# **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/
- 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 547Simulation 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	e.	
At most 6 credits can be taken from the following co	ourses:	
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

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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		

Total Credit Hours		132
Other Credits		3
STEM Cognate (9 credits)(fulfilled through the major)		
		9
Arts and Humanities Cognate People and Society Cognate		9
Areas of Knowledge:		
MTH 151	Calculus I for Engineers (fulfilled through the major))	
Quantitative Skills (3 credits)	Onlawlyn I fan Franciscana (fylfillad thursen the marin)	
WRS 107	First-Year Writing II: STEM	3
WRS 105	First-Year Writing I	3
Written Communication Skills	Final Vasa Maisin at I	
General Education Requirements		
PHY 306	Intermediate Laboratory	
MSC 112	Introduction to Marine Science Lab	
CHM 153	Chemistry Laboratory for Engineers	
CHM 113	Chemistry Laboratory I	
BIL 151	General Biology Laboratory	
Basic Science Elective Lab	0 10:1	1
PHY 360	Introduction to Modern Physics	
MSC 111	Introduction to Marine Science	
CHM 151	Chemistry for Engineers	
CHM 121	Principles of Chemistry	
BIL 150	General Biology	
Basic Science Elective	0 10:1	3
PHY 106	Physics Laboratory 1	1
or EGN 233	Electromagnetics and Its Engineering Applications	
PHY 223	University Physics III	3
PHY 222	University Physics II	3
PHY 221	University Physics I	3
or EGN 319	Engineering Mathematics II	_
MTH 311	Introduction to Ordinary Differential Equations	3
or EGN 318	Engineering Mathematics I	
MTH 210	Introduction to Linear Algebra	3
MTH 162	Calculus II	4
MTH 151	Calculus I for Engineers	5
SE 310	Introduction to Engineering Probability	3
Total Math & Basic Sciences Credit Hours		
	Learning	
FIN 460	Financial Decisions using Artificial Intelligence and Machine	
FIN 427	Fixed Income Markets and Analysis	
FIN 423	Introduction to Alternative Investment	
FIN 421	Investment Portfolio Management	
FIN 418	Fundamentals of Fintech	
Select one from the following:		
Approved Financial Engineering Elective	· 	3
FIN 422	Speculative Markets and Derivatives	3
FIN 320	Investment and Security Markets	3

# **Sample BSIE Plan of Study**

Freshmen Ver	<b>/</b>	
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
1111 221	Credit Hours	14
Spring	Credit Flours	17
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	3
211 01 212	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	3
	or Engineering Mathematics I	
PS Cognate (PS Elective) 1		3
PHY 223 or EGN 233	University Physics III	3
	or Electromagnetics and Its Engineering Applications	
	Credit Hours	15
Spring		
AH Cognate (AH Elective) 1		3
ISE 224	Python for Engineers	3
CAE 210, ECE 205,	Mechanics of Solids I	3
or MAE 303	or Principles of Electrical Engineering-I	
Basis Caismas Floatins	or Thermodynamics	2
Basic Science Elective		3
Basic Science Elective Lab	late destinate Outlines Differential Franctions	1
MTH 311 or EGN 319	Introduction to Ordinary Differential Equations or Engineering Mathematics II	3
	Credit Hours	16
Junior Year	Great Hours	10
Fall		
ISE 310	Introduction to Engineering Probability	3
ISE 380	Engineering Economic Analysis	3
ISE 441	Operations Research and Optimization Methods	3
Technical Elective <sup>2</sup>	operations resocaton and optimization methods	3
AH Cognate (Advanced AH Elective) 1		3
PS Cognate (Advanced PS Elective)		3
	Credit Hours	18
Spring	o.cu.c.i.ouio	10
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
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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.

## **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	3
	or Principles of Macroeconomics	
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

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.

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.

