# INDUSTRIAL AND SYSTEMS ENGINEERING, BACHELOR OF SCIENCE (BS)

# **Program Learning Outcomes**

#### Student Outcomes

Upon graduation, students will have:

- 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
- · An ability to communicate effectively with a range of audiences
- 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
- 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
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

# **Related Links**

Industrial and Systems Engineering, BS Program Page (https://www.sru.edu/academics/majors-and-minors/industrial-and-systems-engineering/)

Physics and Engineering Department Page (https://www.sru.edu/academics/colleges-and-departments/ches/departments/physics-and-engineering/)

Professional Licensure/Certification Page (https://www.sru.edu/students/student-consumer-information/professional-licensures/)

# Curriculum Guide GPA Requirement

Major GPA: 2.00 or higher Overall GPA: 2.00 or higher

#### Summary\*

Code	Title	Hours
Rock Studies	2 Requirements	41
Other Basic F	Requirements	0-3
Computer Competency		0-3
Major Requir	ements	84
Natural Scien	nce and Math College-Wide Requirements	12
Elective		3

\* All undergraduate degree programs require a minimum of 120 credits. Some courses meet multiple requirements, but are only counted once toward the 120 credit total required to graduate.

#### **Rock Studies 2 Requirements**

Code	Title	Hours
The Rock		
SUBJ 139	Foundations of Academic Discovery <sup>1</sup>	3
ENGL 102	Critical Writing	3
ENGL 104	Critical Reading	3
MATH 225	Calculus I	4
Select one of the fo	llowing:	3
COMM 200	Civil Discourse: Theory & Practice	
PHIL 110	Ethics and Civil Discourse	
POLS 235	Civil Discourse and Democracy	
Subtotal		16
Integrated Inquiry		
Creative and Aesthet	tic Inquiry	
Select 3 Credits (htt	ps://catalog.sru.edu/undergraduate/rock-	3
studies/rock-studie	s-program/)	
Humanities Inquiry		
Select 3 Credits (htt	ps://catalog.sru.edu/undergraduate/rock-	3
studies/rock-studie	s-program/)	
Social Science Inquir	T <b>y</b>	
Select 3 Credits (htt studies/rock-studie	ps://catalog.sru.edu/undergraduate/rock- s-program/)	3
Natural Sciences Inq	uiry	
CHEM 107	General Chemistry I	3
CHEM 111	General Chemistry I Lab	1
Physical Sciences In	quiry	
PHYS 216	University Physics 1 with Lab	4
Subtotal		17
Additional Rock Stu	idies 2 Requirements	
Required Thematic	Thread Coursework:	
MATH 230	Calculus II	4
PHYS 217	University Physics 2 with Lab	4
Subtotal		8
Total Hours		41

Course offered in multiple subjects; cannot take course in first major subject.

## **Basic Math Requirement**

Check with your adviser or a current degree audit report to see if you have been exempted from this course. The credit earned in this course will not be counted toward the 120 credit hour minimum needed to earn a degree.

Code	Title	Hours
Complete one	of the following:	0-3
Meet require	ed minimum SAT or ACT math score OR	
ESAP 110	Beginning Algebra	
Total Hours		0-3

#### **Computer Competency**

Code	Title	Hours
Demonstrate "comp	uter competency" by one of the following:	0-3
Pass Computer C	ompetency Exam OR	
Select one of the institution:	following at SRU or another post-secondary	
CPSC 100	Introduction to Computing for Liberal Arts	
CPSC 110	Computer Concepts	
CPSC 130	Introduction to Computing and Programming	
PE 202	Technology for Wellness	
Total Hours		0-3

#### **DIVERSITY, EQUITY, AND INCLUSION REQUIREMENT**

Students must take and pass a course with the Diversity, Equity, and Inclusion (DEI) designation prior to graduation. Students can meet this requirement by taking any DEI - designated course in any program at any time during their undergraduate career.

#### **Major Requirements**

- · 44 major credits must be taken at SRU or PASSHE
- · 44 major credits must be taken at the 300 level or above

