Institutional Effectiveness
2024-2025

Program: Computer Engineering BSCMPE
College and Department: College of Engineering, Electrical and Computer Engineering
Contact: Dr. Allen MacKenzie
Mission:
Provide quality undergraduate and graduate education and perform research in the areas of electrical and computer engineering to enhance the competitiveness of our graduates and contribute to economic, scientific, and social development.

Attach Curriculum Map (Educational Programs Only):
Attached Files: See Appendix 1

SLO1: Identify, Formulate and Solve Engineering Problems

Define Outcome:

Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Assessment Methods:

1. Capstone Assessment (Survey)
2. Capstone Assessment (Reviewer)
3. Final Exam Assessment (Through Fall 2020)
4. Student Outcome Assessment (Beginning Spring 2021)
5. Senior Exit Survey

Criteria for Success (Thresholds for Assessment Methods):

1. Capstone Assessment (Survey)
2. Capstone Assessment (Reviewer)
3. Final Exam Assessment (Through Fall 2020)
4. Student Outcome Assessment (Beginning Spring 2021)
5. Senior Exit Survey

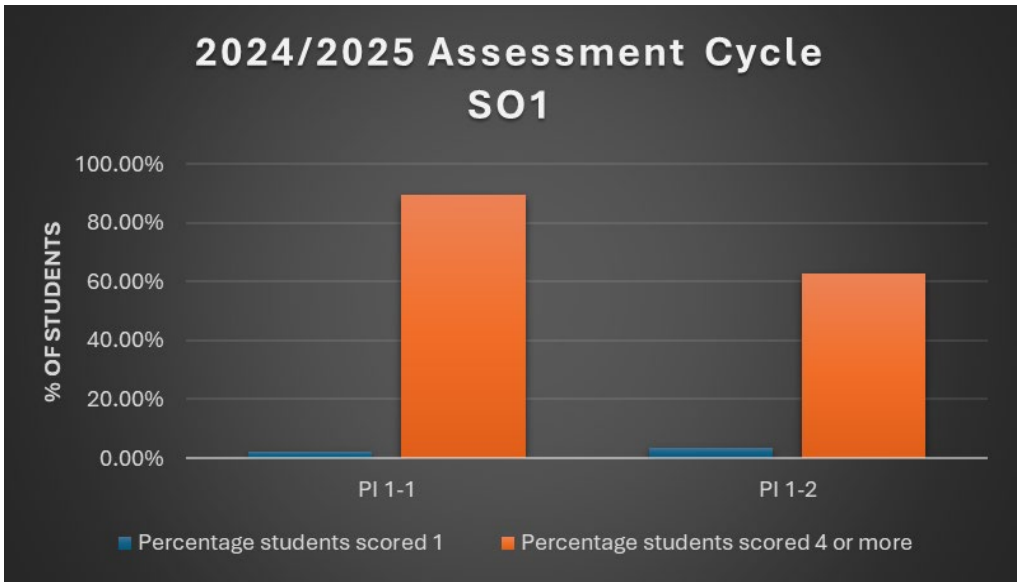
The raw data from most tools is obtained on a 1-5 scale with 5 being the best score. For the final exam assessment, scores on selected exam questions are reported out of 100%. For comparability, we translate this into a 5-point scale with the formula X/20, this translates into an average grade of 60 on the selected exam problems receiving a 3.0, the threshold for acceptability on our 5-point scale.