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) <sup>1</sup>	or Electromagnetics and its Engineering Applications	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 EngineeringI 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
Spring	Credit Hours	16
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

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**

EGN 114 Global Challenges Addressed by Engineering and Technology MTH 151 Calculus I for Engineers WRS 105 First-Year Writing I Credit Hours Spring  EGN 123 Computing and Digital Solutions for the future EGN 210 c712 Principles of Microeconomics or Principles of Macroeconomics MTH 162 Calculus II PHY 222 University Physics II PHY 106 Physics Laboratory 1 WRS 107 First-Year Writing II: STEM  Oredit Hours Sophomore Year Fall AH Cognate (AH Elective) 1 SE 201 Work Design Systems MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I PHY 225 University Physics III Lab PS Cognate (PS Elective) 1 Spring CAE 210, ECE 205, Or Principles of Electrical Engineering—I SF 224 Python for Engineers Or Principles of Electrical Engineering—I SE 224 Python for Engineers Or Principles of Electrical Engineering—I SF 224 Python for Engineers Or Principles of Demistry Chemistry Laboratory 1 MTH 311 or EGN 319 Introduction to Engineering Mathematics I  Junior Year Fall AH Cognate (AH Elective) 1 Thermodynamics Or Principles of Electrical Engineering—I Or Principles of Electrical Engineering—I Or Principles of Electrical Engineering—I Or Principles of Demistry CHM 153 or 113 Chemistry Laboratory for Engineers Or Principles of Demistry CHM 153 or 113 Chemistry Laboratory of Engineers Or Principles of Demistry CHM 153 or 113 Chemistry Laboratory of Engineering—I Ordenistry Laboratory of Engineering—I Ordenistry Laboratory of Engineering Mathematics II  Junior Year Fall AH Cognate (Advanced AH Elective) 1 Introduction to Ordinary PortBeathal Equations Or Engineering Mathematics II  Junior Year Fall AH Cognate (Advanced AH Elective) 1 Introduction to Engineering Probability Engineering Probability Engineering Economic Analysis	Freshman Year		
MTH 151 Calculus I for Engineers PHY 221 University Physics I WRS 105 First-Year Writing I Spring CTedit Hours Spring ECO 211 or 212 Principles of Microeconomics or Principles of Microeconomics or Principles of Macroeconomics MTH 162 Calculus II PHY 222 University Physics II PHY 210 Or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I PHY 223 University Physics III PHY 225 University Physics III PHY 225 University Physics III PHY 225 University Physics III Lab PS Cognate (PS Elective)  Spring Credit Hours Spring Credit Hours Spring Credit Hours  Spring Credit Hours  ISE 224 Python for Engineers Or Principles of Electrical Engineering—I or Thermodynamics  ISE 224 Python for Engineers Or Principles of Chemistry Chemistry Chemistry Laboratory I MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (AH Elective)  INTRODUCTION OF Engineers Or Chemistry Laboratory for Engineers or Chemistry Laboratory of Engineers or Engineering Mathematics II AH Cognate (AH Elective)  Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (Advanced AH Elective)  Introduction to Engineering Probability	Fall		Credit Hours
PHY 221 University Physics I WRS 105 First-Year Writing I  Credit Hours  Spring  EON 123 Computing and Digital Solutions for the future ECO 211 or 212 Principles of Microeconomics or Principles of Macroeconomics MTH 162 Calculus II PHY 226 University Physics II PHY 106 Physics Laboratory 1 WRS 107 First-Year Writing II: STEM  Sophomore Year Fall AH Cognate (AH Elective)  ISE 201 Work Design Systems MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I PHY 223 University Physics III Lab PS Cognate (PS Elective)  Credit Hours  Spring  CAE 210, ECE 205, or MAE 303 or Principles of Electrical Engineering—I or Thermodynamics ISE 24 Python for Engineers Or Hemistry Laboratory for Engineers or Principles of Chemistry CHM 153 or 113 Chemistry Chemistry Gregineering Mathematics II AH Cognate (AH Elective)  MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (AH Elective)  Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (AH Elective)  Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (AH Elective)  Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (Advanced AH Elective)  Introduction to Engineering Probability E5 230 Engineering Economic Analysis	EGN 114	Global Challenges Addressed by Engineering and Technology	3
