ACADEMIC PROGRAM REVIEW:

COLLEGE OF BUSINESS, ENGINEERING, COMPUTER SCIENCE AND MATH: SCHOOL OF ENGINEERING

5-YEAR REVIEW: 2019-2023

Lake Superior State University

Contents

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5-Year Academic Program Review 2023

Due to the Dean's Office by October 27, 2023

This reporting form was introduced in FY2020; numerical data prior to FY2020 may be excluded.

COMPUTER ENGINEERING BS

Submitted by: *Paul Weber*
Date: *12/5/2023*
School: *Engineering & Technology*
Academic Program(s): *B.S. Computer Engineering*

Annual Program Data Reporting

The following table summarizes data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022	2022-2023
Enrollments	Not Available	Freshmen: *2* Sophomores: *4* Juniors: *3* Seniors: *9*	Freshmen: *5* Sophomores: *4* Juniors: *4* Seniors: *7*	Freshmen: *6* Sophomores: *2* Juniors: *2* Seniors: *6*
Retention as of fall 2023	Not Available	Fr to So: *3* So to Jun: *1* Jun to Sen: *4*	Fr to So: *1* So to Jun: *2* Jun to Sen: *2*	Fr to So: *0* So to Jun: *3* Jun to Sen: *2*
Degrees Conferred	Not Available	5	2	3

Graduate Placement Data:

Graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

	2018-2019	2019-2020	2020-2021	2021-2022
Response Rate	95.8%	100%	Not Available	84.2%
Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

High Impact Practices:

The following high impact practices are embedded in all engineering and engineering technology degrees.

- First-Year Experience: All School of Engineering & Technology (SET) students take EGNR101 where they learn study skills, work on a team project, and develop writing skills through weekly reflections that promote a growth mindset.
- Capstone Courses and Projects: All SET students complete a capstone project with either industry collaboration – for EGNR491/495 or the EGNR250/450/451 co-op sequence – or by completing an undergraduate research project in the EGNR260/460/461 sequence which is another high impact practice. In these projects, students work closely with faculty and contacts from industry to complete a year-long project that helps them prepare to enter industry or for the next step in their academic career.
- Internships: The SET faculty and staff communicate with industry partners to help students find summer internships and then serve as references where needed. This past fall was one of the strongest career fairs with the largest attendance that LSSU has had in the last four years and the majority of companies looking to hire SET students for internship and/or full-time employment.

Summary of Annual Assessment Updates

The following table summarizes assessment data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022
Program Learning Outcome	*The report for this year was missing due to the pandemic.*	*The program is preparing Computer Engineering*	*The program is preparing Computer*

Findings	*However, the data showed that students in the Computer Engineering program had an average of 3.0 on PLO1 and PLO3, and that all teams had a score of 3 or higher for PLO2. Specific actions were identified to strengthen learning at the course level where the PLOs were measured, but no programmatic changes were identified.*	*students to be successful. The average of the performance indicators across all seven PLOs in Computer Engineering were above 2.0 and some even above 3.0. The real strength in the program is providing opportunities for students to apply engineering design to produce solutions (PLO#2) and to communicate effectively (PLO#3). As a result of reviewing most of the performance indicators, small adjustments and improvements will be made within the course for which the performance indicator was extracted. The review of others lead to discussion of how to introduce or support a topic or idea in an earlier course in the curriculum so that students would be better prepared for the course for which the performance indicator was used.*	*Engineering students to be successful. The average of the performance indicators across all seven PLOs in Computer Engineering were above 2.5 and some even above 3.0. Senior Projects continues to prepare students to apply engineering design to produce solutions (PLO#2) and to communicate effectively (PLO#3), but there has been a slight decrease in performance on PLO#2 which should be monitored. While no indicators had results that were extremely low, PLO#6 (the ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions) was lower across multiple programs. As a result, more efforts will be made in multiple classes to emphasize methodical debugging and validation. Furthermore, more open-ended testing could be done in labs where students would develop the testing procedure rather than just being given it to follow.*

Summary of decisions, recommendations, and/or improvements concerning the future of the program

Decisions and recommendations should include budgets, additions of new courses or concentrations, discontinuation or suspension of the program, etc.

2019-2020

No programmatic changes were identified this year due to the pandemic.

2020-2021

CE - PLO#1:

- Consider placing more emphasis on the need for validation (for those course that have a system design aspect) through the core course in the curriculum.

CE - PLO#2:

- It is a strength in the program, so no major recommendations for improvement at the program level.

CE - PLO#3:

- It is a strength in the program, so no major recommendations for improvement at the program level.
- Greater emphasis should be placed on developing the report as the project progresses, not something generated after the physical project is complete.
- Set up some type of proof reading mechanism that might include using the resources at the writing center or peer reviewed by members from other teams could be a possibility.

CE - PLO#4:

- Do not offer EGEE320 as a lecture only course. Additionally, a performance indicator will be defined and it will be evaluated for the Fall 2022 offering of EGEE320.

CE - PLO#6:

- Consider in EGEE355 of having the testing design review also answer the following questions: "How will you test it?" and "How do you know it works?". Since some CE students would take EGEE355 prior to EGNR346, a solid introduction on how to review data for proper results prior to EGNR346 might help reinforce the "big picture" understanding of control charts. More exposure to a topic should assist in improving this outcome.

2021-2022

CE - PLO#1:

- Integrate more POS expression problems in EGEE125 to prepare for reinforcement in EGEE320.

CE - PLO#2:

- Make sure time is made for design reviews in EGEE355.

CE - PLO#3:

- While oral communication results from Senior Projects remain strong, more emphasis is needed on creating documentation throughout projects rather than at the end of them. Assignments will thus be spread out more with checkpoints to encourage this practice.

CE - PLO#4 (same as previous since EGEE320 was not offered in Fall 2021):

- Do not offer EGEE320 as a lecture only course. Additionally, a performance indicator will be defined and it will be evaluated for the Fall 2022 offering of EGEE320.

CE - PLO#6:

- Emphasize methodical debugging and validation throughout courses in the curriculum. Also, incorporate more open-ended testing in labs where students would develop the testing procedure rather than just being given it to follow.

2022-2023

Outcome 1: Need to introduce POS Boolean expressions in EGEE125 so students are introduced to the topic and then later course re-enforce it. Also, we need to arrive at a means to emphasize the importance of timing (frequency and resolution).

Outcome 2: No action plan needed.

Outcome 3: Minor adjustments to the course should improve the performance in EGEE355. We will continue to monitor to see if the improvements have the desired effect.

Outcome 4: Gather data from EGEE320 to see if it matches the data from EGNR495.

Outcome 5: No action plan needed.

Outcome 6: Additional time can be spent in class to further improve the student's understanding of this outcome.

Outcome 7: No action plan needed.

Rationale or justification for decisions made for the future of the program

Integrated operating systems into the core of the CE degree to make sure there was an appropriate breadth of topics based on ABET feedback. Integrated product of sums into EGEE125 for preparation with EGEE320. In EGEE425 we tested teaching the course without a lab, it was decided that the lab was needed to maximize student learning.

Long-range future goals or plans for the program

Program enrollment has decreased so we need to do more marketing to improve student enrollment. Create more demonstration systems to show to prospective students. Work to give more tours to high school students particularly math and science classes.

Renovate CAS304 to make it more suitable for offering both lecture and lab. The university is proposing a capital outlay request to renovate the CAS building to provide updated lecture and lab space.

Quality, Resources, and Support for the program

Summarize Strengths and Weaknesses in each area.

Student Learning:

Many of our students come in with SAT/ACT scores below the acceptance requirement of other engineering programs. In recent years, the math preparation of incoming students has been significantly declining. One of our strengths, due to our high faculty to student ratio, is in working closely with students, who may not typically succeed at other engineering programs, and helping them to reach their potential.

Evidence of student learning can be found in the multiple job offers of our seniors typically get before graduation. Our graduates are sought after by employers, especially in the robotics and automation areas.

Graduate Success:

As stated previously, graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022

grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

	2018-2019	2019-2020	2020-2021	2021-2022
Response Rate	95.8%	100%	Not Available	84.2%
Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

Academic Programming and Rigor:

The Electrical Engineering, Computer Engineering, Mechanical Engineering, Manufacturing Engineering Technology, and Electrical Engineering Technology degrees are all accredited by ABET. The Robotics Engineering and Mechatronics are still new and we will be applying for ABET accreditation during the next visit. ABET accreditation assures that the program meets the quality standards required by the profession.

Beyond the ABET accreditation evidence of the strength of the program can be found in the multiple job offers of our seniors typically get before graduation. The School of Engineering & Technology prides itself on having a mix of theoretical and practical learning. The majority of our courses contain a lab component where students are able to use real world equipment and develop practical skills.

Faculty Qualifications, Staffing, and Effectiveness of Instruction:

The School of Engineering & Technology (SET) contains positions for eleven full-time faculty and two laboratory engineers. School and program leadership rests with key faculty members who perform these functions on a release time basis. The School faculty work very well together as a combined team on school-related items.

Because of its small size, the School of Engineering & Technology offers engineering curricula that are significantly impacted by the other engineering disciplines in the School and also receive a significant amount of instruction from the faculty in the Department of Math and Computer Science. By the time they leave LSSU, graduates will have taken classes taught (or team-taught) by most, if not all, of the School of Engineering & Technology faculty. Furthermore, much of the continuous

improvement process occurs at the School level, in which the entire School of Engineering & Technology faculty participate. A list of the faculty and lab engineers can be seen in the table below.

Name	Degree	Job Title
Baumann, David	PhD, Electrical Engineering, 1992	Professor
Devaprasad, Jim	MS, Mechanical Engineering, 1986	Professor
Hildebrand, Robert	PhD, Acoustics, 2001	Professor
Jones, Andrew	PhD, Electrical and Computer Engineering, 2002	Professor
Haluk Kucuk	PhD, Mechanical Engineering, 1999	Assistant Professor
Leach, David	MS, Mechanical Engineering, 2018	Assistant Professor
Mahmud, Zakaria	PhD, Mechanical Engineering, 2003	Associate Professor
Moening, Joseph	PhD, Electrical Engineering, 2010	Professor
Edoardo Sarda	PhD, Ocean Systems Engineering, 2016	Assistant Professor
Weber, Paul	PhD, Electrical Engineering (CE), 2006	Professor
Zarepoor, Masoud	PhD, Mechanical Engineering, 2016	Associate Professor
Bryant, Trevor		ECE Lab Engineer
Throener, Ron		ME Lab Engineer

Given the small number of faculty it is challenging to offer 7 different 4-year degree programs (CE, EE, ME, RE, EET, MfgET, and Mechatronics). Faculty regularly teach on overload (above 24 load hours for the year). One area where this affects the students is in the course offerings. Due to low student demand and to keep the load hours to a minimum, there are some core courses that are only offered once every two years. To maximize the number of students and minimize the load hours, many courses have been designed to serve multiple audiences within the school.

Assessment Practices:

The process for continuous improvement of the program is primarily a combination of student outcome and course assessment/evaluation. Assessment and evaluation of the student outcomes provides a means of improving the program while course assessment improves each individual course.

The block diagram shown in the figure below provides an overview of the continuous improvement process. The process starts with the ABET criteria as well as the missions and goals of the University, College, and School. From the criteria and missions the program educational objectives (PEOs) and the student outcomes are developed. The program educational objectives, in addition to input from the industrial advisory board and employers of our graduates are used to inform in determining the program curriculum. From the program curriculum courses and individual course objectives are designed. An essential component in this process is regularly measuring student performance in both the student outcomes and course objectives.

5-Year Academic Program Review 2023

Due to the Dean's Office by October 27, 2023

This reporting form was introduced in FY2020; numerical data prior to FY2020 may be excluded.

ELECTRICAL ENGINEERING BS

Submitted by: *Paul Weber and Andrew Jones*
Date: *12/5/2023*
School: *Engineering & Technology*
Academic Program(s): *B.S. Electrical Engineering*

Annual Program Data Reporting

The following table summarizes data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022	2022-2023
Enrollments	Not Available	Freshmen: *5* Sophomores: *3* Juniors: *3* Seniors: *12*	Freshmen: *3* Sophomores: *5* Juniors: *5* Seniors: *9*	Freshmen: *5* Sophomores: *3* Juniors: *3* Seniors: *6*
Retention as of fall 2023	Not Available	Fr to So: *2* So to Jun: *2* Jun to Sen: *3*	Fr to So: *5* So to Jun: *2* Jun to Sen: *3*	Fr to So: *1* So to Jun: *5* Jun to Sen: *3*
Degrees Conferred	Not Available	6	3	1

Graduate Placement Data:

Graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

	2018-2019	2019-2020	2020-2021	2021-2022
Response Rate	95.8%	100%	Not Available	84.2%

Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

High Impact Practices:

The following high impact practices are embedded in all engineering and engineering technology degrees.

- First-Year Experience: All School of Engineering & Technology (SET) students take EGNR101 where they learn study skills, work on a team project, and develop writing skills through weekly reflections that promote a growth mindset.
- Capstone Courses and Projects: All SET students complete a capstone project with either industry collaboration – for EGNR491/495 or the EGNR250/450/451 co-op sequence – or by completing an undergraduate research project in the EGNR260/460/461 sequence which is another high impact practice. In these projects, students work closely with faculty and contacts from industry to complete a year-long project that helps them prepare to enter industry or for the next step in their academic career.
- Internships: The SET faculty and staff communicate with industry partners to help students find summer internships and then serve as references where needed. This past fall was one of the strongest career fairs with the largest attendance that LSSU has had in the last four years and the majority of companies looking to hire SET students for internship and/or full-time employment.

Summary of Annual Assessment Updates

The following table summarizes assessment data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022
Program Learning Outcome Findings	The report for this year was missing due to the pandemic and no programmatic changes were identified. The only data	The program is preparing electrical engineering students to be successful. The average of the performance indicators	For this year, one team had an average of 2.5 for PLO2. There did not seem to be a concern at the program level

available showed that students in the Electrical Engineering program had an average of 3.0 on PLO2 (met expectations).

across all seven PLOs in Electrical Engineering were above 2.0 and some even above 3.0. The real strength in the program is providing opportunities for students to apply engineering design to produce solutions (PLO#2) and to communicate effectively (PLO#3). As a result of reviewing most of the performance indicators, small adjustments and improvements will be made within the course for which the performance indicator was extracted. The review of others lead to discussion of how to introduce or support a topic or idea in an earlier course in the curriculum so that students would be better prepared for the course for which the performance indicator was used. It was also noted that the evaluation of all the electrical engineering outcomes arrived from either the senior project faculty board or from just one ECE faculty, David Baumann. It was decided to have at least a second ECE faculty also assess the performance indicators in the future.

as all other teams met the standard. For PLO3 all teams averaged a 3.0 or higher, for PLO4 the average was 3.2, for PLO5 the average was 3.0, and for PLO7 the average was 3.1. The only performance that did not meet expectations was for PLO6 from a testing design review. The students submitted documentation that was missing test tables or had vague terms such as "reasonable" instead of measurable items. While there was not a long-term trend that caused concern, this outcome was flagged for closer monitoring the following year.

Summary of decisions, recommendations, and/or improvements concerning the future of the program

Decisions and recommendations should include budgets, additions of new courses or concentrations, discontinuation or suspension of the program, etc.

2019-2020

No programmatic changes were identified this year due to the pandemic.

2020-2021

General recommendations:

- Have a second ECE faculty member assess the student work in terms of the performance indicators.

EE - PLO#1:

- Being that this data set is small and it was collected during Covid impacted years, there were no recommendations for changes to the rest of the EE program.

EE - PLO#2:

- It is a strength in the program, so no major recommendations for improvement at the program level.
- Consider adding a design review in EGEE310 as a means to prepare students for later courses particular EGNR491 (the capstone senior project course).

EE - PLO#3:

- It is a strength in the program, so no major recommendations for improvement at the program level.
- Keep the mechanism of having the students in EGNR495 undergo a practice presentation for which faculty provide feedback for improvement. This process has always benefitted the students for the final presentation.

EE – PLO#4:

- While the performance indicator in EGEE345 does provide support for this outcome, the ECE faculty decided to change the course and performance indicator to better reflect the breadth of this outcome. The assessment will now come from a written assignment in EGEE475 (power electronics).

EE – PLO#6:

- Consider in EGEE310 of having the testing design review also answer the following questions: "How will you test it?" and "How do you know it works?". Since EE students typically take EGEE310 prior to EGNR346, a solid introduction on how to review data for proper results prior to EGNR346 might help reinforce the "big picture" understanding of control charts. More exposure to a topic should assist in improving this outcome.

2021-2022

No new data was reported this year so 2022-2023 information is included below.

2022-2023

Outcome 1: No action plan needed.

Outcome 2: No action plan needed.

Outcome 3: The assignment and/or performance indicator needs to be reviewed as it may be an assessment of AI (ChatGPT) rather than the review of student effort. Need to re-evaluation the usefulness of this assignment.

Outcome 4: The assignment and/or performance indicator needs to be reviewed as it may be an assessment of AI (ChatGPT) rather than the review of student effort. Need to re-evaluation the usefulness of this assignment.

Outcome 5: No action plan needed.

Outcome 6: Additional time can be spent in class to further improve the student's understanding of this

outcome.