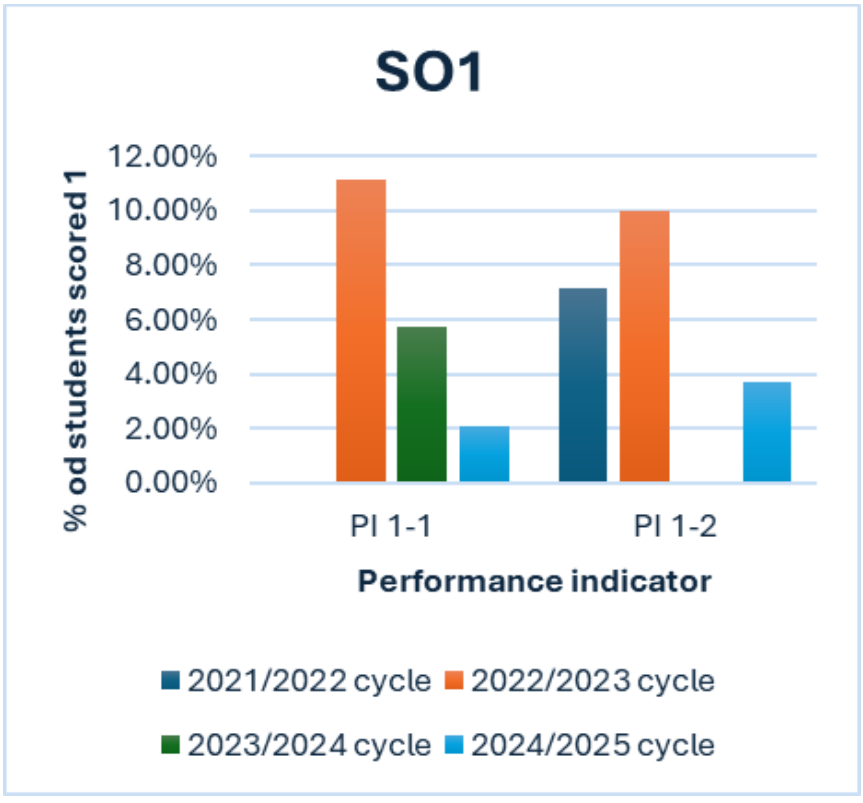
Our target for each student outcome and each assessment tool is to achieve greater than 3.5 out of 5. We categorize the attainment of each outcome using each assessment tool as:

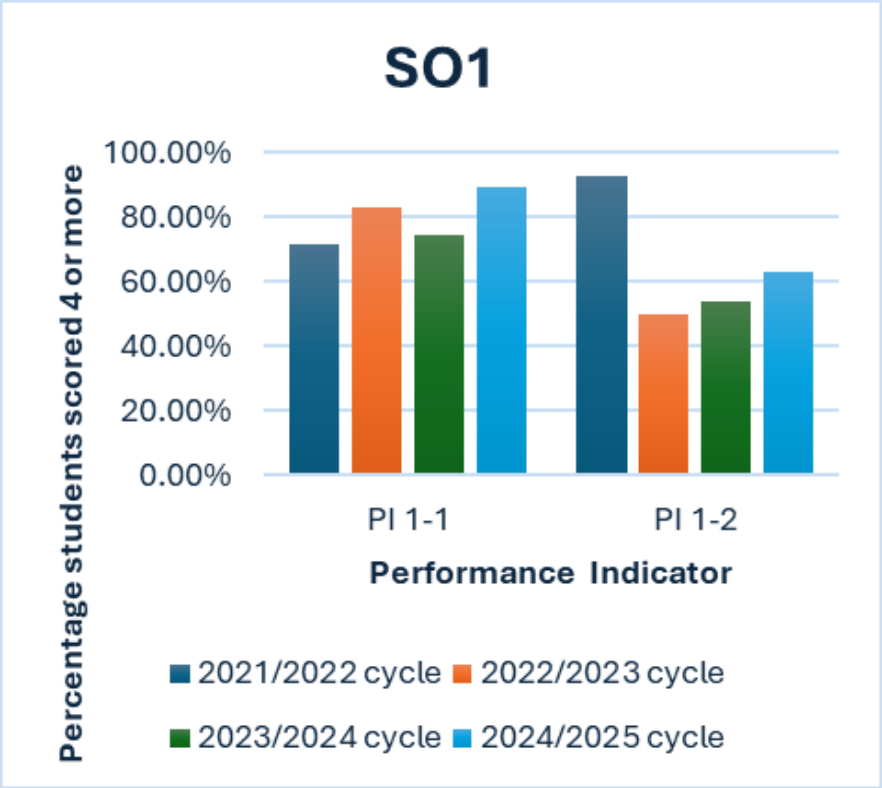
- Highly Satisfactory (HS) if the rating is 3.75 or above,
- Satisfactory (S) if the rating is between 3.00 and 3.74,
- Unsatisfactory (U) if the rating is less than 3.00.