WRS 105 First-Year Writing I  Credit Hours  Spring  EN 123 Computing and Digital Solutions for the future  ECO 211 or 212 Principles of Microeconomics or Principles of Microeconomics MTH 162 Calculus II PHY 202 University Physics II PHY 106 Physics Laboratory I WRS 107 First-Year Writing II: STEM  Credit Hours  Sophomore Year Fall AH Cognate (AH Elective)  Work Design Systems  Introduction to Linear Algebra or Engineering Mathematics I University Physics III Lab  PHY 223 University Physics III University Physics III Lab  Spring  Credit Hours  Spring  CAE 210, ECE 205, or MAE 303 Or Principles of Electrical Engineering—I or Thermodynamics ISE 224 Python for Engineers or Principles of Chemistry Carbonatory  WRH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (AH Elective)  Thermodynamics  Chemistry Laboratory for Engineers or Ordemistry Laboratory for Engineers or Engineering Mathematics II AH Cognate (AH Elective)  Linear Spring  Credit Hours  Thermodynamics  Chemistry Laboratory for Engineers or Chemistry Laboratory for Engineers or Engineering Mathematics II AH Cognate (AH Elective)  Linear Spring  Credit Hours  Junior Year Fall AH Cognate (Advanced AH Elective)  Introduction to Engineering Probability Engineering Economic Analysis	MTH 151	Calculus I for Engineers	5
Spring  EON 123 Computing and Digital Solutions for the future  EON 121 or 212 Principles of Microeconomics or Principles of Microeconomics MTH 162 Calculus II PHY 222 University Physics II PHY 106 Physics Laboratory I WISS 107 First-Year Writing II: STEM  Credit Hours  Sophomore Year Fall AH Cognate (AH Elective) I SE 201 Work Design Systems MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I PHY 225 University Physics III Lab PS Cognate (PS Elective) Credit Hours  Spring  CAE 210. ECE 205, Mechanics of Solids I or Principles of Electrical Engineering—I or MAE 303 Or Principles of Electrical Engineering—I or Thermodynamics SE 224 Python for Engineers CHM 151 or 121 Chemistry for Engineers Or Hemistry Laboratory for Engineers Or Hemistry Laboratory or Chemistry Laboratory I MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (AH Elective) Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (Advanced AH Elective) Introduction to Engineering Probability ES 330 Introduction to Engineering Probability ES 330 Engineering Economic Analysis	PHY 221	University Physics I	3
Spring  EON 123 Computing and Digital Solutions for the future  ECO 211 or 212 Principles of Microeconomics or Principles of Macroeconomics  MTH 162 Calculus II PHY 225 University Physics II PHY 106 Physics Laboratory 1 WRS 107 First-Year Writing II: STEM  Sophomore Year Fall AH Cognate (AH Elective) 1 SEZ 201 Work Design Systems MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I PHY 225 University Physics III Lab PS Cognate (PS Elective) 1  Spring  CAE 210, ECE 205, Mechanics of Solids I or Principles of Electrical Engineering—I or Thermodynamics ISE 224 Python for Engineers or Principles of Chemistry CHM 153 or 113 Chemistry for Engineers or Chemistry Laboratory 1  MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics I  Junior Year Fall AH Cognate (AH Elective) 1  Junior Year Fall AH Cognate (AH Elective) 1  Introduction to Ordinary Differential Equations or Engineering Mathematics II  Junior Year Fall AH Cognate (Advanced AH Elective) 1  Introduction to Engineering Probability ISE 330 Introduction to Engineering Probability ISE 330 Engineering Economic Analysis	WRS 105	First-Year Writing I	3