Outcome 7: No action plan needed.

Rationale or justification for decisions made for the future of the program

The program was stable with no major program level changes or new equipment needed. There were some smaller course level changes made to improve student learning.

Long-range future goals or plans for the program

Program enrollment has decreased so we need to do more marketing to improve student enrollment. Create more demonstration systems to show to prospective students. Work to give more tours to high school students particularly math and science classes.

Would like to offer EGRS461 Design of Control Systems again to give students more options for technical elective courses.

Purchase equipment for BLDC motors for the EGEE330 Electro-mechanical Systems.

Renovate CAS304 to make it more suitable for offering both lecture and lab. The university is proposing a capital outlay request to renovate the CAS building to provide updated lecture and lab space.

Quality, Resources, and Support for the program

Summarize Strengths and Weaknesses in each area.

Student Learning:

Many of our students come in with SAT/ACT scores below the acceptance requirement of other engineering programs. In recent years, the math preparation of incoming students has been significantly declining. One of our strengths, due to our high faculty to student ratio, is in working closely with students, who may not typically succeed at other engineering programs, and helping them to reach their potential.

Evidence of student learning can be found in the multiple job offers of our seniors typically get before graduation. Our graduates are sought after by employers, especially in the robotics and automation areas.

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Faculty Qualifications, Staffing, and Effectiveness of Instruction:

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Leach, David	MS, Mechanical Engineering, 2018	Assistant Professor
Mahmud, Zakaria	PhD, Mechanical Engineering, 2003	Associate Professor
Moening, Joseph	PhD, Electrical Engineering, 2010	Professor
Edoardo Sarda	PhD, Ocean Systems Engineering, 2016	Assistant Professor
Weber, Paul	PhD, Electrical Engineering (CE), 2006	Professor
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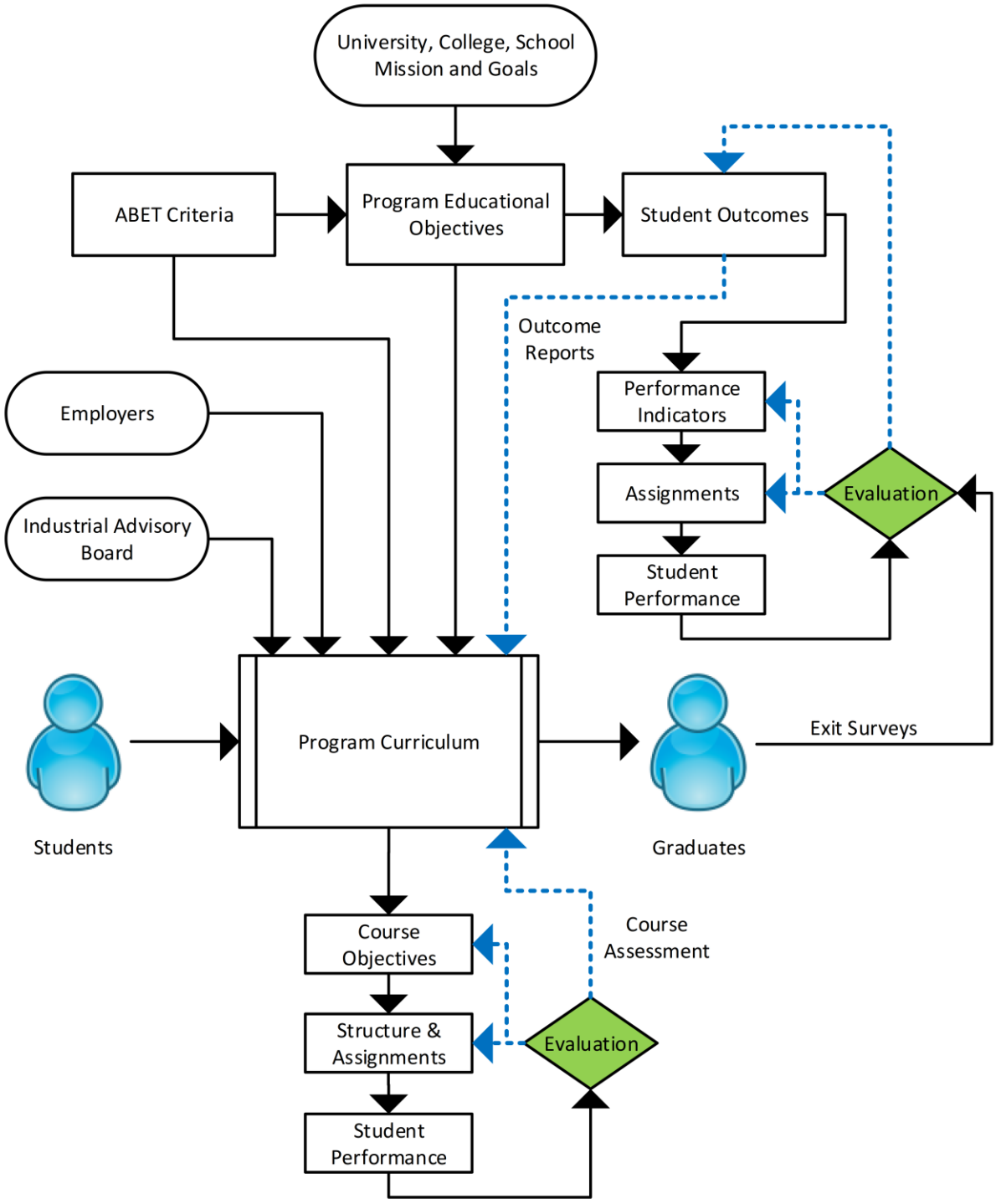
Given the small number of faculty it is challenging to offer 7 different 4-year degree programs (CE, EE, ME, RE, EET, MfgET, and Mechatronics). Faculty regularly teach on overload (above 24 load hours for the year). One area where this affects the students is in the course offerings. Due to low student demand and to keep the load hours to a minimum, there are some core courses that are only offered once every two years. To maximize the number of students and minimize the load hours, many courses have been designed to serve multiple audiences within the school.

Assessment Practices:

The process for continuous improvement of the program is primarily a combination of student outcome and course assessment/evaluation. Assessment and evaluation of the student outcomes provides a means of improving the program while course assessment improves each individual course.

The block diagram shown in the figure below provides an overview of the continuous improvement process. The process starts with the ABET criteria as well as the missions and goals of the University, College, and School. From the criteria and missions the program educational objectives (PEOs) and the student outcomes are developed. The program educational objectives, in addition to input from the industrial advisory board and employers of our graduates are used to inform in determining the program curriculum. From the program curriculum courses and individual course objectives are designed. An essential component in this process is regularly measuring student performance in both the student outcomes and course objectives.



In addition to measuring student performance, constituent feedback is a vital part of our assessment process. Given our small student population, the sample size for student work is rarely statistically significant. The small size can also cause student performance to fluctuate as the academic ability of a particularly class varies. This can make it challenging to make definitive conclusions about changes made to a course and/or the program. As a result more qualitative mechanisms are used in conjunction with student performance.

Student feedback is an essential component in our assessment. The small student population allows the faculty to get to know the students which makes them more comfortable with providing meaningful feedback. This includes formal feedback in the form of written and verbal from course assessment as well as senior exit surveys and interviews. In addition, informal feedback such as conversations with students also plays an important role but is difficult to document. Faculty are also in contact with alumni and employers who provide valuable feedback to improve courses and the program.

Faculty regularly evaluate the student performance and constituent feedback. After thorough deliberation, recommendations for changes to courses or programs are developed. For minor changes, these recommendations are then implemented by course instructors. Larger changes may require approval from the University-wide curriculum committee and the Provost. These changes are usually initiated by the school chair or program coordinator.

The process, so described, takes place at the School level (SET) in the case of courses common to multiple engineering programs. If the course is specific to the program, then the process described takes place at the Department level instead. This assessment process is effective, however it is also time consuming. As previously mentioned, given the large number of programs relative to faculty, it takes a significant amount of time to assess and evaluate each program.

Resources / Facilities:

The program is housed within the School of Engineering & Technology, which is located entirely in the Center for Applied Science and Engineering Technology (CASET) Building. Built in 1980, the three-story structure is home to the areas of Engineering, Engineering Technology, Mathematics, Computer Science, and Fire Science. Two additional non-academic facilities associated with Information Technology are also located in the building: Enterprise Application Services and University Support Services.

The School of Engineering & Technology has approximately 30,000 sq. ft. of usable space, which includes offices, storage areas, labs, and work areas. The CASET building has multiple classrooms with the room size and capacity are shown in the table below.

Room	Type	Size (sq.ft.)	Capacity
CAS-106A	Classroom/Lab	1,140	22
CAS-119	Classroom	880	48
CAS-205	Classroom	1,010	40
CAS-207	Classroom	690	30
CAS-210	Classroom	1,100	56
CAS-211	Classroom	585	27
CAS-212	Lecture Room	1,265	76
CAS-310	Classroom/Lab	1,320	30
CAS-311	Classroom/Lab	1,320	24

All classrooms are equipped with a whiteboard or chalkboard, a computer, a document camera, a projector, and a screen. The rooms are arranged in a typical fashion with desk and chairs arranged in rows. The lecture room has fixed desks and chairs arranged in a stepped fashion. Since most engineering courses have enrollments with less than 40 students, the classroom facilities within the building are adequate, and nearly all engineering classes take place in the CASET building.

Laboratory experiences are a central component of the engineering curriculum at LSSU. Most technical courses contain labs. A summary of the lab facilities available to all engineering and engineering technology students can be found in the table below.

Room	Name	Size (sq. ft.)	Capacity
CAS-105	Data Acquisition / Microscopy Lab	370	12
CAS-106A	Materials Testing Lab	1,140	22
CAS-106B	Engineering Design Center	1,140	30
CAS-106C	Thermal Fluids Lab	900	10
CAS-120	Machine Shop	5,180	20
CAS-120A&B	Welding Lab &Foundry	1,760	10
CAS-122	Senior Projects Construction Area	2,240	20
CAS-124	Robotics Annex	1,200	8
CAS-125	Robotics and Automation Center	2,600	16
CAS-209A&B	Computer Lab	1,100	28
CAS-304	Digital Electronics Lab	1,080	14
CAS-306	Analog Electronics I Lab	1,175	16
CAS-309	Analog Electronics II Lab	1,175	16
CAS-310	Electro-mechanical Systems Lab	1,320	30
CAS-311	Programmable Logic Controllers Lab	1,320	24

In general the space is adequate, however it is challenging to find enough room for senior projects when there is a large senior class. In addition, if the Robotic Engineering and Mechatronics programs grow as hoped, we will likely run into space constraints in the robotics lab and other areas.

5-Year Academic Program Review 2023

Due to the Dean's Office by October 27, 2023

This reporting form was introduced in FY2020; numerical data prior to FY2020 may be excluded.

ELECTRICAL ENGINEERING TECHNOLOGY BS

Submitted by: *Paul Weber*
Date: *12/5/2023*
School: *Engineering & Technology*
Academic Program(s): *B.S. Electrical Engineering Technology*

Annual Program Data Reporting

The following table summarizes data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022	2022-2023
Enrollments	Not Available	Freshmen: *0* Sophomores: *1* Juniors: *3* Seniors: *2*	Freshmen: *2* Sophomores: *0* Juniors: *0* Seniors: *3*	Freshmen: *0* Sophomores: *1* Juniors: *1* Seniors: *2*
Retention as of fall 2023	Not Available	Fr to So: *1* So to Jun: *1* Jun to Sen: *1*	Fr to So: *N/A* So to Jun: *1* Jun to Sen: *0*	Fr to So: *1* So to Jun: *N/A* Jun to Sen: *1*
Degrees Conferred	Not Available	2	1	1

Graduate Placement Data:

Graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

2018-2019	2019-2020	2020-2021	2021-2022

Response Rate	95.8%	100%	Not Available	84.2%
Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

High Impact Practices:

The following high impact practices are embedded in all engineering and engineering technology degrees.

- First-Year Experience: All School of Engineering & Technology (SET) students take EGNR101 where they learn study skills, work on a team project, and develop writing skills through weekly reflections that promote a growth mindset.
- Capstone Courses and Projects: All SET students complete a capstone project with either industry collaboration – for EGNR491/495 or the EGNR250/450/451 co-op sequence – or by completing an undergraduate research project in the EGNR260/460/461 sequence which is another high impact practice. In these projects, students work closely with faculty and contacts from industry to complete a year-long project that helps them prepare to enter industry or for the next step in their academic career.
- Internships: The SET faculty and staff communicate with industry partners to help students find summer internships and then serve as references where needed. This past fall was one of the strongest career fairs with the largest attendance that LSSU has had in the last four years and the majority of companies looking to hire SET students for internship and/or full-time employment.

Summary of Annual Assessment Updates

The following table summarizes assessment data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022
Program Learning Outcome Findings	Students performed at the following levels for the PLOs: • PLO1: 3.0	Students performed at the following levels for the PLOs: • PLO1: One team had	Students performed at the following levels for the PLOs: • PLO1: 3.0

- PLO2: 3.0
- PLO3: N/A – under development for ABET ETAC during the transition from {a-k} to {1-5}
- PLO4: No data
- PLO5: No data

a rating of 1.8

- PLO2: 3.0
- PLO3: 3.0
- PLO4: 2.4, 2.5
- PLO5: 3.0

PLO1 seemed to be a result of COVID and was to be monitored in the future. More emphasis was identified for preparing students to test and validate products (PLO4).

- PLO2: 3.0
- PLO3: 3.0, 2.7
- PLO4: 3.0
- PLO5: 3.0

More emphasis was identified for preparing students to help communicate/document technical drawings (PLO3).

Summary of decisions, recommendations, and/or improvements concerning the future of the program

Decisions and recommendations should include budgets, additions of new courses or concentrations, discontinuation or suspension of the program, etc.

2019-2020
No programmatic changes were identified this year due to the pandemic.

2020-2021
Decisions for this year are discussed in the previous section.

2021-2022
Decisions for this year are discussed in the previous section.

2022-2023
Outcome 1: Need to consider more focus (less breadth) in EGET275 to have better understanding of few topics rather than no understanding of many topics. Additionally, the performance indicator is over a topic (in EGEE355) for which a student may not have seen before (EGET275 is not a prerequisite to EGEE355).

Outcome 2: No action plan needed.

Outcome 3: No action plan needed.

Outcome 4: Additional time can be spent in class to further improve the student's understanding of this outcome.

Outcome 5: No action plan needed.

Rationale or justification for decisions made for the future of the program

EGET110 and EGET175 were changed to EGET270 and EGET275 to better reflect the level of the course material.

Long-range future goals or plans for the program

Program enrollment has decreased so we need to do more marketing to improve student enrollment. Create more demonstration systems to show to prospective students. Work to give more tours to high school students particularly math and science classes.

Renovate CAS304 to make it more suitable for offering both lecture and lab. The university is proposing a capital outlay request to renovate the CAS building to provide updated lecture and lab space.

Due to the low enrollment we need to critically examine the program and see if it should continue. For example, it may be better to offer the Mechatronics degree with a certificate in the electrical area.

Quality, Resources, and Support for the program

Summarize Strengths and Weaknesses in each area.

Student Learning:

Many of our students come in with SAT/ACT scores below the acceptance requirement of other engineering programs. In recent years, the math preparation of incoming students has been significantly declining. One of our strengths, due to our high faculty to student ratio, is in working closely with students, who may not typically succeed at other engineering programs, and helping them to reach their potential.

Evidence of student learning can be found in the multiple job offers of our seniors typically get before graduation. Our graduates are sought after by employers, especially in the robotics and automation areas.

Graduate Success:

As stated previously, graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

	2018-2019	2019-2020	2020-2021	2021-2022
Response Rate	95.8%	100%	Not Available	84.2%
Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

Academic Programming and Rigor:

The Electrical Engineering, Computer Engineering, Mechanical Engineering, Manufacturing Engineering Technology, and Electrical Engineering Technology degrees are all accredited by ABET. The Robotics Engineering and Mechatronics are still new and we will be applying for ABET accreditation during the next visit. ABET accreditation assures that the program meets the quality standards required by the profession.

Beyond the ABET accreditation evidence of the strength of the program can be found in the multiple job offers of our seniors typically get before graduation. The School of Engineering & Technology prides itself on having a mix of theoretical and practical learning. The majority of our courses contain a lab component where students are able to use real world equipment and develop practical skills.

Faculty Qualifications, Staffing, and Effectiveness of Instruction:

The School of Engineering & Technology (SET) contains positions for eleven full-time faculty and two laboratory engineers. School and program leadership rests with key faculty members who perform these functions on a release time basis. The School faculty work very well together as a combined team on school-related items.

Because of its small size, the School of Engineering & Technology offers engineering curricula that are significantly impacted by the other engineering disciplines in the School and also receive a significant amount of instruction from the faculty in the Department of Math and Computer Science. By the time they leave LSSU, graduates will have taken classes taught (or team-taught) by most, if not all, of the School of Engineering & Technology faculty. Furthermore, much of the continuous improvement process occurs at the School level, in which the entire School of Engineering & Technology faculty participate. A list of the faculty and lab engineers can be seen in the table below.