Link to 'Tech Tomorrow' Strategic Plan:

Results and Analysis:







Comparing the assessment results for SO1 of the 2024/2025 cycle with the previous 3 cycles we notice that the percentage of students scoring 1 is way below the 10%. The percentage of students scoring 4 and more is less than the target, but it had increased compared to the 2023/2024 cycle. The main two reasons affecting the score are:

- The capstone assessments had been taken into consideration for most of the performance indicators.
- The ECE 3130 was used to assess the achievement of the students starting from 2022/2023 cycle while ECE 3020 was used in the previous cycles.

Use of Results to Improve Outcomes:

Suggestions for performance improvement:

- Increase the amount of hands-on outside of the lab, such as ungraded assignments that will challenge the students and increase their motivation. I suggest the instructor also link the theory with the hands-on in the lecture to help the students understand how hardware is used using a programming language like C. I suggest a web site similar to https://wokwi.com which help them to visualize before the implementation.
- Do an assessment on the first week of the 3130 course to assess their level. Based on the assessment a study plan will be developed to enhance the weaknesses found from the level assessment.

- Conduct tutorial to show students how to connect the boards to their computers as well as downloading the software and drivers
- Remove the cache memory from the course as preparing the student to complete the 3 phases of the project could be better than teaching the memory during the last 2 weeks.

SLO2: Apply Engineering Design to Produce Solutions That Meet Specified Needs

Define Outcome:

Students will demonstrate an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Assessment Methods:

1. Capstone Assessment (Survey)
2. Capstone Assessment (Reviewer)
3. Senior Exit Survey

Criteria for Success (Thresholds for Assessment Methods):

1. Capstone Assessment (Survey)
2. Capstone Assessment (Reviewer)
3. Senior Exit Survey

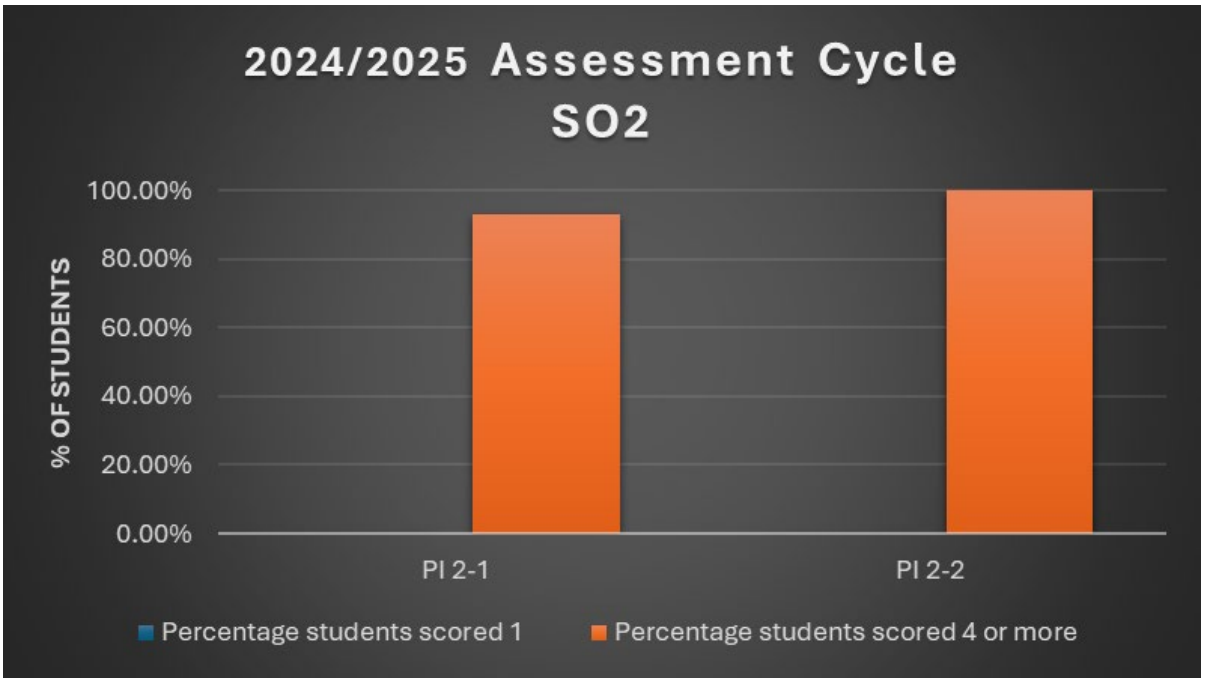
The raw data from most tools is obtained on a 1-5 scale with 5 being the best score. For the final exam assessment, scores on selected exam questions are reported out of 100%. For comparability, we translate this into a 5-point scale with the formula X/20, this translates into an average grade of 60 on the selected exam problems receiving a 3.0, the threshold for acceptability on our 5-point scale.