EGN 123 Computing and Digital Solutions for the future  ECO 211 or 212 Principles of Microeconomics or Principles of Microeconomics  MTH 162 Calculus II PHY 222 University Physics II PHY 106 Physics Laboratory 1 WRS 107 First-Year Writing II: STEM  Credit Hours 1  Sophomore Year Fall  AH Cognate (AH Elective) 1  Second Credit Hours 1  Credit Hours 1  Credit Hours 1  AH Cognate (AH Elective) 1  Credit Hours 1  Credit Hours 1  Credit Hours 1  And Cognate (PS Elective) 1  Credit Hours 1  Credit Hours 1  APH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics II  Description of Physics III  Credit Hours 1  Credit Hours 1  Spring 1  CAE 210, ECE 205, Mechanics of Solids I or Principles of Electrical Engineering—I or Thermodynamics  ISE 224 Python for Engineers  Or Principles of Chemistry  Chemistry Laboratory for Engineers or Principles of Chemistry Laboratory or Engineering—I or Engineering—I or Engineering—I or Engineering—I or Chemistry Laboratory or Engineering—I or Engineer		Credit Hours	14
ECO 211 or 212 Principles of Microeconomics or Principles of Macroeconomics MTH 162 Calculus II PHY 222 University Physics II PHY 106 Physics Laboratory 1 WRS 107 First-Year Writing II: STEM Credit Hours  Sophomore Year Fall AH Cognate (AH Elective) 1 ISE 201 Work Design Systems MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Probability PHY 223 University Physics III Lab PHY 223 University Physics III Lab PHY 225 University Physics III Lab PHY 225 University Physics III Lab PHY 226 Credit Hours  Spring Credit Hours  Spring  Credit Hours  Spring  Credit Fours  ISE 224 Python for Engineers Or Principles of Electrical Engineering-I or Thermodynamics ISE 224 Python for Engineers Or Principles of Chemistry CHM 151 or 121 Chemistry for Engineers or Principles of Chemistry  CHM 151 or 16N 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (AH Elective) 1  Junior Year Fall AH Cognate (Advanced AH Elective) 1 ISE 380 Introduction to Engineering Probability Engineering Economic Analysis	Spring		
or Principles of Macroeconomics  MTH 162 Calculus II  PHY 222 University Physics II  PHY 106 Physics Laboratory 1  WRS 107 First-Year Writing II: STEM  Credit Hours  Sophomore Year  Fall  AH Cognate (AH Elective) 1  SE 201 Work Design Systems  MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I  PHY 223 University Physics III  PHY 225 University Physics III Lab  PHY 225 University Physics III Lab  PS Cognate (PS Elective) 1  Spring  CAE 210, ECE 205, Mechanics of Solids I  or Principles of Electrical Engineering—I  or Thermodynamics  ISE 224 Python for Engineers or Principles of Chemistry  CHM 153 or 113 Chemistry Laboratory I  MTH 311 or EGN 319 Introduction to Credit Hours  I Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective) 1  Credit Hours  I Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective) 1  I Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (Advanced AH Elective) 1  I Introduction to Engineering Probability  ISE 380 Engineering Economic Analysis	EGN 123	Computing and Digital Solutions for the future	3
PHY 222 University Physics II PHY 106 Physics Laboratory 1 WRS 107 First-Year Writing II: STEM  Credit Hours  Sophomore Year Fall  AH Cognate (AH Elective)  ISE 201 Work Design Systems  MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I PHY 223 University Physics III Lab PS Cognate (PS Elective)  Credit Hours  Spring  CAE 210, ECE 205, or MAE 303 or Principles of Electrical Engineering-I or Thermodynamics ISE 224 Python for Engineers CHM 151 or 121 Chemistry for Engineers Or Principles of Chemistry  CHM 153 or 113 Chemistry Laboratory Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)  Total University Physics III Lab  Credit Hours  Spring  CAE 210, ECE 205, or MAE 303 or Principles of Electrical Engineering-I or Thermodynamics ISE 224 Python for Engineers Or Chemistry for Engineers or Chemistry to Dridnary Differential Equations or Principles of Chemistry  CHM 153 or 113 Chemistry Laboratory Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)  Junior Year Fall  AH Cognate (Advanced AH Elective) ISE 310 Introduction to Engineering Probability ISE 330 Introduction to Engineering Probability ISE 330 Engineering Economic Analysis	ECO 211 or 212		3
