

# Systems Engineering: Minor Courses Selection Guideline

Last Updated: 10/30/2024

## 1. General Guideline

Systems Engineering requires an **engineering minor** or **thematic minor**.

Students must complete 18 **unique units** to satisfy this requirement. This means...

- If you complete a minor that shares coursework with your major (ex. ECE 101 applies to the major and the ECE minor), you must take additional technical elective units to reach 18 total units not used anywhere else in the major.
  - The additional technical electives can be SIE electives, upper-level math (if you are completing a math minor) or chosen from coursework in any of the approved engineering minors listed below.
  - 3 units of SIE 492 (research), SIE 493 (internship) may also apply to minor units with pre- approval from your faculty advisor.
  - SIE 496 (Special Topics) may be an option that is approved on a case-by-case basis depending on the content for the semester.

The 18 units of minor coursework must meet the following course levels:

Systems Engineering
No more than 9 units 200-level A minimum of 9 units 300/400-level

You can choose a minor from the following approved minors, Except for the Thematic Minor (See Note 3 at the end of the list) that you must consult with your advisor, our department has approved all of these minors and you do not need to get an approval from your advisor. If you like to choose a minor that is not listed in this list, please contact the faculty advisor at the end of this document for suggestions and approval.

Minor	Link to minor requirements
Aerospace Engineering	<a href="https://catalog.arizona.edu/programs/AEEMINU">https://catalog.arizona.edu/programs/AEEMINU</a>
Biosystems Engineering	<a href="https://catalog.arizona.edu/programs/BEMINU">https://catalog.arizona.edu/programs/BEMINU</a>
Chemical Engineering	<a href="https://catalog.arizona.edu/programs/CHEMINU">https://catalog.arizona.edu/programs/CHEMINU</a>
Civil Engineering	<a href="https://catalog.arizona.edu/programs/CVEMINU">https://catalog.arizona.edu/programs/CVEMINU</a>
Computer Science	<a href="https://catalog.arizona.edu/programs/COSCMINU">https://catalog.arizona.edu/programs/COSCMINU</a>
Electrical and Computer Engineering	<a href="https://catalog.arizona.edu/programs/ECEMINU">https://catalog.arizona.edu/programs/ECEMINU</a>
Engineering Management (Systems majors only)	See "SIE Minor Requirements for SIE majors" below

Industrial Engineering	See “SIE Minor Requirements for SIE majors” below
Materials Science Engineering	<a href="https://catalog.arizona.edu/programs/MSEMINU">https://catalog.arizona.edu/programs/MSEMINU</a>
Mechanical Engineering	<a href="https://catalog.arizona.edu/programs/MEEMINU">https://catalog.arizona.edu/programs/MEEMINU</a>
Mining Engineering	<a href="https://catalog.arizona.edu/programs/MNEMINU">https://catalog.arizona.edu/programs/MNEMINU</a>
Optical Sciences and Engineering	<a href="https://catalog.arizona.edu/programs/OSEMINU">https://catalog.arizona.edu/programs/OSEMINU</a>
Software Engineering	See “Software Engineering Requirements for SIE majors” below
Sustainable Mineral Resources	Approved tracks: Mining & Recycling, Data Analytics & Automation, Environmental, and Health & Safety Track. See <a href="#">Sustainable Mineral Resources Tracks</a>
Systems Engineering (Engr Mgmt majors only)	See “SIE Minor Requirements for SIE majors” below
Thematic Minor <sup>3</sup>	<a href="https://www.registrar.arizona.edu/academics/thematic-minors">https://www.registrar.arizona.edu/academics/thematic-minors</a>

Note 1: Some minors may require more than 18 units

Note 2: In case some web links are not working, please consult with your advisor in our department.

Note 3: You may choose a **thematic minor** in consultation with your advisor and program director. The thematic minor must consist of coursework from two or more engineering disciplines, meet the required course levels, and should be developed around a central and unified theme that does not already exist at UA (e.g., Cybersecurity, Data Analytics, Biomedical, Construction Management, etc.).

## 2. How to Declare your Minor

Once you have decided on a minor, please follow instructions in the table below to officially declare it.

Minor	How to declare
All Engineering Minors	Complete the online form here: <a href="http://engineering.arizona.edu/academic-policies/declare-minor">http://engineering.arizona.edu/academic-policies/declare-minor</a>
Computer Science Minor	Complete info session and online form here: <a href="https://www.cs.arizona.edu/minor-cs">https://www.cs.arizona.edu/minor-cs</a>
Thematic Minor	Complete this form: <a href="https://www.registrar.arizona.edu/sites/registrar.arizona.edu/files/forms/Thematic%20Minor%20Form%203-17.pdf">https://www.registrar.arizona.edu/sites/registrar.arizona.edu/files/forms/Thematic%20Minor%20Form%203-17.pdf</a> Send to SIE advisor for initial review.

## 3. SIE Minor Requirements for SIE majors

If you would like to complete one of the SIE minors (Engineering Management or Industrial Engineering), ***we do not allow double use of coursework between your major and minor.*** As a

result of this departmental policy, the SIE minor requirements are slightly different for students pursuing a major in SIE. Please follow one of following options A1 or A2 to choose courses. Manual adjustments will need to be made to your advisement report by academic advisor.