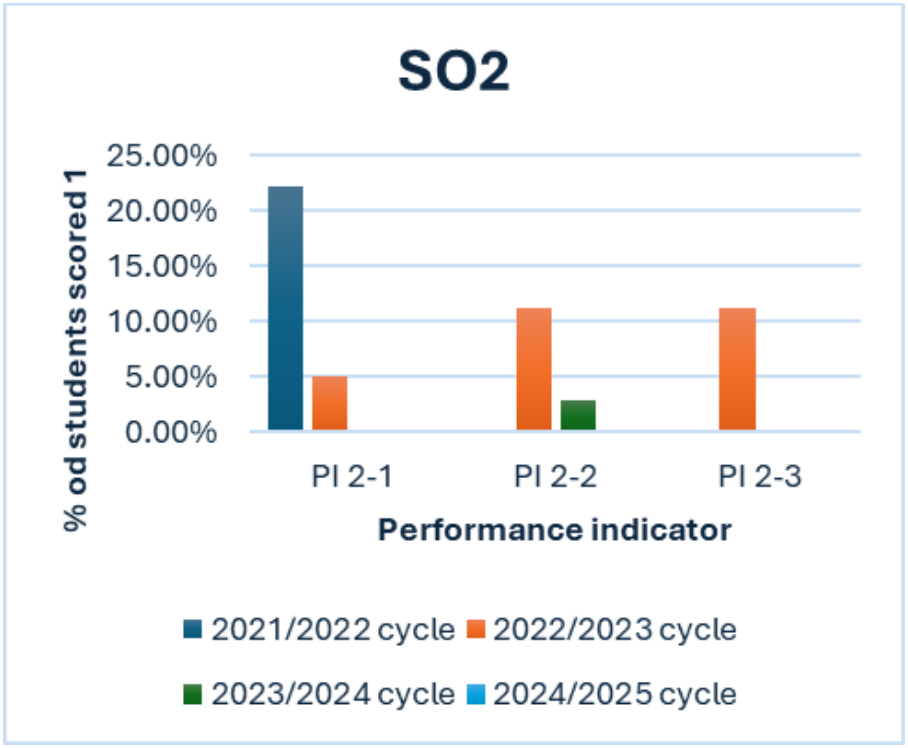
Our target for each student outcome and each assessment tool is to achieve greater than 3.5 out of 5. We categorize the attainment of each outcome using each assessment tool as:

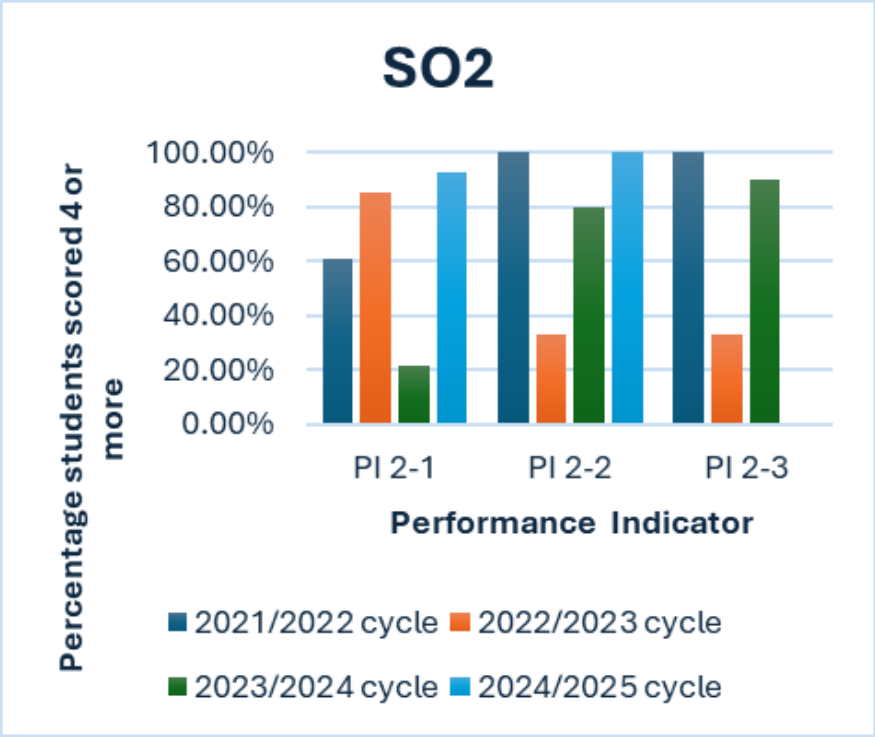
- Highly Satisfactory (HS) if the rating is 3.75 or above,
- Satisfactory (S) if the rating is between 3.00 and 3.74,
- Unsatisfactory (U) if the rating is less than 3.00.