Code	Title	Hours
Required Engineerin	g Courses	
ENGR 110	Introduction to Engineering <sup>1</sup>	2
ENGR 120	Engineering Design Tools <sup>1</sup>	2
ENGR 130	Engineering Computing Tools <sup>1</sup>	2
ENGR 210	Statics <sup>1</sup>	3
ENGR 220	Engineering Materials <sup>1</sup>	3
ENGR 310	Introduction to Electrical Engineering <sup>1</sup>	3
ENGR 340	Engineering Economics <sup>1</sup>	3
ISE 311	Introduction to Operations Research <sup>1</sup>	3
ISE 362	Lean Systems <sup>1</sup>	3
ISE 370	Design of Industrial Systems and Processes <sup>1</sup>	3
ISE 372	Manufacturing Systems Design and Analysis <sup>1</sup>	3
ISE 373	Quality Engineering <sup>1</sup>	3
ISE 402	Work Design <sup>1</sup>	3
ISE 410	Engineering Project Management <sup>1</sup>	3
ISE 420	Simulation of Industrial Systems <sup>1</sup>	4
ISE 421	Supply Chain & Logistics Engineering <sup>1</sup>	3
ISE 430	Production Planning & Control <sup>1</sup>	3
ISE 440	Health Care Systems Engineering <sup>1</sup>	3
ISE 442	Human Factors Engineering <sup>1</sup>	3
ISE 460	Engineering Risk Analysis <sup>1</sup>	3
ISE 487	Industrial and Systems Engineering Senior Project I <sup>1</sup>	1
ISE 488	Senior Project II <sup>1</sup>	3
MECH 330	Introduction to Mechatronics <sup>1</sup>	4
Subtotal		66
ISE Electives		
Select three of the fo	ollowing:	8

Total Hours		84
Subtotal		10
STAT 350	Applied Statistics <sup>1</sup>	3
MATH 232	Linear Algebra <sup>1</sup>	3
MATH 231	Calculus III <sup>1</sup>	4
Required Math and	d Science Courses	
Subtotal		8
MATH 316	Advanced Methods of Operations Research	
ISE 480	Industrial and Systems Engineering Undergraduate Research	
ISE 432	Productivity Analysis	
ISE 382	Sustainable Processes	
ISE 330	Six Sigma Methodology	

- 1 Course counts for 50% of Major requirements and Major GPA
- <sup>2</sup> Course can be counted as a Rock Studies 2 Requirement, but earns credit only once toward your 120-credits total.
- \* Some courses may require pre-requisites. Please see course descriptions to determine if there are any pre-requisites for that specific course.

#### free elective

Code	Title	Hours
Select three credits  Total Hours		3

# Natural Science and Math College-Wide Requirements

Code	Title	Hours
CHEM 107	General Chemistry I <sup>1</sup>	3
CHEM 111	General Chemistry I Lab <sup>1</sup>	1
MATH 225	Calculus I <sup>1</sup>	4
PHYS 216	University Physics 1 with Lab	4
Total Hours		12

Course can be counted as a Rock Studies 2 Requirement, but earns credit only once toward your 120-credits total.

### **Important Curriculum Guide Notes**

This Curriculum Guide is provided to help SRU students and prospective students better understand their intended major curriculum. Enrolled SRU students should note that the My Rock Audit may place alreadyearned and/or in progress courses in different, yet valid, curriculum categories. Enrolled SRU students should use the My Rock Audit Report and materials and information provided by their faculty advisers to ensure accurate progress towards degree completion. The information on this guide is current as of the date listed. Students are responsible for curriculum requirements at the time of enrollment at the University.

PASSHE - Pennsylvania State System of Higher Education Institutions

INDUSTRIAL AND SYSTEMS ENGINEERING - BS (6182) This program is effective as of Summer 2021 Revised 3.31.2022 UCC 10.26.2021