Name	Degree	Job Title
Baumann, David	PhD, Electrical Engineering, 1992	Professor
Devaprasad, Jim	MS, Mechanical Engineering, 1986	Professor
Hildebrand, Robert	PhD, Acoustics, 2001	Professor
Jones, Andrew	PhD, Electrical and Computer Engineering, 2002	Professor
Haluk Kucuk	PhD, Mechanical Engineering, 1999	Assistant Professor
Leach, David	MS, Mechanical Engineering, 2018	Assistant Professor
Mahmud, Zakaria	PhD, Mechanical Engineering, 2003	Associate Professor
Moening, Joseph	PhD, Electrical Engineering, 2010	Professor
Edoardo Sarda	PhD, Ocean Systems Engineering, 2016	Assistant Professor
Weber, Paul	PhD, Electrical Engineering (CE), 2006	Professor
Zarepoor, Masoud	PhD, Mechanical Engineering, 2016	Associate Professor

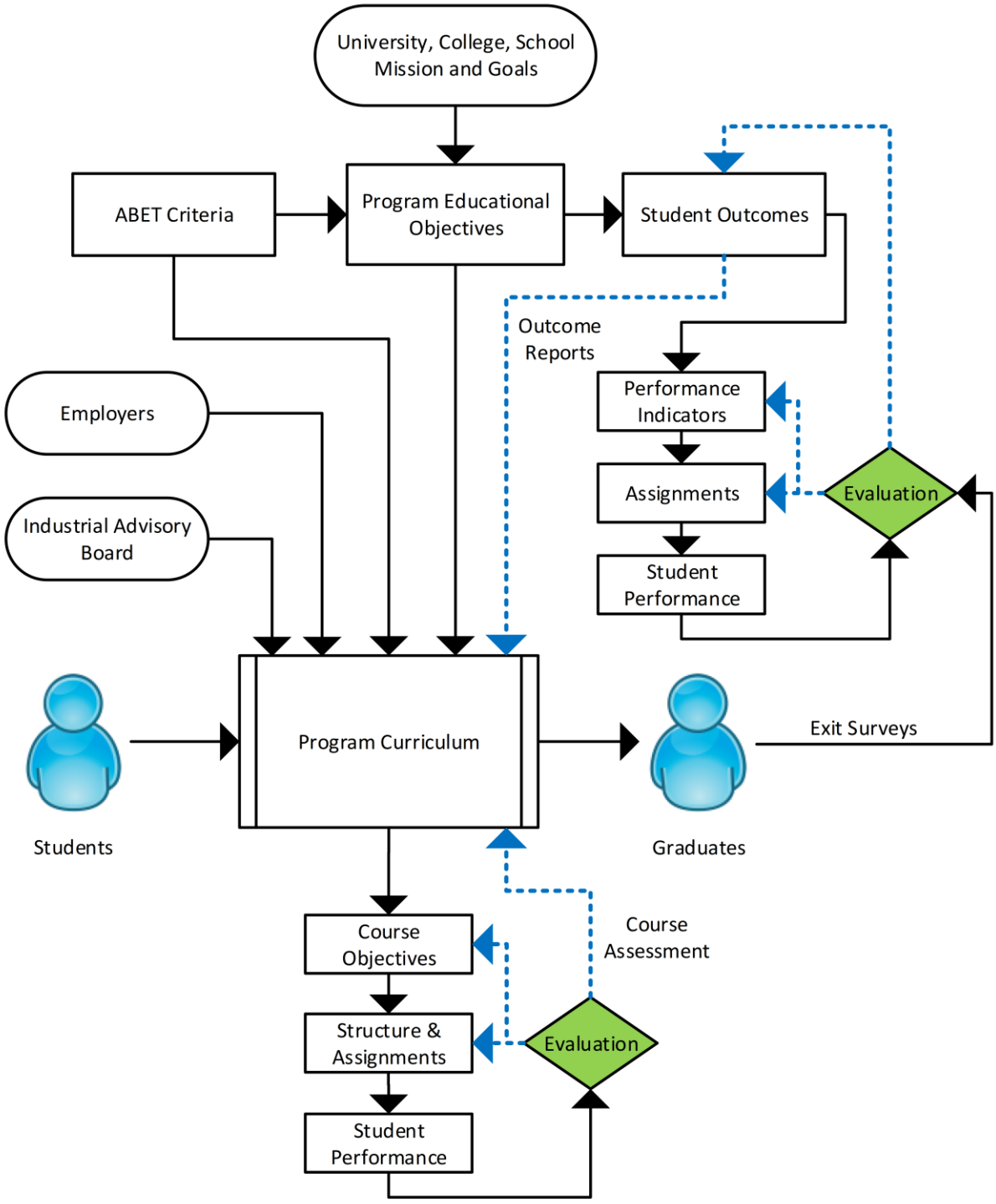
Bryant, Trevor		ECE Lab Engineer
Throener, Ron		ME Lab Engineer

Given the small number of faculty it is challenging to offer 7 different 4-year degree programs (CE, EE, ME, RE, EET, MfgET, and Mechatronics). Faculty regularly teach on overload (above 24 load hours for the year). One area where this affects the students is in the course offerings. Due to low student demand and to keep the load hours to a minimum, there are some core courses that are only offered once every two years. To maximize the number of students and minimize the load hours, many courses have been designed to serve multiple audiences within the school.

Assessment Practices:

The process for continuous improvement of the program is primarily a combination of student outcome and course assessment/evaluation. Assessment and evaluation of the student outcomes provides a means of improving the program while course assessment improves each individual course.

The block diagram shown in the figure below provides an overview of the continuous improvement process. The process starts with the ABET criteria as well as the missions and goals of the University, College, and School. From the criteria and missions the program educational objectives (PEOs) and the student outcomes are developed. The program educational objectives, in addition to input from the industrial advisory board and employers of our graduates are used to inform in determining the program curriculum. From the program curriculum courses and individual course objectives are designed. An essential component in this process is regularly measuring student performance in both the student outcomes and course objectives.



In addition to measuring student performance, constituent feedback is a vital part of our assessment process. Given our small student population, the sample size for student work is rarely statistically significant. The small size can also cause student performance to fluctuate as the academic ability of a particularly class varies. This can make it challenging to make definitive conclusions about changes made to a course and/or the program. As a result more qualitative mechanisms are used in conjunction with student performance.

Student feedback is an essential component in our assessment. The small student population allows the faculty to get to know the students which makes them more comfortable with providing meaningful feedback. This includes formal feedback in the form of written and verbal from course assessment as well as senior exit surveys and interviews. In addition, informal feedback such as conversations with students also plays an important role but is difficult to document. Faculty are also in contact with alumni and employers who provide valuable feedback to improve courses and the program.

Faculty regularly evaluate the student performance and constituent feedback. After thorough deliberation, recommendations for changes to courses or programs are developed. For minor changes, these recommendations are then implemented by course instructors. Larger changes may require approval from the University-wide curriculum committee and the Provost. These changes are usually initiated by the school chair or program coordinator.

The process, so described, takes place at the School level (SET) in the case of courses common to multiple engineering programs. If the course is specific to the program, then the process described takes place at the Department level instead. This assessment process is effective, however it is also time consuming. As previously mentioned, given the large number of programs relative to faculty, it takes a significant amount of time to assess and evaluate each program.

Resources / Facilities:

The program is housed within the School of Engineering & Technology, which is located entirely in the Center for Applied Science and Engineering Technology (CASET) Building. Built in 1980, the three-story structure is home to the areas of Engineering, Engineering Technology, Mathematics, Computer Science, and Fire Science. Two additional non-academic facilities associated with Information Technology are also located in the building: Enterprise Application Services and University Support Services.

The School of Engineering & Technology has approximately 30,000 sq. ft. of usable space, which includes offices, storage areas, labs, and work areas. The CASET building has multiple classrooms with the room size and capacity are shown in the table below.

Room	Type	Size (sq.ft.)	Capacity
CAS-106A	Classroom/Lab	1,140	22
CAS-119	Classroom	880	48
CAS-205	Classroom	1,010	40
CAS-207	Classroom	690	30
CAS-210	Classroom	1,100	56
CAS-211	Classroom	585	27
CAS-212	Lecture Room	1,265	76
CAS-310	Classroom/Lab	1,320	30
CAS-311	Classroom/Lab	1,320	24

All classrooms are equipped with a whiteboard or chalkboard, a computer, a document camera, a projector, and a screen. The rooms are arranged in a typical fashion with desk and chairs arranged in rows. The lecture room has fixed desks and chairs arranged in a stepped fashion. Since most engineering courses have enrollments with less than 40 students, the classroom facilities within the building are adequate, and nearly all engineering classes take place in the CASET building.

Laboratory experiences are a central component of the engineering curriculum at LSSU. Most technical courses contain labs. A summary of the lab facilities available to all engineering and engineering technology students can be found in the table below.

Room	Name	Size (sq. ft.)	Capacity
CAS-105	Data Acquisition / Microscopy Lab	370	12
CAS-106A	Materials Testing Lab	1,140	22
CAS-106B	Engineering Design Center	1,140	30
CAS-106C	Thermal Fluids Lab	900	10
CAS-120	Machine Shop	5,180	20
CAS-120A&B	Welding Lab &Foundry	1,760	10
CAS-122	Senior Projects Construction Area	2,240	20
CAS-124	Robotics Annex	1,200	8
CAS-125	Robotics and Automation Center	2,600	16
CAS-209A&B	Computer Lab	1,100	28
CAS-304	Digital Electronics Lab	1,080	14
CAS-306	Analog Electronics I Lab	1,175	16
CAS-309	Analog Electronics II Lab	1,175	16
CAS-310	Electro-mechanical Systems Lab	1,320	30
CAS-311	Programmable Logic Controllers Lab	1,320	24

In general the space is adequate, however it is challenging to find enough room for senior projects when there is a large senior class. In addition, if the Robotic Engineering and Mechatronics programs grow as hoped, we will likely run into space constraints in the robotics lab and other areas.

5-Year Academic Program Review 2023

Due to the Dean's Office by October 27, 2023

This reporting form was introduced in FY2020; numerical data prior to FY2020 may be excluded.

MECHANICAL ENGINEERING BS

Submitted by: *Paul Weber*
Date: *12/5/2023*
School: *Engineering & Technology*
Academic Program(s): *B.S. Mechanical Engineering*

Annual Program Data Reporting

The following table summarizes data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022	2022-2023
Enrollments	Not Available	Freshmen: *10* Sophomores: *8* Juniors: *20* Seniors: *39*	Freshmen: *13* Sophomores: *11* Juniors: *11* Seniors: *44*	Freshmen: *16* Sophomores: *14* Juniors: *14* Seniors: *24*
Retention as of fall 2023	Not Available	Fr to So: *4* So to Jun: *15* Jun to Sen: *21*	Fr to So: *6* So to Jun: *6* Jun to Sen: *17*	Fr to So: *10* So to Jun: *5* Jun to Sen: *10*
Degrees Conferred	Not Available	10	21	13

Graduate Placement Data:

Graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the

pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

	2018-2019	2019-2020	2020-2021	2021-2022
Response Rate	95.8%	100%	Not Available	84.2%
Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

High Impact Practices:

- *First-Year Experience: All School of Engineering & Technology (SET) students take EGNR101 where they learn study skills, work on a team project, and develop writing skills through weekly reflections that promote a growth mindset.*

- *Capstone Courses and Projects: All SET students complete a capstone project with either industry collaboration – for EGNR491/495 or the EGNR250/450/451 co-op sequence – or by completing an undergraduate research project in the EGNR260/460/461 sequence which is another high impact practice. In these projects, students work closely with faculty and contacts from industry to complete a year-long project that helps them prepare to enter industry or for the next step in their academic career.*

- *Internships: The SET faculty and staff communicate with industry partners to help students find summer internships and then serve as references where needed. This past fall was one of the strongest career fairs with the largest attendance that LSSU has had in the last four years and the majority of companies looking to hire SET students for internship and/or full-time employment.*

Summary of Annual Assessment Updates

The following table summarizes assessment data from the Annual Update Reports conducted for this program:

	2020-2021	2021-2022	2022-2023
Program	The average performance indicators	The average performance indicators	For most (5 of 7) of the program

Learning Outcome Findings	from all seven program outcomes is 3.03. The performance indications were chosen from the two core ME courses, one Controls course, and from the senior design sequence courses. The program strength was noted in three distinct areas. • Students' showed excellence in their ability to apply engineering design to provide solutions (PLO-2). • In the design project essays, Students demonstrated proficiency in their design packet preparation where they have included ethical considerations as well as global, economic, environmental, and societal contexts (PLO-4). • With numerous practice in presentation and technical writings, students also excelled in hands on experiments with appropriate data analysis, interpretation, and engineering judgement to draw conclusions.(PLO-5) LSSU curriculum provides hands-on-experience in the majority of courses, besides, industry sponsored senior design projects help students gather industry-like experience before their graduation. The performance indicator for PLO-1 was adjusted due to the modified ABET outcome a couple of years ago. Therefore, only two years of the assessment results were collected. The results in 2020-21 indicate poor performance (score of 2.56), but the result was very good (score of 3.27) in 2019-20. Therefore, the decision was to	from all seven program outcomes is 3.03. The performance indications were chosen from the two core ME courses, one Controls course, and from the senior design sequence courses. The program strength was noted in three distinct areas. • Students' showed excellence in their ability to apply engineering design to provide solutions (PLO-2). • In the design project essays, Students demonstrated proficiency in their design packet preparation where they have included ethical considerations as well as global, economic, environmental, and societal contexts (PLO-4). • With numerous practice in presentation and technical writings, students also excelled in hands on experiments with appropriate data analysis, interpretation, and engineering judgement to draw conclusions.(PLO-5) LSSU curriculum provides hands-on-experience in the majority of courses, besides, industry sponsored senior design projects help students gather industry-like experience before their graduation. The performance indicator for PLO-1 was adjusted due to the modified ABET outcome a couple of years ago. Therefore, only two years of the assessment results were collected. The results in 2020-21 indicate poor performance (score of 2.56), but the result was very good (score of 3.27) in 2019-20. Therefore, the decision was to continue using the current course	outcomes (all as stipulated by the accrediting body ABET), review of indicators suggested good student attainment (applies for outcomes related to design, communications, ethics, teamwork, and self-learning). Regarding two other program outcomes, however, a more qualified statement would be in order. These outcomes, for problem-solving/STEM knowledge, and for experimentation, respectively, also suggested adequate attainment, but with in each case one of the two indicators was relatively weaker. In the former case (problem solving/STEM), the possible weakness appears to vw narrowly confined to one topic, and is a single instance not amplifying any previously noted trend. Accordingly, at present, there is no action plan other than to watch how it develops. For the latter (experimentation), the possible weakness comes from a multidisciplinary course, whereas the ME program specific course does not bear out the weakness. It's likely the weakness cannot be attributed to students in the ME program specifically.

continue using the current course design and assessment methods for at least another year to better understand the trend.	design and assessment methods for at least another year to better understand the trend.

Summary of decisions, recommendations, and/or improvements concerning the future of the program

Decisions and recommendations should include budgets, additions of new courses or concentrations, discontinuation or suspension of the program, etc.

2019-2020
Pandemic year – not recorded as such.

2020-2021
For the program outcome on design, plan to emphasize a firm foundation in classical mechanics (esp. free body diagrams, and weight-mass distinction), quantitative reasoning, use and understanding of units (esp. consistent use of base units).

2021-2022
For the program outcome on design, plan to emphasize a firm foundation in classical mechanics (esp. free body diagrams, and weight-mass distinction), quantitative reasoning, use and understanding of units (esp. consistent use of base units).

Determined to (and did) formally reconfigure vehicle systems elective course to a lecture-only format (after many offerings in this same format as a special topics course), reflecting the retirement (several years earlier) of the dynamometer lab equipment, too expensive to repair or replace.

Increased range of technical electives allowable in the General and Robotics/Automation concentrations. Expanded list permits more flexibility.

2022-2023
As concerns the program outcome on problem solving/STEM knowledge, await further data to see if the single indicator weakness (on analysing I/O relations for electrical systems) is anything recurring. For other outcomes, no curricular or pedagogical action plan seems warranted.

Rationale or justification for decisions made for the future of the program

The program was stable with no major program level changes or new equipment needed. There were some smaller course level changes made to improve student learning.

Long-range future goals or plans for the program

The B.S. Mechanical Engineering has historically been the largest program within the School of Engineering & Technology. Overall the program is stable in terms of course content, but has declined in enrollment recently (as has SET and LSSU in general). More program-specific content for marketing should be generated. A possible curricular change is to add lab content to the vehicle

systems concentration via EGME415 credit expansion. Equipment/maintenance-wise, EGME276, EGME425, EGME350, EGME432, and EGNR460/461/491/495 would be better supported via Tinius Olsen maintenance, 2 new shakers, new polishing wheels, a new thermal trainer, and NDT capabilities (especially eddy current crack detection).

Quality, Resources, and Support for the program

Summarize Strengths and Weaknesses in each area.

Student Learning:

Many of our students come in with SAT/ACT scores below the acceptance requirement of other engineering programs. In recent years, the math preparation of incoming students has been significantly declining. One of our strengths, due to our high faculty to student ratio, is in working closely with students, who may not typically succeed at other engineering programs, and helping them to reach their potential.