Link to 'Tech Tomorrow' Strategic Plan:

Results and Analysis:







Comparing the assessment results for SO2 of the 2024/2025 cycle with the previous 3 cycles we notice that the percentage of students scoring 1 had decreased below the 10% threshold. And the percentage of students scoring 4 and more had increased in the 2024/2025 cycle to reach the threshold after it was failing in the 2022/2023 cycle for PI2-1 and PI2-2. PI2-3 had been merged to PI2-2, and this is why it disappeared from the 2024/2025 assessment. The main reasons for these scores are:

- Although students often identify a few critical design criteria, it's rare that they consider them all. For instance, when designing a power supply, they tend to focus on voltage and current requirements but overlook factors like power dissipation and thermal management.
- Students are often unfamiliar with electrical codes and industry standards. Even when they recognize these requirements, they typically acknowledge their existence without exserting effort to comply.
- The curriculum needs revision. The new curriculum for the courses on Electronics and Circuits are not well articulated. It is impossible to cover the contents.

Use of Results to Improve Outcomes:

Suggestions for performance improvement:

- Review the syllabi of both ECE 2050 and ECE 3050
- Revise the lab material of ECE 3050
- Review curriculum to solve the issue of ECE 3050 course heavy content
- A lesser dense textbook may be useful. The present textbook on devices is too comprehensive for this class
- Students should learn relevant simulation tools before taking the class.
- It is recommended that, through advising, the fall and spring offerings of ECE 1000 are better balanced

SLO3: Communicate Effectively

Define Outcome:

Students will demonstrate an ability to communicate effectively with a range of audiences.

Assessment Methods:

1. Capstone Assessment (Survey)
2. Capstone Assessment (Reviewer)
3. Senior Exit Survey

Criteria for Success (Thresholds for Assessment Methods):