PHY 106 Physics Laboratory 1 WRS 107 First-Year Writing II: STEM  Credit Hours  Sophomore Year Fall AH Cognate (AH Elective) 1 ISE 201 Work Design Systems Introduction to Linear Algebra or Engineering Mathematics I PHY 223 University Physics III PHY 223 University Physics III Lab PS Cognate (PS Elective) 1  Credit Hours  Spring  CAE 210, ECE 205, or MAE 303 or Principles of Electrical Engineering-I or Thermodynamics ISE 224 Python for Engineers CHM 151 or 121 Chemistry for Engineers or Principles of Chemistry CHM 153 or 1113 Chemistry Laboratory I or Engineers or Chemistry Laboratory I MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (AH Elective) 1  Credit Hours  1 Junior Year Fall AH Cognate (Advanced AH Elective) 1 ISE 330 Introduction to Engineering Probability ISE 330 Engineering Economic Analysis	MTH 162	Calculus II	4
WRS 107 First-Year Writing II: STEM  Credit Hours  1 Sophomore Year Fall AH Cognate (AH Elective)  ISE 201 Work Design Systems  MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I  PHY 223 University Physics III  PHY 225 University Physics III Lab  PS Cognate (PS Elective)  Credit Hours  1 Spring  CAE 210, ECE 205, or MAE 303 Or Principles of Electrical Engineering-I or Thermodynamics  ISE 224 Python for Engineers  CHM 151 or 121 Chemistry for Engineers Or Principles of Chemistry  CHM 153 or 113 Chemistry Laboratory or Engineers or Chemistry Laboratory or Engineers or Chemistry Laboratory I  MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)  Junior Year Fall AH Cognate (Advanced AH Elective) ISE 380 Engineering Economic Analysis	PHY 222	University Physics II	3
Credit Hours  Sophomore Year Fall  AH Cognate (AH Elective)  ISE 201 Work Design Systems  MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I  PHY 223 University Physics III Lab  PHY 225 University Physics III Lab  PS Cognate (PS Elective)  Credit Hours  Spring  CAE 210, ECE 205, Mechanics of Solids I or Principles of Electrical Engineering—I or Thermodynamics  ISE 224 Python for Engineers  CHM 151 or 121 Chemistry for Engineers  or Principles of Chemistry  CHM 153 or 113 Chemistry Laboratory I rengineers  or Chemistry Laboratory I rengineers  or Chemistry Laboratory or Engineers  or Chemistry Laboratory I MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)  Tredit Hours  I Junior Year Fall  AH Cognate (Advanced AH Elective)  I Introduction to Engineering Probability  ISE 380 Engineering Economic Analysis	PHY 106	Physics Laboratory 1	1
Sophomore Year Fall  AH Cognate (AH Elective) <sup>1</sup> ISE 201 Work Design Systems  MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I  PHY 223 University Physics III PHY 225 University Physics III Lab  PS Cognate (PS Elective) <sup>1</sup> Credit Hours 1  Spring  CAE 210, ECE 205, or MAE 303 or Principles of Electrical Engineering—I or Thermodynamics  ISE 224 Python for Engineers  CHM 151 or 121 Chemistry for Engineers  CHM 153 or 113 Chemistry Laboratory for Engineers or Principles of Chemistry  CHM 153 or 113 Chemistry Laboratory I  MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective) <sup>1</sup> Spring  Credit Hours 1  Junior Year Fall  AH Cognate (Advanced AH Elective) <sup>1</sup> ISE 330 Introduction to Engineering Probability  ISE 380 Engineering Economic Analysis	WRS 107	First-Year Writing II: STEM	3