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Graduate Success:

As stated previously, graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

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Academic Programming and Rigor:

The Electrical Engineering, Computer Engineering, Mechanical Engineering, Manufacturing Engineering Technology, and Electrical Engineering Technology degrees are all accredited by ABET. The Robotics Engineering and Mechatronics are still new and we will be applying for ABET accreditation during the next visit. ABET accreditation assures that the program meets the quality standards required by the profession.

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Name	Degree	Job Title
Baumann, David	PhD, Electrical Engineering, 1992	Professor
Devaprasad, Jim	MS, Mechanical Engineering, 1986	Professor
Hildebrand, Robert	PhD, Acoustics, 2001	Professor
Jones, Andrew	PhD, Electrical and Computer Engineering, 2002	Professor
Haluk Kucuk	PhD, Mechanical Engineering, 1999	Assistant Professor
Leach, David	MS, Mechanical Engineering, 2018	Assistant Professor
Mahmud, Zakaria	PhD, Mechanical Engineering, 2003	Associate Professor
Moening, Joseph	PhD, Electrical Engineering, 2010	Professor
Edoardo Sarda	PhD, Ocean Systems Engineering, 2016	Assistant Professor
Weber, Paul	PhD, Electrical Engineering (CE), 2006	Professor
Zarepoor, Masoud	PhD, Mechanical Engineering, 2016	Associate Professor
Bryant, Trevor		ECE Lab Engineer
Throener, Ron		ME Lab Engineer

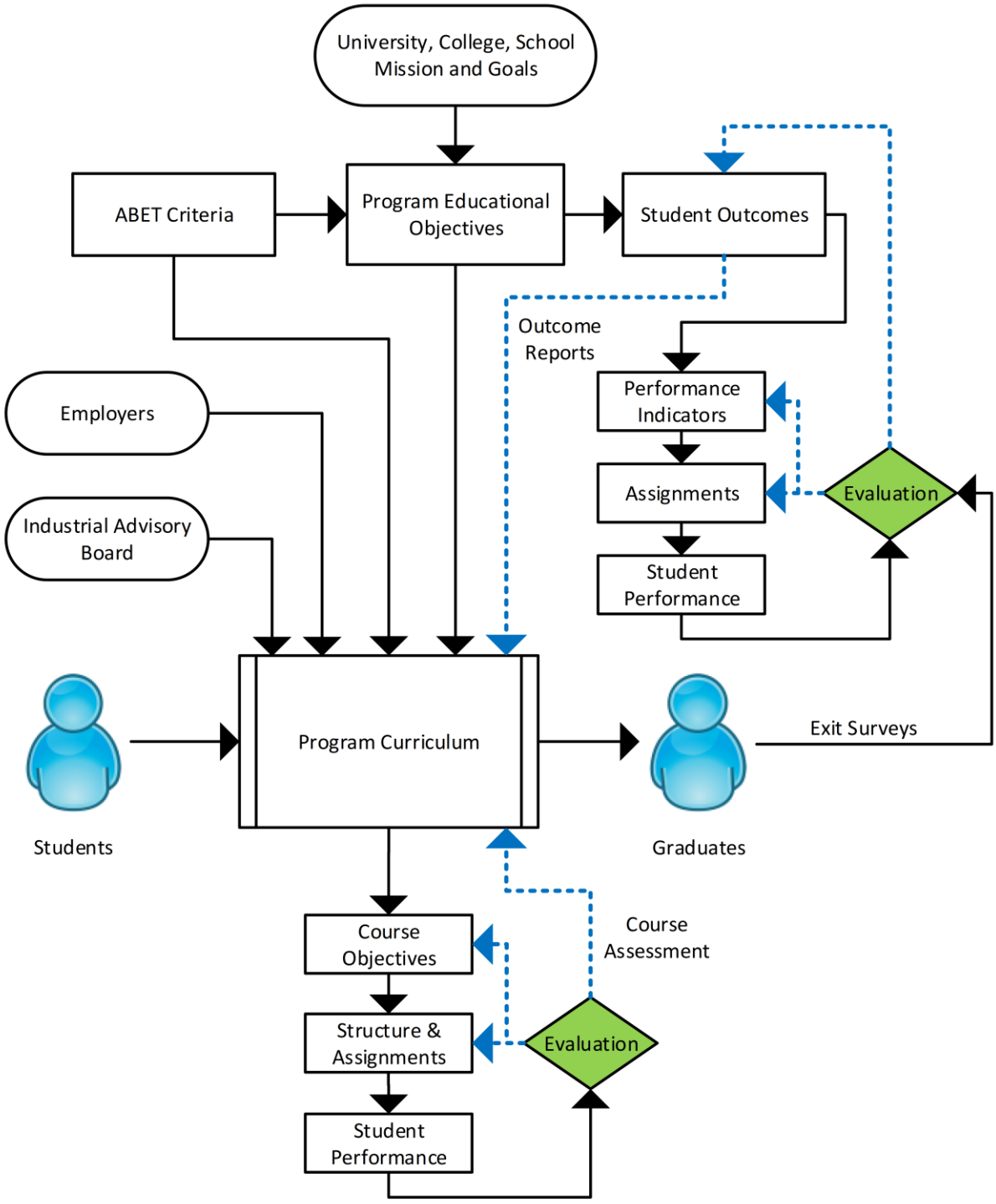
Given the small number of faculty it is challenging to offer 7 different 4-year degree programs (CE, EE, ME, RE, EET, MfgET, and Mechatronics). Faculty regularly teach on overload (above 24 load hours for the year). One area where this affects the students is in the course offerings. Due to low student demand and to keep the load hours to a minimum, there are some core courses that are only

offered once every two years. To maximize the number of students and minimize the load hours, many courses have been designed to serve multiple audiences within the school.

Assessment Practices:

The process for continuous improvement of the program is primarily a combination of student outcome and course assessment/evaluation. Assessment and evaluation of the student outcomes provides a means of improving the program while course assessment improves each individual course.

The block diagram shown in the figure below provides an overview of the continuous improvement process. The process starts with the ABET criteria as well as the missions and goals of the University, College, and School. From the criteria and missions the program educational objectives (PEOs) and the student outcomes are developed. The program educational objectives, in addition to input from the industrial advisory board and employers of our graduates are used to inform in determining the program curriculum. From the program curriculum courses and individual course objectives are designed. An essential component in this process is regularly measuring student performance in both the student outcomes and course objectives.



In addition to measuring student performance, constituent feedback is a vital part of our assessment process. Given our small student population, the sample size for student work is rarely statistically significant. The small size can also cause student performance to fluctuate as the academic ability of a particularly class varies. This can make it challenging to make definitive conclusions about changes made to a course and/or the program. As a result more qualitative mechanisms are used in conjunction with student performance.

Student feedback is an essential component in our assessment. The small student population allows the faculty to get to know the students which makes them more comfortable with providing meaningful feedback. This includes formal feedback in the form of written and verbal from course assessment as well as senior exit surveys and interviews. In addition, informal feedback such as conversations with students also plays an important role but is difficult to document. Faculty are also in contact with alumni and employers who provide valuable feedback to improve courses and the program.

Faculty regularly evaluate the student performance and constituent feedback. After thorough deliberation, recommendations for changes to courses or programs are developed. For minor changes, these recommendations are then implemented by course instructors. Larger changes may require approval from the University-wide curriculum committee and the Provost. These changes are usually initiated by the school chair or program coordinator.

The process, so described, takes place at the School level (SET) in the case of courses common to multiple engineering programs. If the course is specific to the program, then the process described takes place at the Department level instead. This assessment process is effective, however it is also time consuming. As previously mentioned, given the large number of programs relative to faculty, it takes a significant amount of time to assess and evaluate each program.

Resources / Facilities:

The program is housed within the School of Engineering & Technology, which is located entirely in the Center for Applied Science and Engineering Technology (CASET) Building. Built in 1980, the three-story structure is home to the areas of Engineering, Engineering Technology, Mathematics, Computer Science, and Fire Science. Two additional non-academic facilities associated with Information Technology are also located in the building: Enterprise Application Services and University Support Services.

The School of Engineering & Technology has approximately 30,000 sq. ft. of usable space, which includes offices, storage areas, labs, and work areas. The CASET building has multiple classrooms with the room size and capacity are shown in the table below.

Room	Type	Size (sq.ft.)	Capacity
CAS-106A	Classroom/Lab	1,140	22
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CAS-205	Classroom	1,010	40
CAS-207	Classroom	690	30
CAS-210	Classroom	1,100	56
CAS-211	Classroom	585	27
CAS-212	Lecture Room	1,265	76
CAS-310	Classroom/Lab	1,320	30
CAS-311	Classroom/Lab	1,320	24

All classrooms are equipped with a whiteboard or chalkboard, a computer, a document camera, a projector, and a screen. The rooms are arranged in a typical fashion with desk and chairs arranged in rows. The lecture room has fixed desks and chairs arranged in a stepped fashion. Since most engineering courses have enrollments with less than 40 students, the classroom facilities within the building are adequate, and nearly all engineering classes take place in the CASET building.

Laboratory experiences are a central component of the engineering curriculum at LSSU. Most technical courses contain labs. A summary of the lab facilities available to all engineering and engineering technology students can be found in the table below.

Room	Name	Size (sq. ft.)	Capacity
CAS-105	Data Acquisition / Microscopy Lab	370	12
CAS-106A	Materials Testing Lab	1,140	22
CAS-106B	Engineering Design Center	1,140	30
CAS-106C	Thermal Fluids Lab	900	10
CAS-120	Machine Shop	5,180	20
CAS-120A&B	Welding Lab &Foundry	1,760	10
CAS-122	Senior Projects Construction Area	2,240	20
CAS-124	Robotics Annex	1,200	8
CAS-125	Robotics and Automation Center	2,600	16
CAS-209A&B	Computer Lab	1,100	28
CAS-304	Digital Electronics Lab	1,080	14
CAS-306	Analog Electronics I Lab	1,175	16
CAS-309	Analog Electronics II Lab	1,175	16
CAS-310	Electro-mechanical Systems Lab	1,320	30
CAS-311	Programmable Logic Controllers Lab	1,320	24

In general the space is adequate, however it is challenging to find enough room for senior projects when there is a large senior class. In addition, if the Robotic Engineering and Mechatronics programs grow as hoped, we will likely run into space constraints in the robotics lab and other areas.

5-Year Academic Program Review 2023

Due to the Dean's Office by October 27, 2023

This reporting form was introduced in FY2020; numerical data prior to FY2020 may be excluded.

MANUFACTURING ENGINEERING TECHNOLOGY BS

Submitted by: *Paul Weber*
Date: *12/5/2023*
School: *Engineering & Technology*
Academic Program(s): *B.S. Manufacturing Engineering Technology (MfgET)*

Annual Program Data Reporting

The following table summarizes data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022	2022-2023
Enrollments	Not Available	Not Available	Freshmen: *1* Sophomores: *2* Juniors: *2* Seniors: *5*	Freshmen: *1* Sophomores: *2* Juniors: *2* Seniors: *6*
Retention as of fall 2023	Not Available	Not Available	Fr to So: *1* So to Jun: *3* Jun to Sen: *4*	Fr to So: *1* So to Jun: *1* Jun to Sen: *4*
Degrees Conferred	Not Available	Not Available	2	3

Graduate Placement Data:

Graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the

pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

	2018-2019	2019-2020	2020-2021	2021-2022
Response Rate	95.8%	100%	Not Available	84.2%
Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

High Impact Practices:

- *First-Year Experience: All School of Engineering & Technology (SET) students take EGNR101 where they learn study skills, work on a team project, and develop writing skills through weekly reflections that promote a growth mindset.*

- *Capstone Courses and Projects: All SET students complete a capstone project with either industry collaboration – for EGNR491/495 or the EGNR250/450/451 co-op sequence – or by completing an undergraduate research project in the EGNR260/460/461 sequence which is another high impact practice. In these projects, students work closely with faculty and contacts from industry to complete a year-long project that helps them prepare to enter industry or for the next step in their academic career.*

- *Internships: The SET faculty and staff communicate with industry partners to help students find summer internships and then serve as references where needed. This past fall was one of the strongest career fairs with the largest attendance that LSSU has had in the last four years and the majority of companies looking to hire SET students for internship and/or full-time employment.*

Summary of Annual Assessment Updates

The following table summarizes assessment data from the Annual Update Reports conducted for this program:

2019-2020	2020-2021	2021-2022

Program Learning Outcome Findings	Students performed at the following levels for the PLOs: • PLO1: No data • PLO2: No data • PLO3: N/A – under development for ABET ETAC during the transition from {a-k} to {1-5} • PLO4: No data • PLO5: No data	Students performed at the following levels for the PLOs: • PLO1: No data • PLO2a: 1.8, all other teams above 3.0 • PLO2b: No data • PLO3a: 3.0 • PLO3b: 3.16 • PLO4a: 3.0 • PLO4b: No data • PLO5: 3.0	Students performed at the following levels for the PLOs: • PLO1: 3.0, 3.0 • PLO2a: 2.5, all other teams above 3.0 • PLO2b: c • PLO3a: 3.0 • PLO3b: 3.11 • PLO4a: 3.0 • PLO4b: 2.4 • PLO5: 3.0

Summary of decisions, recommendations, and/or improvements concerning the future of the program

Decisions and recommendations should include budgets, additions of new courses or concentrations, discontinuation or suspension of the program, etc.

2019-2020
Pandemic year – no program changes were made.

2020-2021
No program changes noted.

2021-2022
No program changes noted.

2022-2023
Outcome 4: Assessment questionnaires were based on statistical methods. MfgET students were first introduced these methods during their freshmen year in Math207. To improve students' performance, students will be required to use regression analysis of the experimental data in EGME276 for the bending and torsion lab.

Rationale or justification for decisions made for the future of the program

The program was stable with no major program level changes. There were some smaller course level changes made to improve student learning.

Long-range future goals or plans for the program

Future Goals and Plans for the Program:

- Improve and increase marketing to boost low enrollment.
- Continue to develop lab spaces and equipment to foster technological advancements.
- Continue to grow additive manufacturing / 3D printing capabilities.

- Develop a course in additive manufacturing.
- Update CAD software to PTC CREO to Solidworks, to improve synergy with employers in the automation and robotics industry, as well as high schools and community colleges (enrollment).
- Develop a certificate in MfgET.

Quality, Resources, and Support for the program

Summarize Strengths and Weaknesses in each area.

Student Learning:

Many of our students come in with SAT/ACT scores below the acceptance requirement of other engineering programs. In recent years, the math preparation of incoming students has been significantly declining. One of our strengths, due to our high faculty to student ratio, is in working closely with students, who may not typically succeed at other engineering programs, and helping them to reach their potential.

Evidence of student learning can be found in the multiple job offers of our seniors typically get before graduation. Our graduates are sought after by employers, especially in the robotics and automation areas.

Graduate Success:

As stated previously, graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

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find internship opportunities during the summers between freshman and senior years. These practices should be continued.

Academic Programming and Rigor:

The Electrical Engineering, Computer Engineering, Mechanical Engineering, Manufacturing Engineering Technology, and Electrical Engineering Technology degrees are all accredited by ABET. The Robotics Engineering and Mechatronics are still new and we will be applying for ABET accreditation during the next visit. ABET accreditation assures that the program meets the quality standards required by the profession.

Beyond the ABET accreditation evidence of the strength of the program can be found in the multiple job offers of our seniors typically get before graduation. The School of Engineering & Technology prides itself on having a mix of theoretical and practical learning. The majority of our courses contain a lab component where students are able to use real world equipment and develop practical skills.

Faculty Qualifications, Staffing, and Effectiveness of Instruction:

The School of Engineering & Technology (SET) contains positions for eleven full-time faculty and two laboratory engineers. School and program leadership rests with key faculty members who perform these functions on a release time basis. The School faculty work very well together as a combined team on school-related items.

Because of its small size, the School of Engineering & Technology offers engineering curricula that are significantly impacted by the other engineering disciplines in the School and also receive a significant amount of instruction from the faculty in the Department of Math and Computer Science. By the time they leave LSSU, graduates will have taken classes taught (or team-taught) by most, if not all, of the School of Engineering & Technology faculty. Furthermore, much of the continuous improvement process occurs at the School level, in which the entire School of Engineering & Technology faculty participate. A list of the faculty and lab engineers can be seen in the table below.

Name	Degree	Job Title
Baumann, David	PhD, Electrical Engineering, 1992	Professor
Devaprasad, Jim	MS, Mechanical Engineering, 1986	Professor
Hildebrand, Robert	PhD, Acoustics, 2001	Professor
Jones, Andrew	PhD, Electrical and Computer Engineering, 2002	Professor
Haluk Kucuk	PhD, Mechanical Engineering, 1999	Assistant Professor
Leach, David	MS, Mechanical Engineering, 2018	Assistant Professor
Mahmud, Zakaria	PhD, Mechanical Engineering, 2003	Associate Professor
Moening, Joseph	PhD, Electrical Engineering, 2010	Professor
Edoardo Sarda	PhD, Ocean Systems Engineering, 2016	Assistant Professor
Weber, Paul	PhD, Electrical Engineering (CE), 2006	Professor
Zarepoor, Masoud	PhD, Mechanical Engineering, 2016	Associate Professor
Bryant, Trevor		ECE Lab Engineer
Throener, Ron		ME Lab Engineer

Given the small number of faculty it is challenging to offer 7 different 4-year degree programs (CE, EE, ME, RE, EET, MfgET, and Mechatronics). Faculty regularly teach on overload (above 24 load hours for the year). One area where this affects the students is in the course offerings. Due to low

student demand and to keep the load hours to a minimum, there are some core courses that are only offered once every two years. To maximize the number of students and minimize the load hours, many courses have been designed to serve multiple audiences within the school.

