

Assessment Plan
B.S. in Industrial and Systems Engineering
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The student learning outcomes for the program changed as a result of our accrediting bodies initiatives. Consequently, the program has adopted the following student learning objectives and assessment methods from fall 2018. The new student learning objectives and the assessment methods are discussed in the next two sections.

1. Student Learning Objectives

The Department of Industrial and Systems Engineering has revised the student learning objectives to remain consistent with Accreditation Board of Engineering and Technology (ABET). These SLOs are adopted during the AY 2018-2019. The learning objectives are:

1. An ability to identify, formulate, and solve complex Industrial and Systems 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 audience.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, 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 judgement to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

For each of the SLOs listed above, operational definitions/performance indicators are developed and described below. These definitions are mapped to each required course in the program (see Table 1). These course mappings were later used to develop a yearly assessment plan (see Table 3).

1. An ability to identify, formulate, and solve complex Industrial and Systems engineering problems by applying principles of engineering, science, and mathematics.
 - 1.1. Formulates the given system appropriately for the purpose of understanding the qualitative and/or quantitative behavior of the system and the effects of potential changes made to the system.
 - 1.2. Identifies constraints or customer requirements and key areas in a given system where improvements can be made.
 - 1.3. Applies appropriate engineering principles to solve complex Industrial and Systems engineering problems.
 - 1.4. Applies appropriate science principles to solve complex Industrial and Systems engineering problems.
 - 1.5. Applies appropriate mathematical tools to solve complex Industrial and Systems engineering problems.
 - 1.6. Chooses the "best" solution based on stated criteria and formulates evidence that supports the solution.
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.
 - 2.1. Identifies and understands the critical issues and determines the overall goal and objectives of the design project.
 - 2.2. Determines what information is critical and evaluates resources needed to obtain it.

- 2.3. Applies analytics tools, software, creativity, and "outside-of-the-box thinking" to generate solutions.
- 2.4. Evaluates and selects the preferred solution(s) considering technical, non-technical or external factors and design tradeoffs.
3. An ability to communicate effectively with a range of audience.
 - 3.1. Communicates information, concepts, and ideas effectively in writing using standard formats, grammar, and mechanics.
 - 3.2. Communicates information, concepts, and ideas effectively through well-organized and high quality presentations.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
 - 4.1. Demonstrates knowledge of codes of conduct that guide the professional practice of engineering.
 - 4.2. Identifies various types of impacts for an engineering solution (i.e. environmental, political, economical, etc.).
 - 4.3. Questions decision by incorporating the ethical impacts the decision can have on the individual, the client, the company and/or the public.
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.
 - 5.1. Shares responsibilities and duties, and takes on different roles when applicable.
 - 5.2. Develop solutions through consensus by analyzing alternative perspectives and ideas objectively.
 - 5.3. Develop and follow a project plan with milestones to achieve project goals.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.
 - 6.1. Defines a problem statement, dependent/independent variables and/or appropriate hypothesis.
 - 6.2. Uses and documents measurement techniques to collect data.
 - 6.3. Applies appropriate tools and techniques to analyze data.
 - 6.4. Interprets results and draws conclusions with respect to the assumptions and constraints.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
 - 7.1. Demonstrates an understanding of emerging trends and innovation in industrial and systems engineering.
 - 7.2. Demonstrates the ability to use information-seeking tools.

Table 1: Course mappings

New SLOs and Revised Operational Definitions	220	250	310	335	350	370	371	410	430	435	440	450	460	480	492	495
1. An ability to identify, formulate, and solve complex Industrial and Systems engineering problems by applying principles of engineering, science, and mathematics	4	2	2	4	4	4	4	3	4	4	4	4	4	4		
1.1. Formulates the given system appropriately for the purpose of understanding the qualitative and/or quantitative behavior of the system and the effects of potential changes made to the system.	x					x	x		x		x	x	x	x		
1.2. Identifies constraints or customer requirements and key areas in a given system where improvements can be made.			x			x	x						x	x		
1.3. Applies appropriate engineering principles to solve complex Industrial and Systems engineering problems.		x	x		x							x	x			
1.4. Applies appropriate science principles to solve complex Industrial and Systems engineering problems.				x		x	x	x								
1.5. Applies appropriate mathematical tools to solve complex Industrial and Systems engineering problems.	x				x	x	x	x		x	x					x
1.6. Chooses the "best" solution based on stated criteria and formulates evidence that supports the solution.	x				x	x	x			x			x	x		
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.		4	3		2					4		4	4	4		
2.1. Identifies and understands the critical issues and determines the overall goal and objectives of the design project.					x								x			
2.2. Determines what information is critical and evaluates resources needed to obtain it.			x												x	
2.3. Applies analytics tools, software, creativity, and "outside-of-the-box thinking" to generate solutions.		x	x		x					x		x	x	x		
2.4. Evaluates and selects the preferred solution(s) considering technical, non-technical or external factors and design tradeoffs.			x										x	x		