Fall AH Cognate (AH Elective)  AH Cognate (AH Elective)  ISE 201 Work Design Systems  Introduction to Linear Algebra or Engineering Mathematics I  PHY 223 University Physics III PHY 225 University Physics III Lab  Credit Hours  Spring  CAE 210, ECE 205, or Pinciples of Electrical Engineering—I or Thermodynamics  ISE 224 Python for Engineers CHM 151 or 121 Chemistry for Engineers Or Principles of Chemistry CHM 153 or 113 Chemistry Laboratory of Engineers or Engineering Mathematics II  AH Cognate (AH Elective)  Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (Advanced AH Elective)  Introduction to Engineering Probability ISE 310 Introduction to Engineering Probability ISE 380 Engineering Economic Analysis		Credit Hours	17
AH Cognate (AH Elective)  ISE 201 Work Design Systems  MTH 210 or EGN 318 Introduction to Linear Algebra	Sophomore Year		
ISE 201 Work Design Systems MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I PHY 223 University Physics III PHY 225 University Physics III Lab PS Cognate (PS Elective)  Credit Hours  Spring  CAE 210, ECE 205, or Mechanics of Solids I or Principles of Electrical Engineering—I or Thermodynamics ISE 224 Python for Engineers CHM 151 or 121 Chemistry for Engineers or Principles of Chemistry CHM 153 or 113 Chemistry Laboratory I Engineers or Chemistry Laboratory I MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (AH Elective)  Credit Hours  ISE 310 Introduction to Engineering Probability Engineering Economic Analysis  Engineering Economic Analysis	Fall		
MTH 210 or EGN 318 Introduction to Linear Algebra or Engineering Mathematics I PHY 223 University Physics III PHY 225 University Physics III Lab PS Cognate (PS Elective)   Credit Hours  Spring  CAE 210, ECE 205, or Mechanics of Solids I or Principles of Electrical Engineering—I or Thermodynamics ISE 224 Python for Engineers CHM 151 or 121 Chemistry for Engineers or Principles of Chemistry CHM 153 or 113 Chemistry Laboratory I MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)   Credit Hours  ISE 310 Introduction to Engineering Probability ISE 380 Engineering Economic Analysis	AH Cognate (AH Elective) <sup>1</sup>		3
or Engineering Mathematics I PHY 223 University Physics III PHY 225 University Physics III Lab PS Cognate (PS Elective)   Credit Hours  Spring  CAE 210, ECE 205, or Mechanics of Solids I or Principles of Electrical Engineering—I or Thermodynamics ISE 224 Python for Engineers  CHM 151 or 121 Chemistry for Engineers  CHM 153 or 113 Chemistry Laboratory for Engineers or Principles of Chemistry  CHM 153 or 113 Chemistry Laboratory I  MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)   Junior Year  Fall  AH Cognate (Advanced AH Elective)  ISE 310 Introduction to Engineering Probability ISE 380 Engineering Economic Analysis	ISE 201	Work Design Systems	3
PHY 223 University Physics III PHY 225 University Physics III Lab PS Cognate (PS Elective)  Credit Hours  Spring  CAE 210, ECE 205, or MAE 303 or Principles of Electrical Engineering—I or Thermodynamics ISE 224 Python for Engineers CHM 151 or 121 Chemistry for Engineers or Principles of Chemistry CHM 153 or 113 Chemistry Laboratory for Engineers or Chemistry Laboratory I  MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)  Junior Year Fall AH Cognate (Advanced AH Elective) ISE 310 Introduction to Engineering Probability ISE 380 Engineering Economic Analysis	MTH 210 or EGN 318		3
PHY 225 University Physics III Lab PS Cognate (PS Elective)   Credit Hours  Spring  CAE 210, ECE 205, or MAE 303 or Principles of Electrical Engineering—I or Thermodynamics  ISE 224 Python for Engineers CHM 151 or 121 Chemistry for Engineers or Principles of Chemistry  CHM 153 or 113 Chemistry Laboratory for Engineers or Chemistry Laboratory I  MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)   Credit Hours  Tall  AH Cognate (Advanced AH Elective)  ISE 310 Introduction to Engineering Probability ISE 380 Engineering Economic Analysis			