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The process for continuous improvement of the program is primarily a combination of student outcome and course assessment/evaluation. Assessment and evaluation of the student outcomes provides a means of improving the program while course assessment improves each individual course.

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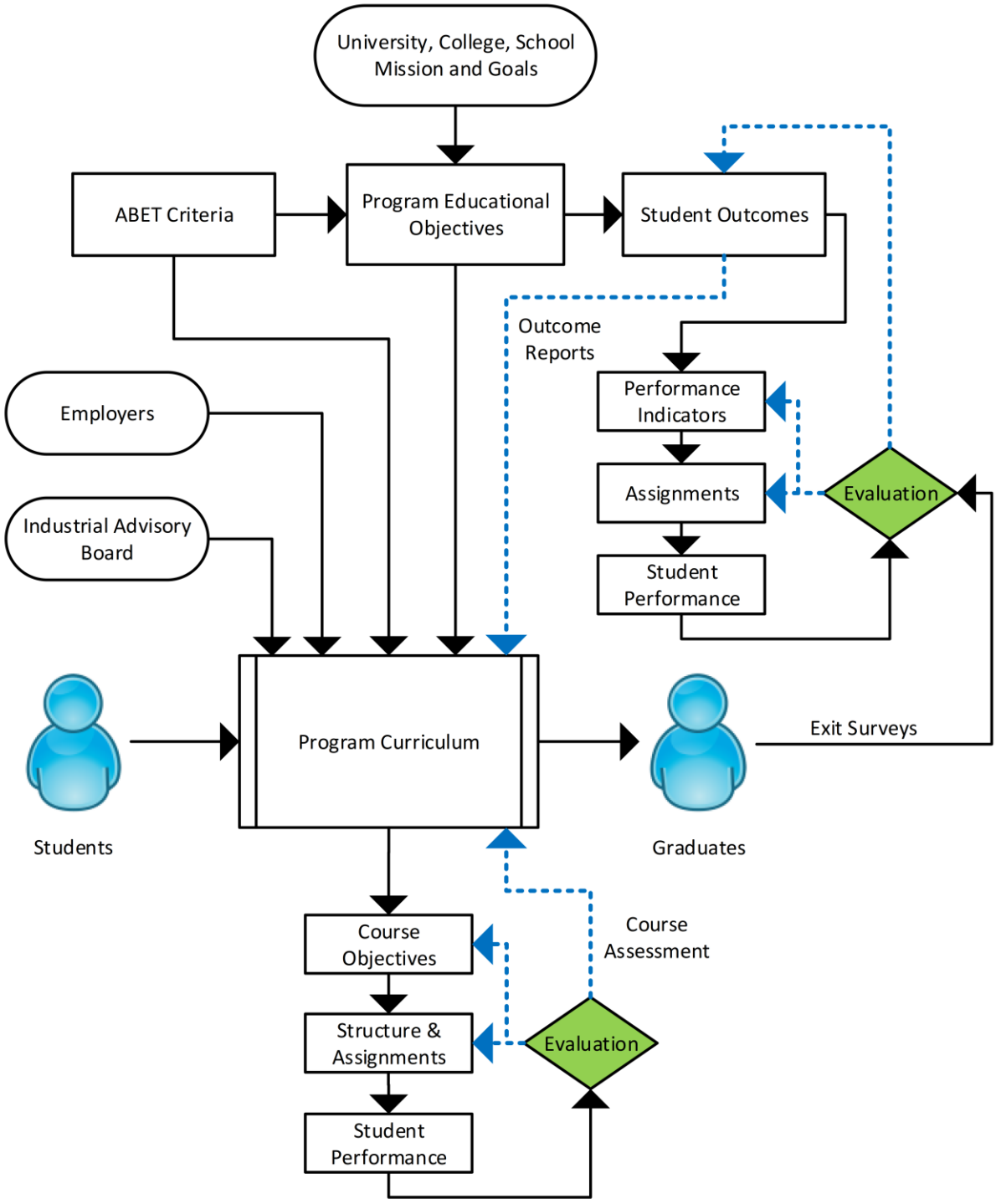

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Resources / Facilities:

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CAS-306	Analog Electronics I Lab	1,175	16
CAS-309	Analog Electronics II Lab	1,175	16
CAS-310	Electro-mechanical Systems Lab	1,320	30
CAS-311	Programmable Logic Controllers Lab	1,320	24

In general the space is adequate, however it is challenging to find enough room for senior projects when there is a large senior class. In addition, if the Robotic Engineering and Mechatronics programs grow as hoped, we will likely run into space constraints in the robotics lab and other areas.

5-Year Academic Program Review 2023

Due to the Dean's Office by October 27, 2023

This reporting form was introduced in FY2020; numerical data prior to FY2020 may be excluded.

ROBOTICS ENGINEERING BS

Submitted by: *Paul Weber*
Date: *12/5/2023*
School: *Engineering & Technology*
Academic Program(s): *B.S. Robotics Engineering*

Annual Program Data Reporting

The following table summarizes data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022	2022-2023
Enrollments	Not Available	Freshmen: *7* Sophomores: *5* Juniors: *6* Seniors: *3*	Freshmen: *4* Sophomores: *5* Juniors: *5* Seniors: *5*	Freshmen: *4* Sophomores: *3* Juniors: *3* Seniors: *10*
Retention as of fall 2023	Not Available	Fr to So: *4* So to Jun: *4* Jun to Sen: *0*	Fr to So: *4* So to Jun: *5* Jun to Sen: *5*	Fr to So: *3* So to Jun: *3* Jun to Sen: *8*
Degrees Conferred	Not Available	2	7	4

Graduate Placement Data:

Graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

	2018-2019	2019-2020	2020-2021	2021-2022
Response Rate	95.8%	100%	Not Available	84.2%

Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

High Impact Practices:

The following high impact practices are embedded in all engineering and engineering technology degrees.

- First-Year Experience: All School of Engineering & Technology (SET) students take EGNR101 where they learn study skills, work on a team project, and develop writing skills through weekly reflections that promote a growth mindset.
- Capstone Courses and Projects: All SET students complete a capstone project with either industry collaboration – for EGNR491/495 or the EGNR250/450/451 co-op sequence – or by completing an undergraduate research project in the EGNR260/460/461 sequence which is another high impact practice. In these projects, students work closely with faculty and contacts from industry to complete a year-long project that helps them prepare to enter industry or for the next step in their academic career.
- Internships: The SET faculty and staff communicate with industry partners to help students find summer internships and then serve as references where needed. This past fall was one of the strongest career fairs with the largest attendance that LSSU has had in the last four years and the majority of companies looking to hire SET students for internship and/or full-time employment.

Summary of Annual Assessment Updates

The following table summarizes assessment data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022
Program Learning Outcome Findings	Due to the timing of when the program was started, no data at the summative program was collected this year with	Overall students performed well, meeting all Program Learning Outcomes expectations for having at	Students performed at the following levels for the PLOs: • PLO1: 3.0

the exception of common data from the capstone courses.	least one performance indicator at or above 3.0 and none below 2.0. Most of the meeting discussion focused on Program Learning Outcome 1 – An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. At this time it was unclear whether incoming students' math preparation has changed based on standardized test scores. In terms of math taught at LSSU, students' math preparation in differential equations was noted as a concern. This was discussed with the Chair of Math & CS, and it will be important to support efforts from faculty in that area as they implement some changes (developing a cohort of teachers for MATH310, implementing more symbolic math at the lower levels, etc.) as well as continue to look for ways to strengthen and reinforce math skills within engineering courses.	• PLO2: One team had a score of 2.5 • PLO3: All teams at or above 3.0 and a report average was 3.33 • PLO4: 3.2 • PLO5: 3.0 • PLO6: 2.5 (x2) • PLO7: 3.1 More emphasis was identified for preparing students to test and validate products (PLO6).

Summary of decisions, recommendations, and/or improvements concerning the future of the program

Decisions and recommendations should include budgets, additions of new courses or concentrations, discontinuation or suspension of the program, etc.

2019-2020

No programmatic changes were identified this year due to the pandemic.

2020-2021
The priority will be to support faculty teaching math courses as they implement changes and look for ways to strengthen and reinforce math skills within engineering courses.
A number of smaller actions will be taken within courses where the outcomes were measured to continue to strengthen learning with respect to the outcomes (ex: helping students develop more methodical testing methods in EGRS430 for a broader range of scenarios to increase design robustness).

2021-2022
No new data was reported this year so 2022-2023 information is included below.

2022-2023
Outcome 1: No action plan needed.

Outcome 2: No action plan needed.

Outcome 3: No action plan needed.

Outcome 4: No action plan needed.

Outcome 5: Monitor the results to see if there is cause for concern.

Outcome 6: Monitor the results for the future. Additional time can be spent in EGNR495 to further improve the student's understanding of this outcome.

Outcome 7: No action plan needed.

Rationale or justification for decisions made for the future of the program

Adding a lab to EGRS305 was based on student and Industrial Advisory Board (IAB) input to better prepare graduates with more practical experience in the areas of collaborative robotics and safety.

Long-range future goals or plans for the program

The B.S. Robotics Engineering curriculum is reaching a stable point with the new courses having now been offered a couple times. As a relatively new and growing program, more resources should be dedicated to continue to promote the program, especially at events like the FIRST Robotics Competitions (FRC) across the state and beyond as well as VEX Robotics in Sault Ste. Marie, ON.

Quality, Resources, and Support for the program

Summarize Strengths and Weaknesses in each area.

Student Learning:

Many of our students come in with SAT/ACT scores below the acceptance requirement of other engineering programs. In recent years, the math preparation of incoming students has been significantly declining. One of our strengths, due to our high faculty to student ratio, is in working

closely with students, who may not typically succeed at other engineering programs, and helping them to reach their potential.

Evidence of student learning can be found in the multiple job offers of our seniors typically get before graduation. Our graduates are sought after by employers, especially in the robotics and automation areas.

Graduate Success:

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Academic Programming and Rigor:

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Faculty Qualifications, Staffing, and Effectiveness of Instruction:

The School of Engineering & Technology (SET) contains positions for eleven full-time faculty and two laboratory engineers. School and program leadership rests with key faculty members who perform these functions on a release time basis. The School faculty work very well together as a combined team on school-related items.

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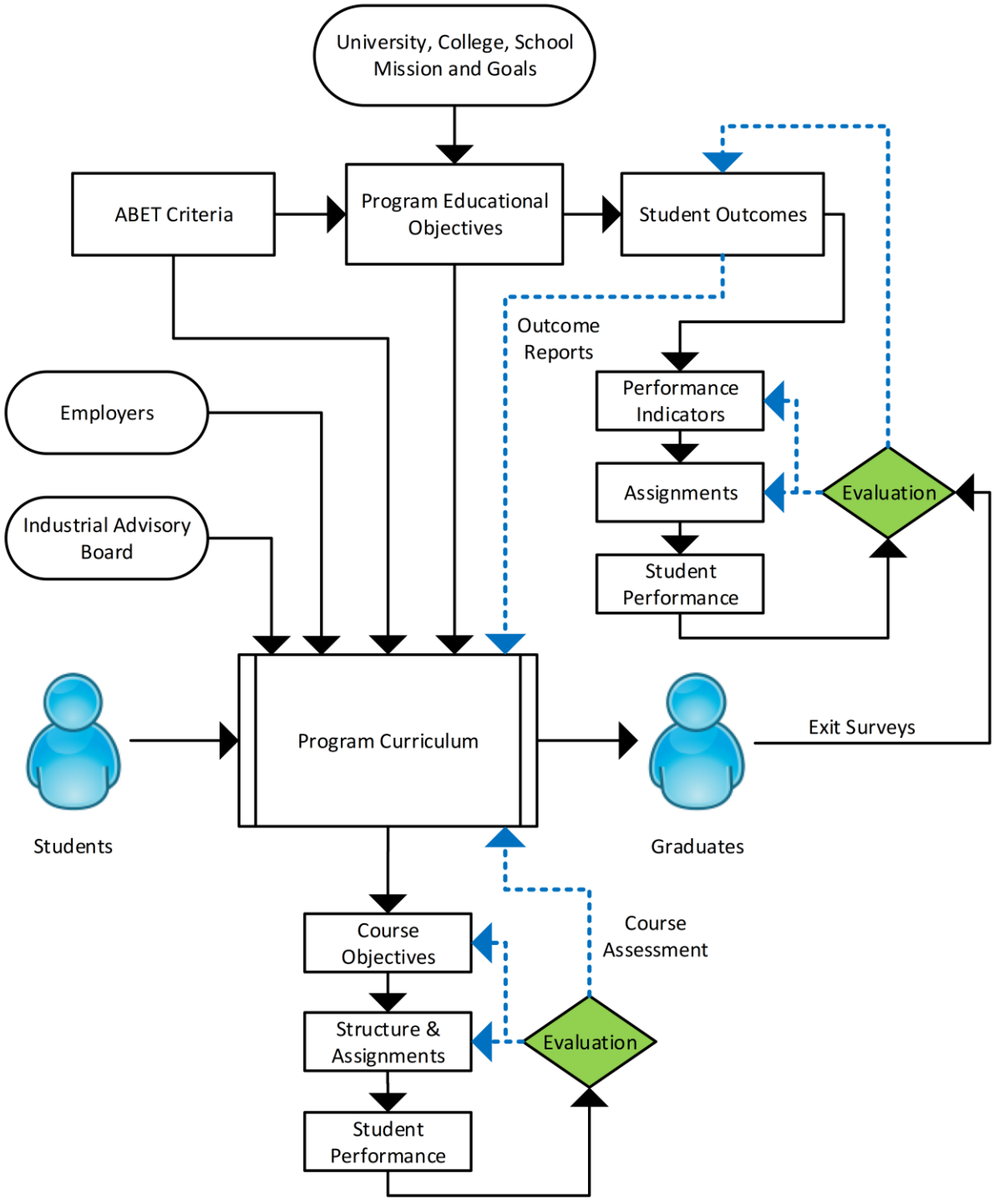

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LAKE SUPERIOR STATE UNIVERSITY

Annual Program Assessment Update Report

This reporting form was introduced in FY2020; numerical data prior to FY2020 may be excluded.

AS – EET; GE; GET; MfgET

Person Submitting: *Paul J. Weber*
Date: *11/8/2023*
Academic Program: *AS Electrical Engineering Technology (EET)*
AS General Engineering (GE)
AS General Engineering Technology (GET)
AS Manufacturing Engineering Technology (MfgET)
Annual Update – Year Being Reported: *2022-2023*

DUE: Email this form to the Vice-Provost for Accreditation & Assessment and your Dean before 3:00pm on Friday of Week 6 in the fall semester, along with the accompanying program-level 4-column report from Nuventive. *(Please verify that the appropriate year has been selected when entering your data into Nuventive).*

With approval of the Dean, academic programs with an enrollment of less than 10 may present their data in a combined Within-School Annual Program Assessment Update Report.

Annual Program Data – Combined Reporting for Programs Within Schools with < 10 Enrollment

Program Enrollment Data (Primary Major) – programs with < 10 students

	Program Name:	*Program Name:*	*Program Name:*	*Program Name:*
	AS EET	AS GE	AS GET	AS MfgET
Freshmen	0	1	0	0
Sophomores	0	1	0	0
Juniors	0	1	0	1
Seniors	0	0	0	3

Retention Numbers within this Academic Program:
(Data for Program retention reporting)

Retention Numbers for Primary Major within Programs with < 10 students				
	Program Name:	*Program Name:*	*Program Name:*	*Program Name:*
	AS EET	AS GE	AS GET	AS MfgET
1st Year Students (prior) Retained to 2nd Year	N/A	0 of 1, 0%	N/A	0 of 1, 0%
2nd Year Students (prior) Retained to 3rd Year	N/A	1 of 1, 100%	N/A	1 of 2, 50%
3rd Year Students (prior) Retained to 4th Year	N/A	N/A	N/A	1 of 1, 100%
4th Year Students (prior) Retained to 5th Year (if any)	0 of 1, 0%	N/A	0 of 1, 0%	0 of 2, 0%

Still Attending LSSU, but changed major:
(Data for annual Institutional retention reporting)

Retention Numbers for Programs with < 10 students				
	Program Name:	*Program Name:*	*Program Name:*	*Program Name:*
	AS EET	AS GE	AS GET	AS MfgET
1st Year Students (prior) Retained to 2nd Year	N/A	1 of 1, 100%	N/A	0 of 1, 0%
2nd Year Students (prior) Retained to 3rd Year	N/A	1 of 1, 100%	N/A	1 of 2, 50%
3rd Year Students (prior) Retained to 4th Year	N/A	N/A	N/A	1 of 1, 100%
4th Year Students (prior) Retained to 5th Year (if any)	0 of 1, 0%	N/A	0 of 1, 0%	0 of 2, 0%

Degrees Conferred:	*0*	*0*	*1*	*2*

High Impact Practices (HIPs) Applied *(specify HIPs applied in specific program(s)***:**
The following high impact practices are embedded in all engineering and engineering technology degrees.