New SLOs and Revised Operational Definitions	220	250	310	335	350	370	371	410	430	435	440	450	460	480	492	495
3. An ability to communicate effectively with a range of audience.		4	4	3	2			4	4	3	4	4	4	4		
3.1. Communicates information, concepts, and ideas effectively in writing using standard formats, grammar, and mechanics.		x	x					x			x	x	x	x		
3.2. Communicates information, concepts, and ideas effectively through well-organized and high quality presentations.			x	x	x			x	x	x	x	x	x	x		
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.					3									3	3	
4.1. Demonstrates knowledge of codes of conduct that guide the professional practice of engineering.														x	x	
4.2. Identifies various types of impacts for an engineering solution (i.e. environmental, political, economical, etc.).					x									x	x	
4.3. Questions decision by incorporating the ethical impacts the decision can have on the individual, the client, the company and/or the public.															x	
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.		4	4	4	3			4	4	4	4	4	4	4		
5.1. Shares responsibilities and duties, and takes on different roles when applicable.		x	x	x	x			x	x	x	x	x	x	x		
5.2. Develop solutions through consensus by analyzing alternative perspectives and ideas objectively.			x							x			x	x		
5.3. Develop and follow a project plan with milestones to achieve project goals.					x					x			x	x		

New SLOs and Revised Operational Definitions	220	250	310	335	350	370	371	410	430	435	440	450	460	480	492	495
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions			4	4	0	4	4	4	3	4				4		
6.1. Defines a problem statement, dependent/independent variables and/or appropriate hypothesis.						x	x			x				x		
6.2. Uses and documents measurement techniques to collect data.			x	x				x		x				x		
6.3. Applies appropriate tools and techniques to analyze data.			x	x			x		x	x				x		
6.4. Interprets results and draws conclusions with respect to the assumptions and constraints.			x			x	x	x	x	x				x		
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies					4						3				3	
7.1. Demonstrates an understanding of emerging trends and innovation in industrial and systems engineering.					x										x	
7.2. Demonstrates the ability to use information-seeking tools.					x						x				x	

Note: ISYE 495 will be used to assess all outcomes

2. Explanation of Methods

Table 2 presents the different direct and indirect methods used to assess the different learning objectives. The table also presents a brief description of each method used, a timeline for implementation, the person responsible, and the objectives that each method addresses.

Table 2: Different methods applied to assess SLOs

Method	Description	Timeline	Person Responsible	Objectives
Senior design project appraisals	Evaluation of senior design projects by mentors from industry sponsors (potential employers)	Fall and Spring	Instructor/Employer	SLOs: 1, 2, 3, 4, 5, 6, and 7
Senior design day project evaluations	Evaluation of senior design projects based on the final project presentation on senior design day by instructor, faculty and industry sponsors (potential employers)	Fall and Spring	Instructor/Faculty/Employer	SLOs: 1, 2, 3, 4, 5, 6, and 7
Course embedded assessments	Evaluation of student's performance on specific course activities (e.g. assignments, quizzes, exams, projects, papers, discussions, etc.)	Fall and Spring	Instructors	see Table 3 for details
Exit survey	Graduating student's feedback on how well they achieved the SLOs	Fall and Spring	Chair	SLOs: 1, 2, 3, 4, 5, 6, and 7
Employer survey	Evaluation of internship or co-op by employers	Fall, Spring, and Summer	Instructor/Employer	SLOs: 1, 2, 3, 4, 5, 6, and 7