PS Cognate (PS Elective)  Credit Hours  Spring  CAE 210, ECE 205, or MAE 303 or Principles of Electrical Engineering—I or Thermodynamics  ISE 224 Python for Engineers CHM 151 or 121 Chemistry for Engineers or Principles of Chemistry  CHM 153 or 113 Chemistry Laboratory I MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)  Junior Year Fall AH Cognate (Advanced AH Elective)  Introduction to Engineering Probability  ISE 310 Introduction to Engineering Probability  Engineering Economic Analysis			3
Credit Hours  Spring  CAE 210, ECE 205,		University Physics III Lab	1
Spring  CAE 210, ECE 205, or MAE 303 or Principles of Electrical Engineering—I or Thermodynamics  ISE 224 Python for Engineers CHM 151 or 121 Chemistry for Engineers or Principles of Chemistry CHM 153 or 113 Chemistry Laboratory for Engineers or Chemistry Laboratory I  MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)   Credit Hours  1  Junior Year Fall AH Cognate (Advanced AH Elective)  Introduction to Engineering Probability ISE 310 Introduction to Engineering Probability Engineering Economic Analysis	PS Cognate (PS Elective)		3
CAE 210, ECE 205, or MAE 303 or Principles of Electrical Engineering—I or Thermodynamics ISE 224 Python for Engineers CHM 151 or 121 Chemistry for Engineers or Principles of Chemistry CHM 153 or 113 Chemistry Laboratory for Engineers or Chemistry Laboratory I MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II AH Cognate (AH Elective)  Credit Hours  1 Junior Year Fall AH Cognate (Advanced AH Elective) Introduction to Engineering Probability ISE 310 Introduction to Engineering Probability Engineering Economic Analysis		Credit Hours	16
or MAE 303 or Principles of Electrical Engineering—I or Thermodynamics  ISE 224 Python for Engineers  CHM 151 or 121 Chemistry for Engineers	Spring		
CHM 151 or 121 Chemistry for Engineers or Principles of Chemistry  CHM 153 or 113 Chemistry Laboratory for Engineers or Chemistry Laboratory I  MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)  Credit Hours  1  Junior Year  Fall  AH Cognate (Advanced AH Elective)  ISE 310 Introduction to Engineering Probability ISE 380 Engineering Economic Analysis		or Principles of Electrical Engineering-I	3
or Principles of Chemistry  CHM 153 or 113  Chemistry Laboratory for Engineers or Chemistry Laboratory I  MTH 311 or EGN 319  Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)  Credit Hours  Junior Year Fall  AH Cognate (Advanced AH Elective)  Introduction to Engineering Probability  ISE 310  Introduction to Engineering Economic Analysis	ISE 224	Python for Engineers	3
or Chemistry Laboratory I  MTH 311 or EGN 319 Introduction to Ordinary Differential Equations or Engineering Mathematics II  AH Cognate (AH Elective)   Credit Hours 1  Junior Year  Fall  AH Cognate (Advanced AH Elective)   ISE 310 Introduction to Engineering Probability  ISE 380 Engineering Economic Analysis	CHM 151 or 121		3
or Engineering Mathematics II  AH Cognate (AH Elective)   Credit Hours   Junior Year  Fall  AH Cognate (Advanced AH Elective)   ISE 310	CHM 153 or 113		1
Credit Hours  Junior Year  Fall  AH Cognate (Advanced AH Elective)  ISE 310 Introduction to Engineering Probability ISE 380 Engineering Economic Analysis	MTH 311 or EGN 319		3
Junior Year  Fall  AH Cognate (Advanced AH Elective)   ISE 310 Introduction to Engineering Probability  ISE 380 Engineering Economic Analysis	AH Cognate (AH Elective) <sup>1</sup>		3
Fall AH Cognate (Advanced AH Elective)   ISE 310 Introduction to Engineering Probability ISE 380 Engineering Economic Analysis		Credit Hours	16
AH Cognate (Advanced AH Elective)   ISE 310 Introduction to Engineering Probability  ISE 380 Engineering Economic Analysis	Junior Year		
ISE 310 Introduction to Engineering Probability ISE 380 Engineering Economic Analysis	Fall		
ISE 380 Engineering Economic Analysis	AH Cognate (Advanced AH Elective) 1		3
	ISE 310	Introduction to Engineering Probability	3
ISE 441 Operations Research and Optimization Methods	ISE 380	Engineering Economic Analysis	3
operations research and optimization victious	ISE 441	Operations Research and Optimization Methods	3