- *First-Year Experience: All School of Engineering & Technology (SET) students take EGNR101 where they learn study skills, work on a team project, and develop writing skills through weekly reflections that promote a growth mindset.*
- *Internships: The SET faculty and staff communicate with industry partners to help students find summer internships and then serve as references where needed. This past fall was one of the strongest career fairs with the largest attendance that LSSU has had in the last four years and the majority of companies looking to hire SET students for internship and/or full-time employment.*

Significant Data Trends:
The AS Electrical Engineering Technology (EET), General Engineering (GE), General Engineering Technology (GET), and Manufacturing Engineering Technology (MfgET) programs have had low enrollments historically. Students often complete such degrees along the way to a BS degree within the School of Engineering & Technology. It is hard to infer any information given the small numbers of students for any given program, but more support may be needed for students pursuing AS degrees.

Analysis:
In the past, some students have not formally added the AS programs to their records until they were also graduating with a BS degree. As a result advisors have been making a more conscience effort to encourage students to use the Change of Major form earlier to add AS degrees to their major if they are pursuing them. There has not, as of yet, been any significant improvement in the number of students actually doing this. Such encouragement could be added to the School town hall meeting announcements in the fall and/or spring semesters.

Annual Assessment Reporting

1. A full list of your Program Learning Outcomes and a description of each outcome's Assessment Methods is required. This can be provided in your attached Program-level Four Column report from Nuventive, with updated data entered from this year's program assessments. Include each program being reported on this form.
(If an outcome was not assessed during the academic year of this reporting, state that it was "Not assessed this past year," and note when it is next scheduled to be assessed).

These are included in the attached reports from Nuventive.

Annual Assessment Results

2. Documentation of your Annual Program Assessment Results for the year is required. The courses from which the data is reported must be made clear. This can also be provided in your attached Program-level Four Column report from Nuventive, with updated data entered from this year's program assessments for each program being reported on this form.

These are included in the attached reports from Nuventive.

Annual Assessment Meeting Minutes – Analysis of Results

3. Combined Annual Assessment Meetings may be conducted for programs with < **10** students enrolled. Briefly summarize the discussion held among program faculty at the Annual Program Assessment Update Meeting (i.e., Meeting Minutes), focusing on the main points discussed to analyze assessment results. (Bullet points sufficient, as long as they are clear. When appropriate, note faculty member names).

The Coordinators of the engineering and engineering technology programs discussed the AS programs. Students still need to declare AS degrees earlier. While there has been effort to promote this, the results have not shown a significant improvement to-date. Advisors should continue to try to encourage students to add these degrees where appropriate.

Annual Assessment Meeting Minutes – Use of Results *(Action Plans)*

4. Combined Annual Assessment Meetings may be conducted for programs with < **10** students enrolled. Based on the assessments results and faculty discussion / analysis of those results, briefly describe plans for improvements and the next steps that will be taken for each program being reported on this form.

To accommodate students solely pursuing an AS degree, EGET270 (formerly EGET110) will be offered in successive fall semesters.

Attachments:

- Program-Level Four Column Report

5-Year Academic Program Review 2023

Due to the Dean's Office by October 27, 2023

This reporting form was introduced in FY2020; numerical data prior to FY2020 may be excluded.

AS – ELECTRICAL ENGINEERING TECHNOLOGY

Submitted by: *Paul Weber*
Date: *12/5/2023*
School: *Engineering & Technology*
Academic Program(s): *A.S. Electrical Engineering Technology*

Annual Program Data Reporting

The following table summarizes data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022	2022-2023
Enrollments	Not Available	Freshmen: *0* Sophomores: *0* Juniors: *0* Seniors: *1*	Freshmen: *1* Sophomores: *0* Juniors: *0* Seniors: *0*	Freshmen: *0* Sophomores: *0* Juniors: *0* Seniors: *0*
Retention as of fall 2023	Not Available	Fr to So: *N/A* So to Jun: *0* Jun to Sen: *1*	Fr to So: *N/A* So to Jun: *N/A* Jun to Sen: *N/A*	Fr to So: *N/A* So to Jun: *N/A* Jun to Sen: *N/A*
Degrees Conferred	Not Available	1	0	0

Graduate Placement Data:

Graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

	2018-2019	2019-2020	2020-2021	2021-2022
Response Rate	95.8%	100%	Not Available	84.2%
Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

High Impact Practices:

The following high impact practices are embedded in all engineering and engineering technology degrees.

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Summary of Annual Assessment Updates

The following table summarizes assessment data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022
Program Learning Outcome Findings	Data was not recorded this year due to the pandemic.	The Coordinators of the engineering and engineering technology programs discussed the AS programs. Several areas of improvement were noted: • The lack of	###Students performed at the following levels for the PLOs: • PLO1: 3.0 • PLO2: 3.0 • PLO3: 3.0, 2.7 More emphasis was identified for preparing students to help

	consistency in reported results. • How results were sometimes an aggregated value from the class rather than being pulled from AS students' work specifically. • The low number of students in the programs (as previously noted in this document).	communicate/document technical drawings (PLO3).

Summary of decisions, recommendations, and/or improvements concerning the future of the program

Decisions and recommendations should include budgets, additions of new courses or concentrations, discontinuation or suspension of the program, etc.

2019-2020

No programmatic changes were identified this year due to the pandemic.

2020-2021

To address the three areas mentioned in the previous section, the following action plans have been identified for each, respectively:

1. Automatically pull data up from the course outcomes, adding new supplementary outcomes where needed. At the top level, the program learning outcome setup will be used for overall recommendations and will reference the Learning Goals (SLOs) by Program Outcomes Report. A table that shows where the data is pulled from will be created similar to the planning documents that are presently used for the BS program assessment.
2. State how AS student(s), if any, did specifically – this will require the instructors to look at their detailed class lists – and also compare their results to that of the overall class results.
3. Make more announcements to students to formally declare AS degrees if they are pursuing them as soon as they know that they are.

Additionally, the number of performance indicators for this program could be reduced to 1-2 per program learning outcome.

2021-2022

###Decisions for this year are discussed in the previous section.

Rationale or justification for decisions made for the future of the program

EGET110 and EGET175 were changed to EGET270 and EGET275 to better reflect the level of the course material.

Long-range future goals or plans for the program

Each of the AS programs within the School of Engineering & Technology (SET) is structured in a way for students to pursue an AS degree on their way to completing a BS degree, which the vast majority of the students do. This enables students to obtain Tuition Incentive Program (TIP) funding and also enables the university to be eligible for occupational education funding to support the first and second year courses through the purchase of equipment. This type of support should continued to be pursued and the AS programs should be monitored to maintain this alignment.

Quality, Resources, and Support for the program

Summarize Strengths and Weaknesses in each area.

Student Learning:

Many of our students come in with SAT/ACT scores below the acceptance requirement of other engineering programs. In recent years, the math preparation of incoming students has been significantly declining. One of our strengths, due to our high faculty to student ratio, is in working closely with students, who may not typically succeed at other engineering programs, and helping them to reach their potential.

Evidence of student learning can be found in the multiple job offers of our seniors typically get before graduation. Our graduates are sought after by employers, especially in the robotics and automation areas.

Graduate Success:

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Academic Programming and Rigor:

The Electrical Engineering, Computer Engineering, Mechanical Engineering, Manufacturing Engineering Technology, and Electrical Engineering Technology degrees are all accredited by ABET. The Robotics Engineering and Mechatronics are still new and we will be applying for ABET accreditation during the next visit. ABET accreditation assures that the program meets the quality standards required by the profession.

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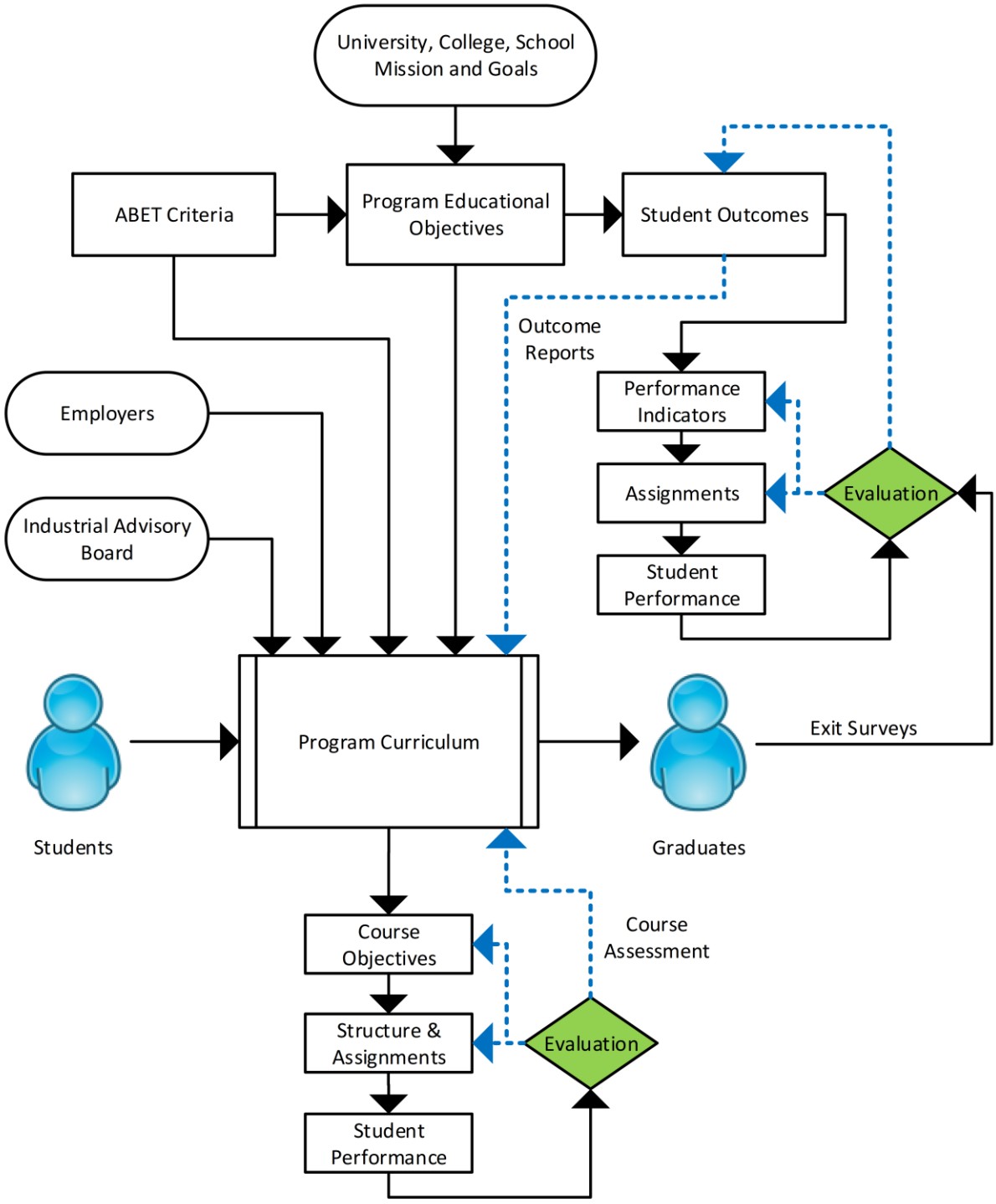

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5-Year Academic Program Review 2023

Due to the Dean's Office by October 27, 2023

This reporting form was introduced in FY2020; numerical data prior to FY2020 may be excluded.

AS – GENERAL ENGINEERING

Submitted by: *Paul Weber*
Date: *12/5/2023*
School: *Engineering & Technology*
Academic Program(s): *A.S. General Engineering*

Annual Program Data Reporting

The following table summarizes data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022	2022-2023
Enrollments	Not Available	Freshmen: *1* Sophomores: *0* Juniors: *0* Seniors: *0*	Freshmen: *1* Sophomores: *1* Juniors: *1* Seniors: *0*	Freshmen: *1* Sophomores: *1* Juniors: *1* Seniors: *0*
Retention as of fall 2023	Not Available	Fr to So: *N/A* So to Jun: *0* Jun to Sen: *N/A*	Fr to So: *0* So to Jun: *N/A* Jun to Sen: *N/A*	Fr to So: *1* So to Jun: *1* Jun to Sen: *N/A*
Degrees Conferred	Not Available	1	3	0

Graduate Placement Data:

Graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

2018-2019	2019-2020	2020-2021	2021-2022

Response Rate	95.8%	100%	Not Available	84.2%
Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

High Impact Practices:

The following high impact practices are embedded in all engineering and engineering technology degrees.

- First-Year Experience: All School of Engineering & Technology (SET) students take EGNR101 where they learn study skills, work on a team project, and develop writing skills through weekly reflections that promote a growth mindset.
- Internships: The SET faculty and staff communicate with industry partners to help students find summer internships and then serve as references where needed. This past fall was one of the strongest career fairs with the largest attendance that LSSU has had in the last four years and the majority of companies looking to hire SET students for internship and/or full-time employment.

Summary of Annual Assessment Updates

The following table summarizes assessment data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022
Program Learning Outcome Findings	Data was not recorded this year due to the pandemic.	The Coordinators of the engineering and engineering technology programs discussed the AS programs. Several areas of improvement were noted: • The lack of consistency in reported results.	Students performed at the following levels for the PLOs: • PLO1: 83% (goal met) • PLO2: 66% (goal not met) • PLO3: 72% (goal met)

	• How results were sometimes an aggregated value from the class rather than being pulled from AS students' work specifically. • The low number of students in the programs (as previously noted in this document).	Actions included using final lab sessions for review for final exams to strengthen the learning in PLO2.

Summary of decisions, recommendations, and/or improvements concerning the future of the program

Decisions and recommendations should include budgets, additions of new courses or concentrations, discontinuation or suspension of the program, etc.

2019-2020
No programmatic changes were identified this year due to the pandemic.

2020-2021
To address the three areas mentioned in the previous section, the following action plans have been identified for each, respectively:

4. Automatically pull data up from the course outcomes, adding new supplementary outcomes where needed. At the top level, the program learning outcome setup will be used for overall recommendations and will reference the Learning Goals (SLOs) by Program Outcomes Report. A table that shows where the data is pulled from will be created similar to the planning documents that are presently used for the BS program assessment.
5. State how AS student(s), if any, did specifically – this will require the instructors to look at their detailed class lists – and also compare their results to that of the overall class results.
6. Make more announcements to students to formally declare AS degrees if they are pursuing them as soon as they know that they are.

Additionally, the number of performance indicators for this program could be reduced to 1-2 per program learning outcome.

2021-2022
Decisions for this year are discussed in the previous section.

Rationale or justification for decisions made for the future of the program

EGET110 and EGET175 were changed to EGET270 and EGET275 to better reflect the level of the course material.

Long-range future goals or plans for the program

Each of the AS programs within the School of Engineering & Technology (SET) is structured in a way for students to pursue an AS degree on their way to completing a BS degree, which the vast majority of the students do. This enables students to obtain Tuition Incentive Program (TIP) funding and also enables the university to be eligible for occupational education funding to support the first and second year courses through the purchase of equipment. This type of support should continued to be pursued and the AS programs should be monitored to maintain this alignment.

Quality, Resources, and Support for the program

Summarize Strengths and Weaknesses in each area.

Student Learning:

Many of our students come in with SAT/ACT scores below the acceptance requirement of other engineering programs. In recent years, the math preparation of incoming students has been significantly declining. One of our strengths, due to our high faculty to student ratio, is in working closely with students, who may not typically succeed at other engineering programs, and helping them to reach their potential.

Evidence of student learning can be found in the multiple job offers of our seniors typically get before graduation. Our graduates are sought after by employers, especially in the robotics and automation areas.

Graduate Success:

As stated previously, graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

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The Electrical Engineering, Computer Engineering, Mechanical Engineering, Manufacturing Engineering Technology, and Electrical Engineering Technology degrees are all accredited by ABET. The Robotics Engineering and Mechatronics are still new and we will be applying for ABET accreditation during the next visit. ABET accreditation assures that the program meets the quality standards required by the profession.

Beyond the ABET accreditation evidence of the strength of the program can be found in the multiple job offers of our seniors typically get before graduation. The School of Engineering & Technology prides itself on having a mix of theoretical and practical learning. The majority of our courses contain a lab component where students are able to use real world equipment and develop practical skills.

Faculty Qualifications, Staffing, and Effectiveness of Instruction:

The School of Engineering & Technology (SET) contains positions for eleven full-time faculty and two laboratory engineers. School and program leadership rests with key faculty members who perform these functions on a release time basis. The School faculty work very well together as a combined team on school-related items.

Because of its small size, the School of Engineering & Technology offers engineering curricula that are significantly impacted by the other engineering disciplines in the School and also receive a significant amount of instruction from the faculty in the Department of Math and Computer Science. By the time they leave LSSU, graduates will have taken classes taught (or team-taught) by most, if not all, of the School of Engineering & Technology faculty. Furthermore, much of the continuous improvement process occurs at the School level, in which the entire School of Engineering & Technology faculty participate. A list of the faculty and lab engineers can be seen in the table below.