If you need help choosing your minor, making minor course selections or need thematic minor OR SIE 493/492 approval, please contact the program director for Systems Engineering:

**Professor**

**Alejandro Salado**

**Office:** ENGR 268

**Email:** [alejandrosalado@arizona.edu](mailto:alejandrosalado@arizona.edu)

**Phone:** 520.626.0728

**Option A1. If you are System Engineering Major, you can choose Industrial Engineering Minor:**

→ Course offering semesters subject to change frequently. Please consult with your SIE advisor to ensure your plan is always up to date.

<b><u>Industrial Engineering minor, if you are a Systems Engineering major...</u></b>			
<b>Course #</b>	<b>Title</b>	<b>Prerequisite Adv Stand in Engineering +</b>	<b>Typically offered</b>
<b>Choose 6 courses from:</b>			
SIE 377	Software for Engineers	ECE 175 or CSC 110	fall
SIE 383	Integrated Manufacturing Systems		spring
SIE 408	Reliability Engineering	SIE 305	reoffered fall 2024
SIE 433 OR SIE 432	Fundamentals of Data Science for Engineers	SIE 305	spring
	Sports Analytics	SIE 305	summer
SIE 440	Survey of Optimization Methods	SIE 340	spring
SIE 465	Supply Chain Management	SIE 305 & SIE 340	spring
SIE 481	Design for Additive Manufacturing	SIE 383 or BE 221	Reoffered fall 2024
SIE 482	Lean Operations and Manufacturing Systems	SIE 305	spring
SIE 492 OR SIE 493	Directed Research	Faculty approval (3 units max)	fall/spring/sum
	Internship		

Approved Amendment options for 5 course electives (as of 10/22/2024):

SIE 449	Optimization for Machine Learning	SIE 270 & SIE 340	spring
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**Option A2. If you are a Systems Engineering Major, you can choose Engineering Management**

**Minor:**

→ Course offering semesters subject to change frequently. Please consult with your SIE advisor to ensure your plan is always up to date.

<b>Engineering Management minor, if you are a Systems Engineering major...</b>			
<b>Course #</b>	<b>Title</b>	<b>Prerequisite AdvStand in Engineering +</b>	<b>Typically offered</b>
<b>Required:</b>			
SIE 457	Project Management		fall/spring
<b>Choose 5 courses from:</b>			
SIE 367	Engineering Management II	SIE 265	No longer offered - previously earned credit can apply
SIE 406	Quality Engineering	SIE 305	fall
SIE 408	Reliability Engineering	SIE 305	reoffered fall 2024
SIE 414	Law for Engineers and Scientists		spring
SIE 415	Technical Sales and Marketing		fall/spring
SIE 422	Engineering Decision Making Under Uncertainty	SIE 305	fall
SIE 432 OR SIE 433	Sports Analytics or Fundamentals of Data Science for Engineers	SIE 305	summer spring
SIE 462	Production Systems Analysis	SIE 305 & 340	spring
SIE 465	Supply Chain Management	SIE 305 & 340	spring
SIE 492 OR SIE 493	Directed Research Internship	Faculty approval (3 units max)	fall/spring/sum

Approved Amendment options for 5 course electives (as of 10/22/2024):

SIE 449	Optimization for Machine Learning	SIE 270 & SIE 340	spring
SIE 481	Design for Additive Manufacturing	SIE 383 or BE 221	Reoffered fall 2024
SIE 482	Lean Operations and Manufacturing Systems	SIE 305	spring

**Option A3. If you are Systems Engineering Major, you can choose Software Engineering Minor:**

→ Course offering semesters subject to change frequently. Please consult with your SIE advisor to ensure your plan is always up to date.

<b>Software Engineering minor for Engineering Management majors...</b>			
<b>Course #</b>	<b>Title</b>	<b>Prerequisite + Adv Stand in Engineering for 300/400 level</b>	<b>Typically offered</b>
<b>Required:</b>			
SFWE 101	Intro to Software Engineering	MATH 112	fall/spring
ECE 201	Computer Programming II	ECE 101	fall/spring
<i>Please Note: We do <b>not</b> accept CSC 110 or 120.</i>			
<b>Choose 4 courses from:</b>			
CSC 355 (or 345)	Discrete Structure & Basic Algorithms	MATH 243 & ECE 201	fall/spring
SFWE 301	SW Requirements Analysis & Test	ECE 201	fall
SFWE 302/405	SW Design Process	SFWE 301	spring
SFWE 401	SW Assurance & Security	ECE 201	spring
SFWE 402	SW DevOps	ECE 201	spring
SFWE 403	SW Project Management	SFWE 301	fall
SFWE 409	Principles of Cloud Computing	ECE 369A or CSC 252	spring
SFWE 410	Cloud Native ( <i>Temporarily SIE 496 for SP25</i> )	SFWE 302/405	spring
SFWE 411	SW for Industrial Control Systems	ECE 201	fall