# **Recommended Four-Year Plan**

Course         Title         Hours           First Year         First Year         Fall           MATH 225         Calculus I         4           CHEM 107         General Chemistry I Lab         4           ENGR 110         Introduction to Engineering         2           ENGR 110         Introduction to Engineering         3           ENGR 110         FYRST Seminar*         0-1           SUBJ 139         Foundations of Academic Discovery         3           Hours         16-17           Spring           ENGR 120         Engineering Design Tools         2           ENGR 120         Engineering Design Tools         2           ENGR 120         Calculus II         4           HOURS 216         University Physics 1 with Lab         4           Science Inquiry (https://catalog.sru.edu/undergraduate/ rock-studies-program/)         3           Total Science Inquiry (https://catalog.sru.edu/undergraduate/ rock-studies-program/)         3           Total Science Inquiry (https://catalog.sru.edu/undergraduate/ rock-studies-program/)         4           Science Inquiry (https://catalog.sru.edu/undergraduate/ rock-studies-program/)         3           ENGR		ica i cai i cai i iaii	
Fall         MATH 225         Calculus I         4           CHEM 107         General Chemistry I         4           & CHEM 111         and General Chemistry I Lab           ENGR 110         Introduction to Engineering         2           ENGL 102         Critical Writing         3           ESAP 101         FYRST Seminar*         0-1           SUBJ 139         Foundations of Academic Discovery ¹         3           FMGR 120         Engineering Design Tools         2           ENGR 120         Engineering Design Tools         2           ENGL 104         Critical Reading         3           MATH 230         Calculus II         4           PHYS 216         University Physics 1 with Lab         4           Social Science Inquiry (https://catalog.sru.edu/undergraduate/ rock-studies/rock-studies-program/)         3           Hours         16         1           Second Year         Fall           ENGR 130         Engineering Computing Tools         2           ENGR 130         Engineering Economics         3           MATH 231         Calculus III         4           PHYS 217         University Physics 2 with Lab         4           PHYS 217         University Physics 2 with Lab </td <td>Course</td> <td>Title</td> <td>Hours</td>	Course	Title	Hours
MATH 225         Calculus I         4           CHEM 107         General Chemistry I         4           & CHEM 111         and General Chemistry I Lab         2           ENGR 110         Introduction to Enjorering         2           ENGL 102         Critical Writing         3           ENGL 102         FYRST Seminar*         0-1           SUBJ 139         Foundations of Academic Discovery 1         3           Hours         16-17           Spring           ENGR 120         Engineering Design Tools         2           ENGL 104         Critical Reading         3           MATH 230         Calculus II         4           PHYS 216         University Physics 1 with Lab         4           Social Science Inquiry (https://catalog.sru.edu/undergraduate/rock-studies-program/)         3           Hours         16           Second Year           Fall           ENGR 30         Engineering Computing Tools         2           ENGR 210         Statics         3           ENGR 210         Statics         3           ENGR 210         Statics         3           BYS 217         University Physics 2 with Lab </td <td>First Year</td> <td></td> <td></td>	First Year		
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ENGL 102	& CHEM 111	and General Chemistry I Lab	
ESAP 101	ENGR 110	Introduction to Engineering	2
SUBJ 139   Foundations of Academic Discovery   3   16-17	ENGL 102	Critical Writing	3
Hours   16-17	ESAP 101	FYRST Seminar *	0-1
Spring	SUBJ 139	Foundations of Academic Discovery <sup>1</sup>	3
ENGR 120         Engineering Design Tools         2           ENGL 104         Critical Reading         3           MATH 230         Calculus II         4           PHYS 216         University Physics 1 with Lab         4           Social Science Inquiry (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/)         3           Hours         16           Second Year           Fall           ENGR 130         Engineering Computing Tools         2           ENGR 210         Statics         3           ENGR 210         Engineering Economics         4           Hours         16           Spring           ENGR 210         Introduction to Electrical Engineering         3           ENGR 310         Introduction Materials         3           SPRING 20         Engineering Materials         3		Hours	16-17
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ISE 373         Quality Engineering         3           ISE 402         Work Design         3           MECH 330         Introduction to Mechatronics         4           Hours         16           Spring           ISE 370         Design of Industrial Systems and Processes         3           ISE 420         Simulation of Industrial Systems         4	135 372		3
ISE 402 Work Design 3  MECH 330 Introduction to Mechatronics 4  Hours 16  Spring  ISE 370 Design of Industrial Systems and Processes  ISE 420 Simulation of Industrial Systems 4	ISF 373	·	3
MECH 330 Introduction to Mechatronics 4  Hours 16  Spring ISE 370 Design of Industrial Systems and Processes ISE 420 Simulation of Industrial Systems 4			
Hours 16 Spring ISE 370 Design of Industrial Systems and Processes ISE 420 Simulation of Industrial Systems 4		-	
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Processes ISE 420 Simulation of Industrial Systems 4		Design of Industrial Systems and	2
ISE 420 Simulation of Industrial Systems 4	ISE 3/U	-	3
	ISF 420		1
Supply Glain & Logistics Engineering 3			
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	Total Hours**	128
	Hours	17
Free Elective		3
ISE 460	Engineering Risk Analysis	3
ISE Elective		5
ISE 488	Senior Project II	3
ISE 362	Lean Systems	3
Spring		
	Hours	16
Humanities Inqui studies/rock-stud	ry (https://catalog.sru.edu/undergraduate/rock- dies-program/)	3
undergraduate/ro	etic Inquiry (https://catalog.sru.edu/ ock-studies/rock-studies-program/)	3
ISE Elective		3
ISE 487	Industrial and Systems Engineering Senior Project I	1
ISE 410	Engineering Project Management	3
ISE 442	Human Factors Engineering	3
Fourth Year Fall		
	Hours	16
ISE 440	Health Care Systems Engineering	3
ISE 430	Production Planning & Control	3

Course offered in multiple subjects; cannot take course in first major subject.

Major Code: 6182 Revised: 07.27.2023

<sup>\*</sup> Students are encouraged to take ESAP 101 as a Free Elective.

<sup>\*\*</sup> This document is meant to serve as a guide. Some planners may show more than 120 credits because faculty have created flexibility in choosing courses. However, only 120 credits are required to obtain a degree. Please consult with your academic adviser and refer to your curriculum guide prior to registering for courses. This plan should be reviewed, and verified, by you and your academic adviser at least once each academic year.