Name	Degree	Job Title
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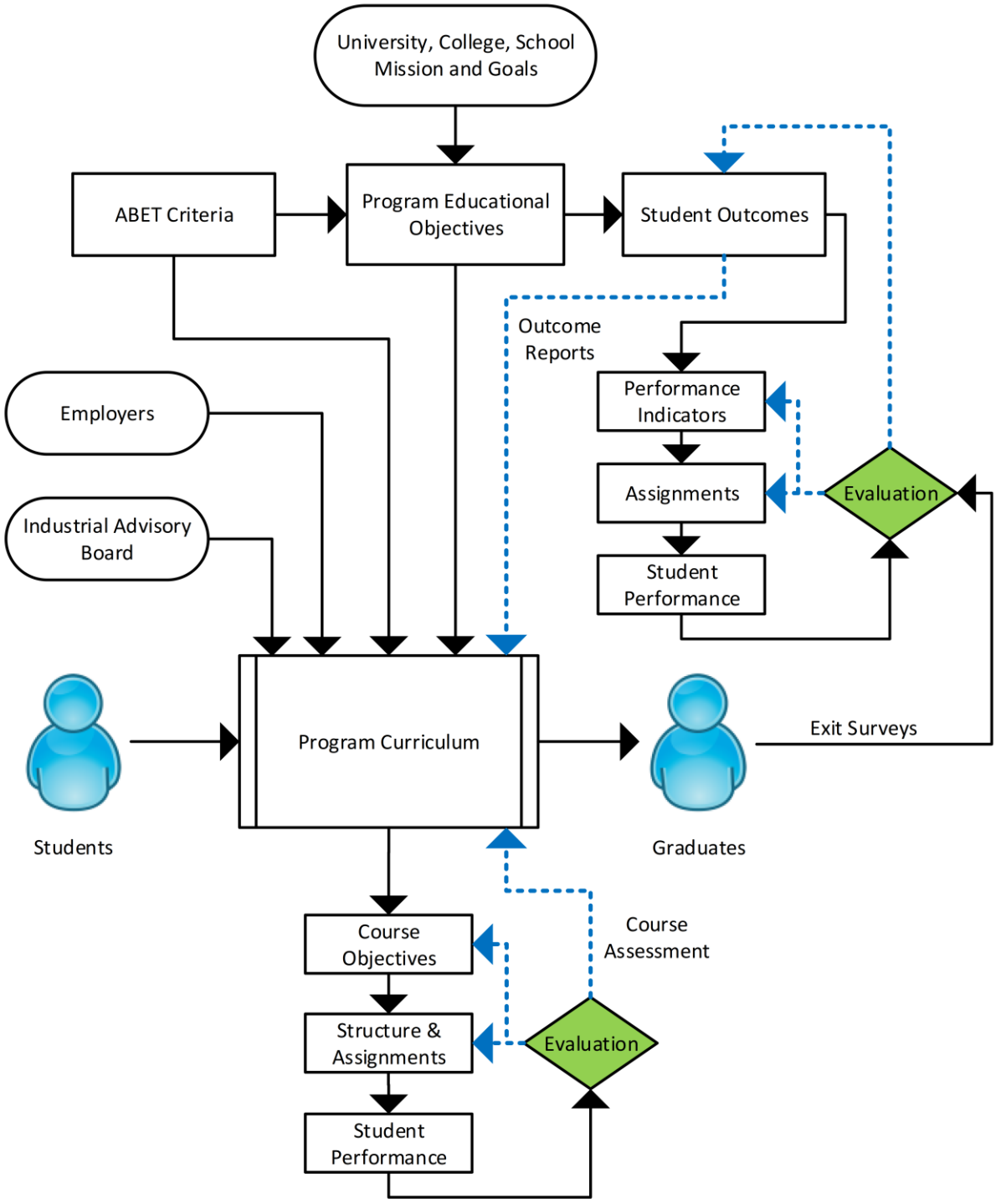
Zarepoor, Masoud	PhD, Mechanical Engineering, 2016	Associate Professor
Bryant, Trevor		ECE Lab Engineer
Throener, Ron		ME Lab Engineer

Given the small number of faculty it is challenging to offer 7 different 4-year degree programs (CE, EE, ME, RE, EET, MfgET, and Mechatronics). Faculty regularly teach on overload (above 24 load hours for the year). One area where this affects the students is in the course offerings. Due to low student demand and to keep the load hours to a minimum, there are some core courses that are only offered once every two years. To maximize the number of students and minimize the load hours, many courses have been designed to serve multiple audiences within the school.

Assessment Practices:

The process for continuous improvement of the program is primarily a combination of student outcome and course assessment/evaluation. Assessment and evaluation of the student outcomes provides a means of improving the program while course assessment improves each individual course.

The block diagram shown in the figure below provides an overview of the continuous improvement process. The process starts with the ABET criteria as well as the missions and goals of the University, College, and School. From the criteria and missions the program educational objectives (PEOs) and the student outcomes are developed. The program educational objectives, in addition to input from the industrial advisory board and employers of our graduates are used to inform in determining the program curriculum. From the program curriculum courses and individual course objectives are designed. An essential component in this process is regularly measuring student performance in both the student outcomes and course objectives.



In addition to measuring student performance, constituent feedback is a vital part of our assessment process. Given our small student population, the sample size for student work is rarely statistically significant. The small size can also cause student performance to fluctuate as the academic ability of a particularly class varies. This can make it challenging to make definitive conclusions about changes made to a course and/or the program. As a result more qualitative mechanisms are used in conjunction with student performance.

Student feedback is an essential component in our assessment. The small student population allows the faculty to get to know the students which makes them more comfortable with providing meaningful feedback. This includes formal feedback in the form of written and verbal from course assessment as well as senior exit surveys and interviews. In addition, informal feedback such as conversations with students also plays an important role but is difficult to document. Faculty are also in contact with alumni and employers who provide valuable feedback to improve courses and the program.

Faculty regularly evaluate the student performance and constituent feedback. After thorough deliberation, recommendations for changes to courses or programs are developed. For minor changes, these recommendations are then implemented by course instructors. Larger changes may require approval from the University-wide curriculum committee and the Provost. These changes are usually initiated by the school chair or program coordinator.

The process, so described, takes place at the School level (SET) in the case of courses common to multiple engineering programs. If the course is specific to the program, then the process described takes place at the Department level instead. This assessment process is effective, however it is also time consuming. As previously mentioned, given the large number of programs relative to faculty, it takes a significant amount of time to assess and evaluate each program.

Resources / Facilities:

The program is housed within the School of Engineering & Technology, which is located entirely in the Center for Applied Science and Engineering Technology (CASET) Building. Built in 1980, the three-story structure is home to the areas of Engineering, Engineering Technology, Mathematics, Computer Science, and Fire Science. Two additional non-academic facilities associated with Information Technology are also located in the building: Enterprise Application Services and University Support Services.

The School of Engineering & Technology has approximately 30,000 sq. ft. of usable space, which includes offices, storage areas, labs, and work areas. The CASET building has multiple classrooms with the room size and capacity are shown in the table below.

Room	Type	Size (sq.ft.)	Capacity
CAS-106A	Classroom/Lab	1,140	22
CAS-119	Classroom	880	48
CAS-205	Classroom	1,010	40
CAS-207	Classroom	690	30
CAS-210	Classroom	1,100	56
CAS-211	Classroom	585	27
CAS-212	Lecture Room	1,265	76
CAS-310	Classroom/Lab	1,320	30
CAS-311	Classroom/Lab	1,320	24

All classrooms are equipped with a whiteboard or chalkboard, a computer, a document camera, a projector, and a screen. The rooms are arranged in a typical fashion with desk and chairs arranged in rows. The lecture room has fixed desks and chairs arranged in a stepped fashion. Since most engineering courses have enrollments with less than 40 students, the classroom facilities within the building are adequate, and nearly all engineering classes take place in the CASET building.

Laboratory experiences are a central component of the engineering curriculum at LSSU. Most technical courses contain labs. A summary of the lab facilities available to all engineering and engineering technology students can be found in the table below.

Room	Name	Size (sq. ft.)	Capacity
CAS-105	Data Acquisition / Microscopy Lab	370	12
CAS-106A	Materials Testing Lab	1,140	22
CAS-106B	Engineering Design Center	1,140	30
CAS-106C	Thermal Fluids Lab	900	10
CAS-120	Machine Shop	5,180	20
CAS-120A&B	Welding Lab &Foundry	1,760	10
CAS-122	Senior Projects Construction Area	2,240	20
CAS-124	Robotics Annex	1,200	8
CAS-125	Robotics and Automation Center	2,600	16
CAS-209A&B	Computer Lab	1,100	28
CAS-304	Digital Electronics Lab	1,080	14
CAS-306	Analog Electronics I Lab	1,175	16
CAS-309	Analog Electronics II Lab	1,175	16
CAS-310	Electro-mechanical Systems Lab	1,320	30
CAS-311	Programmable Logic Controllers Lab	1,320	24

In general the space is adequate, however it is challenging to find enough room for senior projects when there is a large senior class. In addition, if the Robotic Engineering and Mechatronics programs grow as hoped, we will likely run into space constraints in the robotics lab and other areas.

5-Year Academic Program Review 2023

Due to the Dean's Office by October 27, 2023

This reporting form was introduced in FY2020; numerical data prior to FY2020 may be excluded.

AS – GENERAL ENGINEERING TECHNOLOGY

Submitted by: *Paul Weber*
Date: *12/5/2023*
School: *Engineering & Technology*
Academic Program(s): *A.S. General Engineering Technology*

Annual Program Data Reporting

The following table summarizes data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022	2022-2023
Enrollments	Not Available	Freshmen: *0* Sophomores: *0* Juniors: *1* Seniors: *0*	Freshmen: *0* Sophomores: *0* Juniors: *0* Seniors: *1*	Freshmen: *0* Sophomores: *0* Juniors: *0* Seniors: *0*
Retention as of fall 2023	Not Available	Fr to So: *N/A* So to Jun: *N/A* Jun to Sen: *1*	Fr to So: *N/A* So to Jun: *N/A* Jun to Sen: *0*	Fr to So: *N/A* So to Jun: *N/A* Jun to Sen: *N/A*
Degrees Conferred	Not Available	0	2	1

Graduate Placement Data:

Graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

2018-2019	2019-2020	2020-2021	2021-2022

Response Rate	95.8%	100%	Not Available	84.2%
Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

High Impact Practices:

The following high impact practices are embedded in all engineering and engineering technology degrees.

- First-Year Experience: All School of Engineering & Technology (SET) students take EGNR101 where they learn study skills, work on a team project, and develop writing skills through weekly reflections that promote a growth mindset.
- Internships: The SET faculty and staff communicate with industry partners to help students find summer internships and then serve as references where needed. This past fall was one of the strongest career fairs with the largest attendance that LSSU has had in the last four years and the majority of companies looking to hire SET students for internship and/or full-time employment.

Summary of Annual Assessment Updates

The following table summarizes assessment data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022
Program Learning Outcome Findings	Data was not recorded this year due to the pandemic.	The Coordinators of the engineering and engineering technology programs discussed the AS programs. Several areas of improvement were noted: • The lack of consistency in reported results.	Students performed at the following levels for the PLOs: • PLO1: N/A (course chosen for this was an alternating year course not offered in 2021-2022) • PLO2: N/A (no GET students were in

- How results were sometimes an aggregated value from the class rather than being pulled from AS students' work specifically.
- The low number of students in the programs (as previously noted in this document).

EGNR101)
- PLO3: 94.2% (goal met)

Student performance on PLO3 indicated a high level of learning aptitude. Students put a lot of effort in their final Human-Centered Design project. For the next offering, the target criterion should be raised to 70% or higher to better analyze continuous improvement.

Summary of decisions, recommendations, and/or improvements concerning the future of the program

Decisions and recommendations should include budgets, additions of new courses or concentrations, discontinuation or suspension of the program, etc.

2019-2020

No programmatic changes were identified this year due to the pandemic.

2020-2021

To address the three areas mentioned in the previous section, the following action plans have been identified for each, respectively:

7. Automatically pull data up from the course outcomes, adding new supplementary outcomes where needed. At the top level, the program learning outcome setup will be used for overall recommendations and will reference the Learning Goals (SLOs) by Program Outcomes Report. A table that shows where the data is pulled from will be created similar to the planning documents that are presently used for the BS program assessment.
8. State how AS student(s), if any, did specifically – this will require the instructors to look at their detailed class lists – and also compare their results to that of the overall class results.
9. Make more announcements to students to formally declare AS degrees if they are pursuing them as soon as they know that they are.

Additionally, the number of performance indicators for this program could be reduced to 1-2 per program learning outcome.

2021-2022

Decisions for this year are discussed in the previous section.

Rationale or justification for decisions made for the future of the program

EGET110 and EGET175 were changed to EGET270 and EGET275 to better reflect the level of the course material.

Long-range future goals or plans for the program

Each of the AS programs within the School of Engineering & Technology (SET) is structured in a way for students to pursue an AS degree on their way to completing a BS degree, which the vast majority of the students do. This enables students to obtain Tuition Incentive Program (TIP) funding and also enables the university to be eligible for occupational education funding to support the first and second year courses through the purchase of equipment. This type of support should continued to be pursued and the AS programs should be monitored to maintain this alignment.

Quality, Resources, and Support for the program

Summarize Strengths and Weaknesses in each area.

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Many of our students come in with SAT/ACT scores below the acceptance requirement of other engineering programs. In recent years, the math preparation of incoming students has been significantly declining. One of our strengths, due to our high faculty to student ratio, is in working closely with students, who may not typically succeed at other engineering programs, and helping them to reach their potential.

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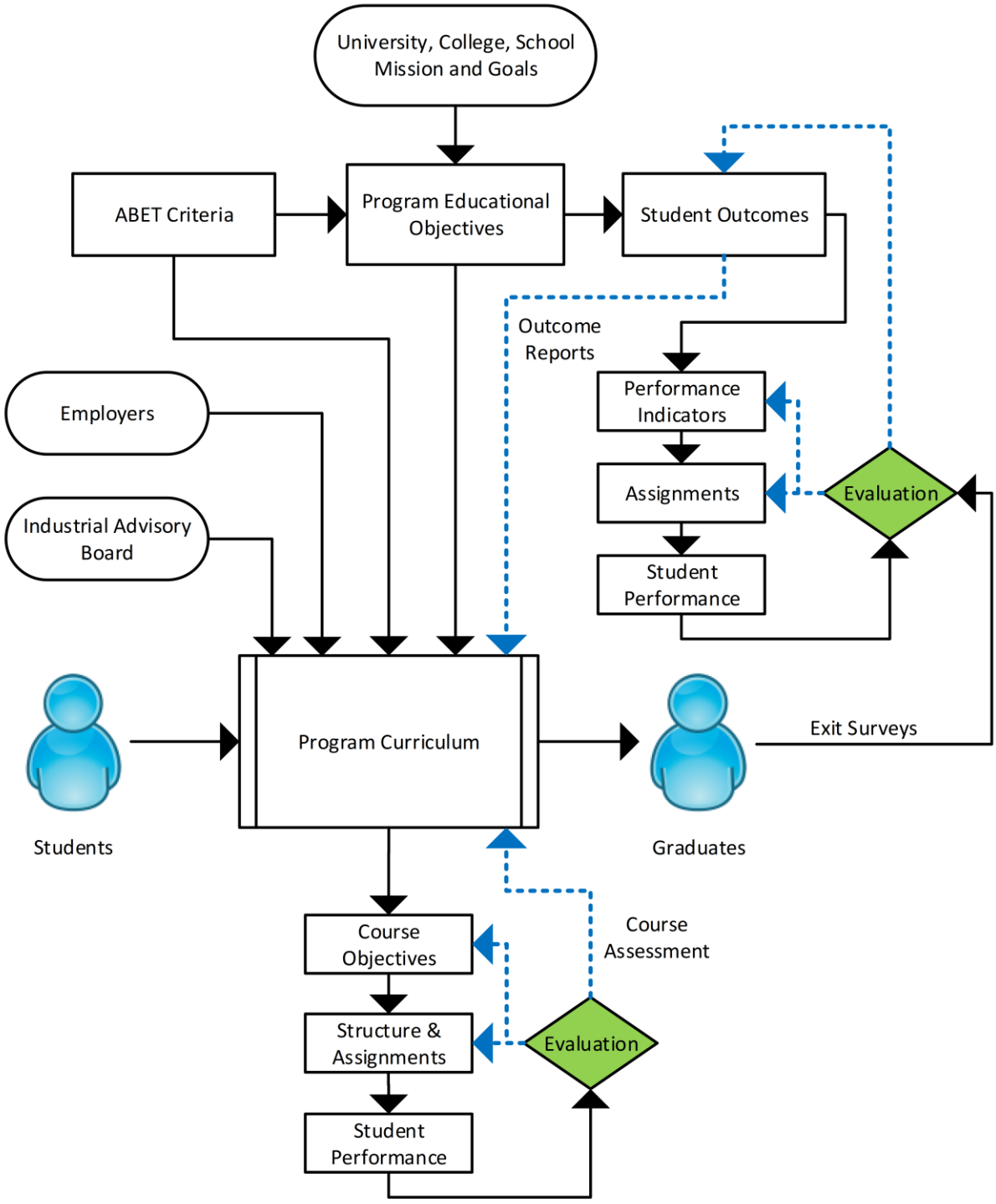

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CAS-311	Programmable Logic Controllers Lab	1,320	24

In general the space is adequate, however it is challenging to find enough room for senior projects when there is a large senior class. In addition, if the Robotic Engineering and Mechatronics programs grow as hoped, we will likely run into space constraints in the robotics lab and other areas.