	Total Credit Hours	130
	Credit Hours	15
ISE 568	Facilities Planning and Logistics	3
ISE 524	Systems Intelligence with Software Applications	3
ISE 516	Introduction to Applied Data Analytics	3
ISE 507	Design of Manufacturing Systems	3
ISE 494	Senior Design Project	3
Spring	Cleur nouis	16
100 007	Credit Hours	16
ISE 557	Ergonomics and Human Factors Engineering	3
ISE 512	Quality Management Systems Simulation Modeling and Systems Analysis	3
ISE 505 ISE 512		3
ISE 493	Industrial and Systems Engineering Capstone Planning Robotics	1
ISE 465	Inventory and Supply Chain Management	3
Fall		
Senior Year		
	Credit Hours	18
PS Cognate (Advanced PS Elective	<u> </u>	3
MAE 301	Engineering Materials Science	3
ISE 442	Stochastic Modeling and Decision Making	3
ISE 406	Computer-Aided Manufacturing	3
ISE 363	Project Management for Engineers	3
ISE 312	Foundations of Data Analysis	3
Spring		
	Credit Hours	18
MAE 505	Design for Manufacturability	3

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	oreal mound	
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	3
	or Engineering Mathematics I	
PHY 223 or EGN 233	University Physics III	3
	or Electromagnetics and Its Engineering Applications	
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 <sup>2</sup>	4
CHM 205	Chemical Dynamics Laboratory	1
MTH 311 or EGN 319	Introduction to Ordinary Differential Equations	3
PS Cognate (PS Elective) <sup>1</sup>	or Engineering Mathematics II	2
PS Cognate (PS Elective)	O. Fall.	3
lunian Vaan	Credit Hours	17
Junior Year		
Fall	Biochemistry for the Biomedical Sciences <sup>2</sup>	4
BMB 401 CHM 206		4
ISE 310	Organic Reactions and Synthesis Laboratory	2
ISE 380	Introduction to Engineering Probability	3
ISE 441	Engineering Economic Analysis Operations Research and Optimization Methods	3
135 441	Credit Hours	15
Carina	Credit Hours	15
Spring ISE 224	Duthon for Engineers	2
	Python for Engineers	3
ISE 312 ISE 363	Foundations of Data Analysis Project Management for Engineers	3
ISE 442	Stochastic Modeling and Decision Making	3
AH Cognate (AH elective) 1	Stochastic Modelling and Decision Making	3
AH Cognate (AH Elective)		3
An Cognate (An Liective)	Credit Hours	18
Senior Year	OF CUIT FROM 19	10
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	Ligonomics and Human Lactors Engineering	3
PS Cognate (PS Elective)		3
1. 5 Sognate (1.5 Elective)	Credit Hours	19
Spring	orean riours	19
ISE 406	Computer-Aided Manufacturing	3
		3

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

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**

#### **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) <sup>1</sup>		3
ISE 201	Work Design Systems	3
MTH 210	Introduction to Linear Algebra	3
PHY 223 or EGN 233	University Physics III	3
_	or Electromagnetics and Its Engineering Applications	
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,	Mechanics of Solids I	3
or MAE 303	or Principles of Electrical Engineering-I	
MTH 311 or EGN 319	or Thermodynamics	
WITH 311 OF EGN 319	Introduction to Ordinary Differential Equations or Engineering Mathematics II	3
Basic Science Elective	5. Engineering Machematics II	3
Dasic Science Lieutive		3

<sup>&</sup>lt;sup>2</sup> 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=BIL%20268), MIC 301 (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.

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) <sup>1</sup>		3
AH Cognate (AH Elective) <sup>1</sup>		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
<u> </u>	Total Credit Hours	132

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.
- 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.