1]		3
AH Cognate (AH Elective)		3
	Credit Hours	**18**
Senior Year		
Fall		
ISE 465	Inventory and Supply Chain Management	3
ISE 493	Industrial and Systems Engineering Capstone Planning	1
ISE 512	Quality Management Systems	3
ISE 547	Simulation Modeling and Systems Analysis	3
ISE 557	Ergonomics and Human Factors Engineering	3
AH Cognate (Advanced AH Elective) [1]		3
PS Cognate (PS Elective)		3
	Credit Hours	**19**
Spring		
ISE 406	Computer-Aided Manufacturing	3

ISE 494	Senior Design Project	3
ISE 516	Introduction to Applied Data Analytics	3
ISE 524	Systems Intelligence with Software Applications	3
ISE 568	Facilities Planning and Logistics	3
PS Cognate (Advanced PS Elective) [1]		3
	Credit Hours	**18**
	Total Credit Hours	**140**

[1]   To be selected from lists approved People and Society (PS)/Arts and Humanities (AH) (or applicable cognates). Students take a minimum of 3 courses (9 credit hours) in AH cognate and 3 courses in PS cognate (9 credit hours).

[2]   Can be replaced with an Advanced Bioscience Elective to be chosen from BIL 250 (https://bulletin.miami.edu/search/?P=BIL%20250), BIL 255 (https://bulletin.miami.edu/search/?P=BIL%20255), BIL 268 (https://bulletin.miami.edu/search/?P=BIL%20268), MIC 301 (https://bulletin.miami.edu/search/?P=MIC%20301), CHM 202 (https://bulletin.miami.edu/search/?P=CHM%20202), CHM 222BMB 401 (https://bulletin.miami.edu/search/?P=BMB%20401) or BMB 402. **Students should verify admission requirements of their medical school of interest to verify Adv. Bioscience requirements, e.g. organic chemistry II, biochemistry, or both.**

Note: Failure to follow the plan of study may result in a delay in your graduation.

Sample BSIE Plan of Study

Financial Engineering Concentration

Freshman Year		
Fall		**Credit Hours**
EGN 114	Global Challenges Addressed by Engineering and Technology	3
MTH 151	Calculus I for Engineers	5
PHY 221	University Physics I	3
WRS 105	First-Year Writing I	3
	Credit Hours	**14**
Spring		
ECO 212	Principles of Macroeconomics	3
EGN 123	Computing and Digital Solutions for the future	3
MTH 162	Calculus II	4
PHY 222	University Physics II	3
PHY 106	Physics Laboratory 1	1
WRS 107	First-Year Writing II: STEM	3
	Credit Hours	**17**
Sophomore Year		
Fall		
AH Cognate (AH Elective) [1]		3
ISE 201	Work Design Systems	3
MTH 210	Introduction to Linear Algebra	3
PHY 223 or EGN 233	University Physics III or Electromagnetics and Its Engineering Applications	3
PS Cognate (PS Elective) [1]		3
	Credit Hours	**15**
Spring		
ISE 224	Python for Engineers	3
ISE 381	Fundamentals of Financial Engineering	3
CAE 210, ECE 205, or MAE 303	Mechanics of Solids I or Principles of Electrical Engineering--I or Thermodynamics	3
MTH 311 or EGN 319	Introduction to Ordinary Differential Equations or Engineering Mathematics II	3
Basic Science Elective		3

Basic Science Elective Lab		1
	Credit Hours	**16**
Junior Year		
Fall		
ISE 310	Introduction to Engineering Probability	3
ISE 380	Engineering Economic Analysis	3
ISE 441	Operations Research and Optimization Methods	3
PS Cognate (PS Elective) [1]		3
AH Cognate (AH Elective) [1]		3
	Credit Hours	**15**
Spring		
FIN 320	Investment and Security Markets	3
ISE 312	Foundations of Data Analysis	3
ISE 363	Project Management for Engineers	3
ISE 406	Computer-Aided Manufacturing	3
ISE 442	Stochastic Modeling and Decision Making	3
PS Cognate (PS Elective)		3
	Credit Hours	**18**
Senior Year		
Fall		
ISE 465	Inventory and Supply Chain Management	3
ISE 493	Industrial and Systems Engineering Capstone Planning	1
ISE 512	Quality Management Systems	3
ISE 547	Simulation Modeling and Systems Analysis	3
ISE 557	Ergonomics and Human Factors Engineering	3
FIN 422	Speculative Markets and Derivatives	3
Financial Engineering Elective		3
	Credit Hours	**19**
Spring		
ISE 494	Senior Design Project	3
ISE 516	Introduction to Applied Data Analytics	3
ISE 524	Systems Intelligence with Software Applications	3
ISE 568	Facilities Planning and Logistics	3
ISE 570	Engineering Management	3
AH Cognate (AH Elective)		3
	Credit Hours	**18**
	Total Credit Hours	**132**

[1]   To be selected from lists of approved People and Society (PS)/Humanities and Arts (HA) (or applicable cognates). Students take a minimum of 3 courses (9 credit hours) in HA cognate and 3 courses in PS Cognate (9 credit hours).

Note: Failure to follow the plan of study may result in a delay of your graduation.

Mission

The Department of Industrial and Systems Engineering's mission is to provide contemporary and relevant industrial and systems engineering education and research; impart knowledge and skills necessary to design and to improve a variety of manufacturing and service processes; promote life-long learning; and contribute to emerging societal needs.

Goals

The major goal of the Industrial and Systems Engineering program at the University of Miami is to prepare graduates to contribute to the economy by virtue of employment in a variety of industries: manufacturing (heavy and light, traditional and high technology) and service (health care, retail, transportation, logistics, government, consulting, banking, and insurance). In striving to achieve this goal, the objective of the faculty is to provide all graduates with the mathematical, scientific, and design tools required to formulate problems accurately, generate alternative solutions, evaluate

those alternatives, and present the best solutions to clients or decision makers in a fashion that facilitates decision-making processes. In addition, superior students are prepared for graduate studies and research. Within the first several years following graduation from the Industrial and Systems Engineering program, graduates are expected to be:

1. Working as professionals by adding value in any one of the following sectors:
   - Service
   - Government
   - Consulting
   - Retail
   - Manufacturing
2. Pursuing or holding a graduate degree and/or developing professionally through continuing education, licensure, certification and seminars in a new area or their chosen areas of expertise.

Student Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.