5-Year Academic Program Review 2023

Due to the Dean's Office by October 27, 2023

This reporting form was introduced in FY2020; numerical data prior to FY2020 may be excluded.

AS – MANUFACTURING ENGINEERING TECHNOLOGY

Submitted by: *Paul Weber*
Date: *12/5/2023*
School: *Engineering & Technology*
Academic Program(s): *A.S. Manufacturing Engineering Technology*

Annual Program Data Reporting

The following table summarizes data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022	2022-2023
Enrollments	Not Available	Freshmen: *1* Sophomores: *0* Juniors: *0* Seniors: *0*	Freshmen: *0* Sophomores: *0* Juniors: *0* Seniors: *0*	Not Available
Retention as of fall 2023	Not Available	Fr to So: *N/A* So to Jun: *N/A* Jun to Sen: *N/A*	Fr to So: *0* So to Jun: *N/A* Jun to Sen: *N/A*	Not Available
Degrees Conferred	Not Available	3	1	Not Available

Graduate Placement Data:

Graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

2018-2019	2019-2020	2020-2021	2021-2022

Response Rate	95.8%	100%	Not Available	84.2%
Employed or in Grad School (or Both)	100%	85.7%	Not Available	100%
Continuing Education	8.7%	21.4%	Not Available	22.6%
Employed in Field	100%	82.1%	Not Available	96.8%
Employed in Michigan	100%	63.6%	Not Available	53.3%
Median Starting Salary	$60,000	$60,000	Not Available	$70,000

Faculty and staff place a high emphasis on job and grad school placement, helping students in EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

High Impact Practices:

The following high impact practices are embedded in all engineering and engineering technology degrees.

- First-Year Experience: All School of Engineering & Technology (SET) students take EGNR101 where they learn study skills, work on a team project, and develop writing skills through weekly reflections that promote a growth mindset.
- Internships: The SET faculty and staff communicate with industry partners to help students find summer internships and then serve as references where needed. This past fall was one of the strongest career fairs with the largest attendance that LSSU has had in the last four years and the majority of companies looking to hire SET students for internship and/or full-time employment.

Summary of Annual Assessment Updates

The following table summarizes assessment data from the Annual Update Reports conducted for this program:

	2019-2020	2020-2021	2021-2022
Program Learning Outcome Findings	Data was not recorded this year due to the pandemic.	The Coordinators of the engineering and engineering technology programs discussed the AS programs. Several areas of improvement were noted: • The lack of consistency in reported results.	Students performed at the following levels for the PLOs: • PLO1: Acceptable average – 1 above, 2 at, 1 below standard (goal met) • PLO2: 2 students averaged 79% (goal met)

- How results were sometimes an aggregated value from the class rather than being pulled from AS students' work specifically.
- The low number of students in the programs (as previously noted in this document).

- PLO3: 93% and 98% from two measures (goal met)

The amount of material should be reduced some in the area of PLO1 so that it can be learned at a higher level of proficiency.

Summary of decisions, recommendations, and/or improvements concerning the future of the program

Decisions and recommendations should include budgets, additions of new courses or concentrations, discontinuation or suspension of the program, etc.

2019-2020
No programmatic changes were identified this year due to the pandemic.

2020-2021
To address the three areas mentioned in the previous section, the following action plans have been identified for each, respectively:

10. Automatically pull data up from the course outcomes, adding new supplementary outcomes where needed. At the top level, the program learning outcome setup will be used for overall recommendations and will reference the Learning Goals (SLOs) by Program Outcomes Report. A table that shows where the data is pulled from will be created similar to the planning documents that are presently used for the BS program assessment.
11. State how AS student(s), if any, did specifically – this will require the instructors to look at their detailed class lists – and also compare their results to that of the overall class results.
12. Make more announcements to students to formally declare AS degrees if they are pursuing them as soon as they know that they are.

Additionally, the number of performance indicators for this program could be reduced to 1-2 per program learning outcome.

2021-2022
Decisions for this year are discussed in the previous section.

Rationale or justification for decisions made for the future of the program

EGET110 and EGET175 were changed to EGET270 and EGET275 to better reflect the level of the course material.

Long-range future goals or plans for the program

Each of the AS programs within the School of Engineering & Technology (SET) is structured in a way for students to pursue an AS degree on their way to completing a BS degree, which the vast majority of the students do. This enables students to obtain Tuition Incentive Program (TIP) funding and also enables the university to be eligible for occupational education funding to support the first and second year courses through the purchase of equipment. This type of support should continued to be pursued and the AS programs should be monitored to maintain this alignment.

Quality, Resources, and Support for the program

Summarize Strengths and Weaknesses in each area.

Student Learning:

Many of our students come in with SAT/ACT scores below the acceptance requirement of other engineering programs. In recent years, the math preparation of incoming students has been significantly declining. One of our strengths, due to our high faculty to student ratio, is in working closely with students, who may not typically succeed at other engineering programs, and helping them to reach their potential.

Evidence of student learning can be found in the multiple job offers of our seniors typically get before graduation. Our graduates are sought after by employers, especially in the robotics and automation areas.

Graduate Success:

As stated previously, graduates from the School of Engineering & Technology (SET) have consistently done well in terms of finding employment in their field with relatively high wages during the last several years. The table below summarizes this. The most recent data is from the Spring 2022 grads so that year and two prior years where data was available are included. Graduate placement rates dipped due to the pandemic in 2020 but rebounded in the most recent data. More details are available upon request.

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EGNR101 and the senior capstone sequence especially in terms of the classes. They also collaborate with companies to have a high turnout of companies at the fall career fair and also to help students find internship opportunities during the summers between freshman and senior years. These practices should be continued.

Academic Programming and Rigor:

The Electrical Engineering, Computer Engineering, Mechanical Engineering, Manufacturing Engineering Technology, and Electrical Engineering Technology degrees are all accredited by ABET. The Robotics Engineering and Mechatronics are still new and we will be applying for ABET accreditation during the next visit. ABET accreditation assures that the program meets the quality standards required by the profession.

Beyond the ABET accreditation evidence of the strength of the program can be found in the multiple job offers of our seniors typically get before graduation. The School of Engineering & Technology prides itself on having a mix of theoretical and practical learning. The majority of our courses contain a lab component where students are able to use real world equipment and develop practical skills.

Faculty Qualifications, Staffing, and Effectiveness of Instruction:

The School of Engineering & Technology (SET) contains positions for eleven full-time faculty and two laboratory engineers. School and program leadership rests with key faculty members who perform these functions on a release time basis. The School faculty work very well together as a combined team on school-related items.

Because of its small size, the School of Engineering & Technology offers engineering curricula that are significantly impacted by the other engineering disciplines in the School and also receive a significant amount of instruction from the faculty in the Department of Math and Computer Science. By the time they leave LSSU, graduates will have taken classes taught (or team-taught) by most, if not all, of the School of Engineering & Technology faculty. Furthermore, much of the continuous improvement process occurs at the School level, in which the entire School of Engineering & Technology faculty participate. A list of the faculty and lab engineers can be seen in the table below.

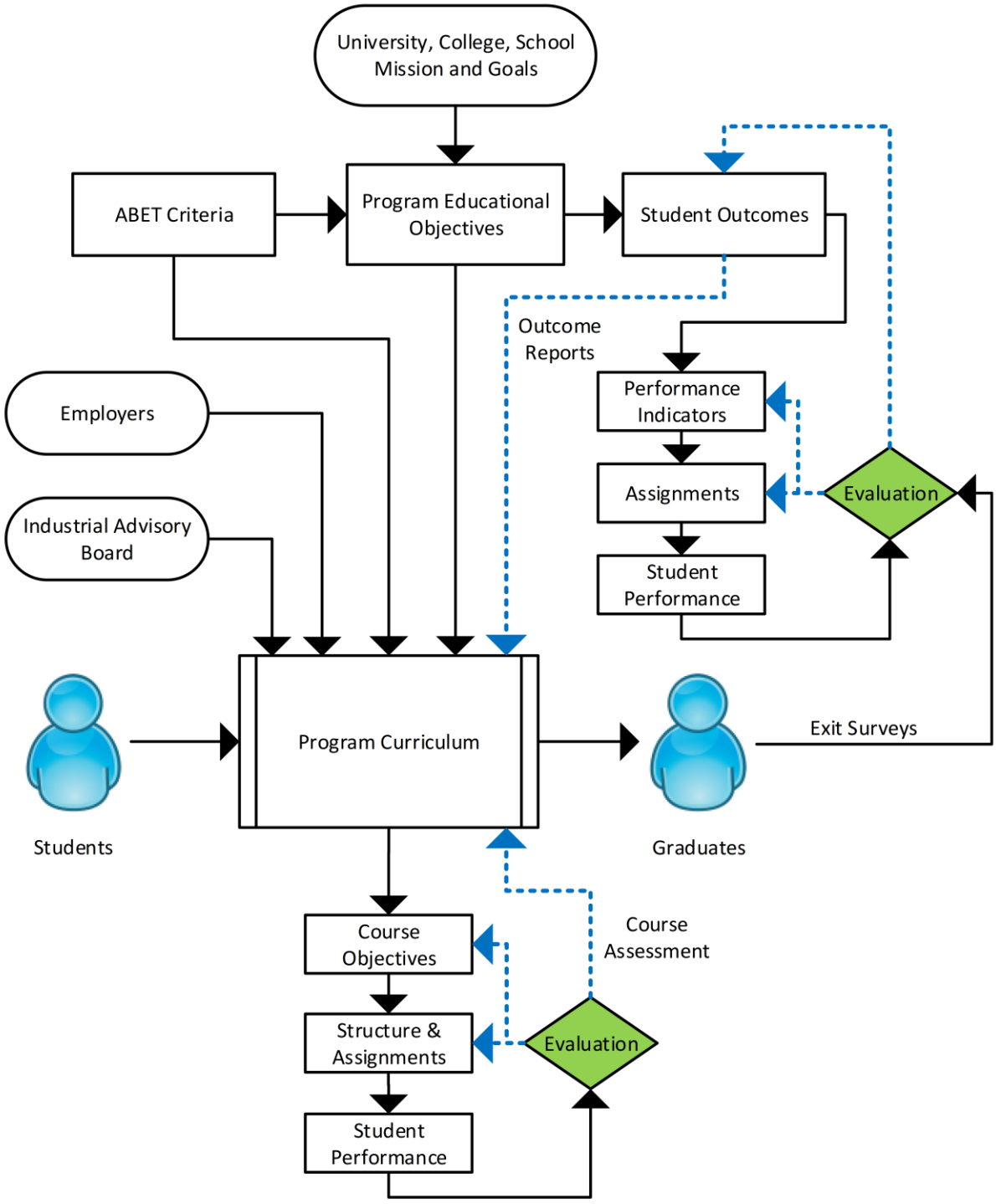
Name	Degree	Job Title
Baumann, David	PhD, Electrical Engineering, 1992	Professor
Devaprasad, Jim	MS, Mechanical Engineering, 1986	Professor
Hildebrand, Robert	PhD, Acoustics, 2001	Professor
Jones, Andrew	PhD, Electrical and Computer Engineering, 2002	Professor
Haluk Kucuk	PhD, Mechanical Engineering, 1999	Assistant Professor
Leach, David	MS, Mechanical Engineering, 2018	Assistant Professor
Mahmud, Zakaria	PhD, Mechanical Engineering, 2003	Associate Professor
Moening, Joseph	PhD, Electrical Engineering, 2010	Professor
Edoardo Sarda	PhD, Ocean Systems Engineering, 2016	Assistant Professor
Weber, Paul	PhD, Electrical Engineering (CE), 2006	Professor
Zarepoor, Masoud	PhD, Mechanical Engineering, 2016	Associate Professor
Bryant, Trevor		ECE Lab Engineer
Throener, Ron		ME Lab Engineer

Given the small number of faculty it is challenging to offer 7 different 4-year degree programs (CE, EE, ME, RE, EET, MfgET, and Mechatronics). Faculty regularly teach on overload (above 24 load hours for the year). One area where this affects the students is in the course offerings. Due to low student demand and to keep the load hours to a minimum, there are some core courses that are only offered once every two years. To maximize the number of students and minimize the load hours, many courses have been designed to serve multiple audiences within the school.

Assessment Practices:

The process for continuous improvement of the program is primarily a combination of student outcome and course assessment/evaluation. Assessment and evaluation of the student outcomes provides a means of improving the program while course assessment improves each individual course.

The block diagram shown in the figure below provides an overview of the continuous improvement process. The process starts with the ABET criteria as well as the missions and goals of the University, College, and School. From the criteria and missions the program educational objectives (PEOs) and the student outcomes are developed. The program educational objectives, in addition to input from the industrial advisory board and employers of our graduates are used to inform in determining the program curriculum. From the program curriculum courses and individual course objectives are designed. An essential component in this process is regularly measuring student performance in both the student outcomes and course objectives.



In addition to measuring student performance, constituent feedback is a vital part of our assessment process. Given our small student population, the sample size for student work is rarely statistically significant. The small size can also cause student performance to fluctuate as the academic ability of a particularly class varies. This can make it challenging to make definitive conclusions about changes made to a course and/or the program. As a result more qualitative mechanisms are used in conjunction with student performance.

Student feedback is an essential component in our assessment. The small student population allows the faculty to get to know the students which makes them more comfortable with providing meaningful feedback. This includes formal feedback in the form of written and verbal from course assessment as well as senior exit surveys and interviews. In addition, informal feedback such as conversations with students also plays an important role but is difficult to document. Faculty are also in contact with alumni and employers who provide valuable feedback to improve courses and the program.

Faculty regularly evaluate the student performance and constituent feedback. After thorough deliberation, recommendations for changes to courses or programs are developed. For minor changes, these recommendations are then implemented by course instructors. Larger changes may require approval from the University-wide curriculum committee and the Provost. These changes are usually initiated by the school chair or program coordinator.

The process, so described, takes place at the School level (SET) in the case of courses common to multiple engineering programs. If the course is specific to the program, then the process described takes place at the Department level instead. This assessment process is effective, however it is also time consuming. As previously mentioned, given the large number of programs relative to faculty, it takes a significant amount of time to assess and evaluate each program.

Resources / Facilities:

The program is housed within the School of Engineering & Technology, which is located entirely in the Center for Applied Science and Engineering Technology (CASET) Building. Built in 1980, the three-story structure is home to the areas of Engineering, Engineering Technology, Mathematics, Computer Science, and Fire Science. Two additional non-academic facilities associated with Information Technology are also located in the building: Enterprise Application Services and University Support Services.

The School of Engineering & Technology has approximately 30,000 sq. ft. of usable space, which includes offices, storage areas, labs, and work areas. The CASET building has multiple classrooms with the room size and capacity are shown in the table below.

Room	Type	Size (sq.ft.)	Capacity
CAS-106A	Classroom/Lab	1,140	22
CAS-119	Classroom	880	48
CAS-205	Classroom	1,010	40
CAS-207	Classroom	690	30
CAS-210	Classroom	1,100	56
CAS-211	Classroom	585	27
CAS-212	Lecture Room	1,265	76
CAS-310	Classroom/Lab	1,320	30
CAS-311	Classroom/Lab	1,320	24

All classrooms are equipped with a whiteboard or chalkboard, a computer, a document camera, a projector, and a screen. The rooms are arranged in a typical fashion with desk and chairs arranged in rows. The lecture room has fixed desks and chairs arranged in a stepped fashion. Since most engineering courses have enrollments with less than 40 students, the classroom facilities within the building are adequate, and nearly all engineering classes take place in the CASET building.

Laboratory experiences are a central component of the engineering curriculum at LSSU. Most technical courses contain labs. A summary of the lab facilities available to all engineering and engineering technology students can be found in the table below.

Room	Name	Size (sq. ft.)	Capacity
CAS-105	Data Acquisition / Microscopy Lab	370	12
CAS-106A	Materials Testing Lab	1,140	22
CAS-106B	Engineering Design Center	1,140	30
CAS-106C	Thermal Fluids Lab	900	10
CAS-120	Machine Shop	5,180	20
CAS-120A&B	Welding Lab &Foundry	1,760	10
CAS-122	Senior Projects Construction Area	2,240	20
CAS-124	Robotics Annex	1,200	8
CAS-125	Robotics and Automation Center	2,600	16
CAS-209A&B	Computer Lab	1,100	28
CAS-304	Digital Electronics Lab	1,080	14
CAS-306	Analog Electronics I Lab	1,175	16
CAS-309	Analog Electronics II Lab	1,175	16
CAS-310	Electro-mechanical Systems Lab	1,320	30
CAS-311	Programmable Logic Controllers Lab	1,320	24

In general the space is adequate, however it is challenging to find enough room for senior projects when there is a large senior class. In addition, if the Robotic Engineering and Mechatronics programs grow as hoped, we will likely run into space constraints in the robotics lab and other areas.