1. Capstone Assessment (Survey)
2. Capstone Assessment (Reviewer)
3. Senior Exit Survey

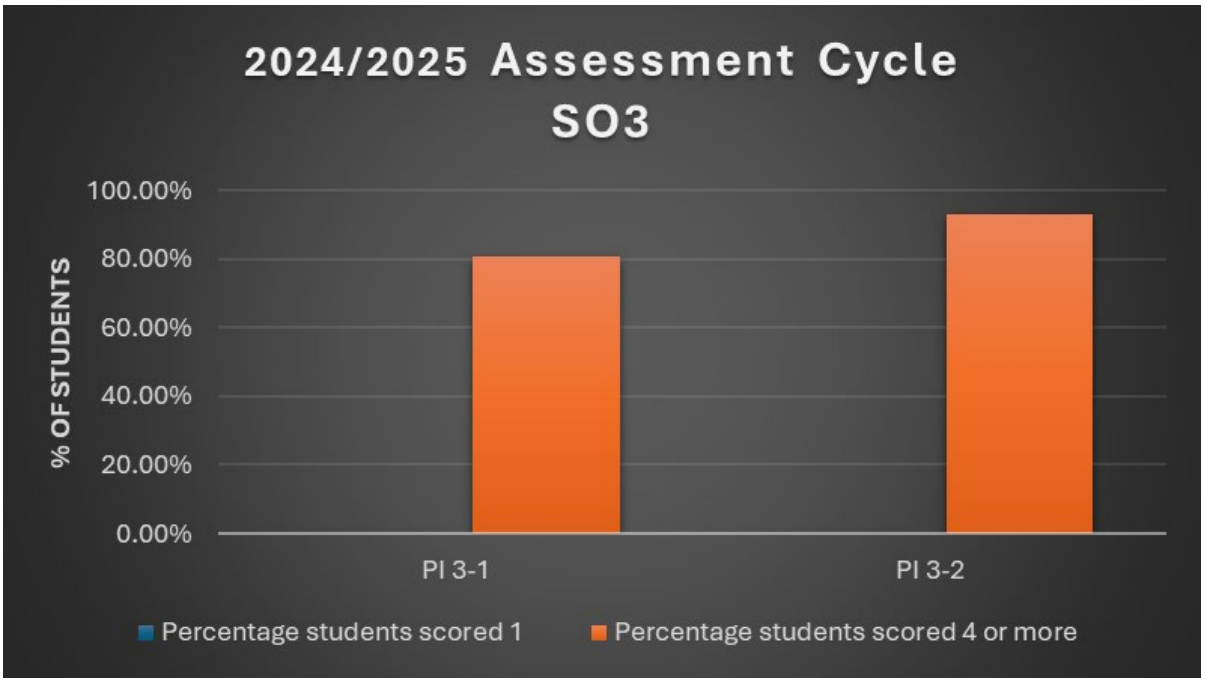
The raw data from most tools is obtained on a 1-5 scale with 5 being the best score. For the final exam assessment, scores on selected exam questions are reported out of 100%. For comparability, we translate this into a 5-point scale with the formula X/20, this translates into an average grade of 60 on the selected exam problems receiving a 3.0, the threshold for acceptability on our 5-point scale.

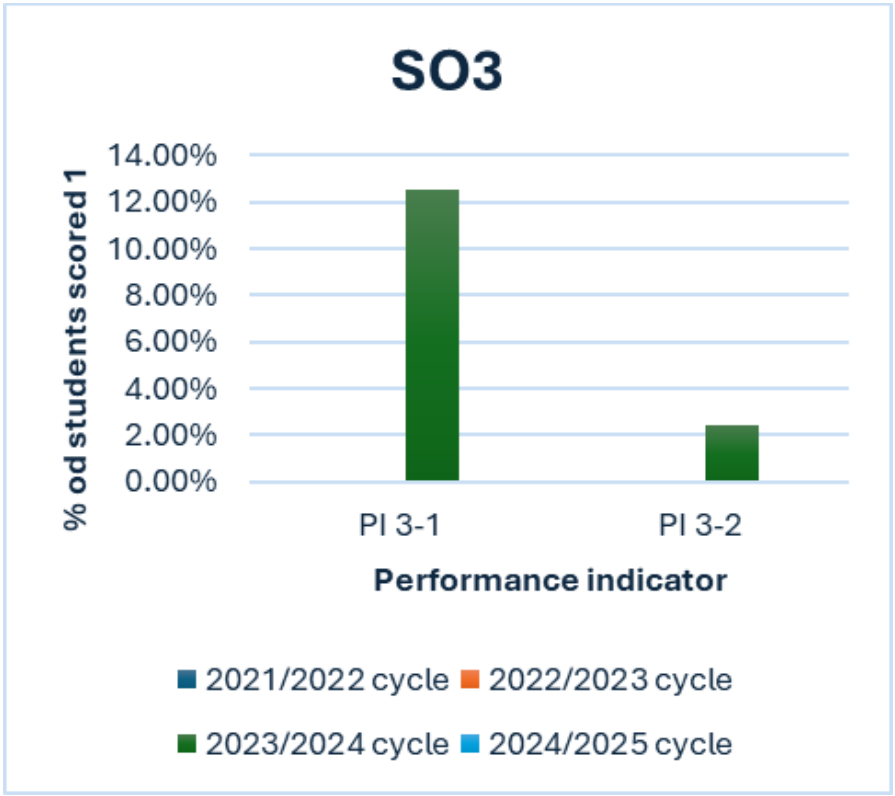
Our target for each student outcome and each assessment tool is to achieve greater than 3.5 out of 5. We categorize the attainment of each outcome using each assessment tool as:

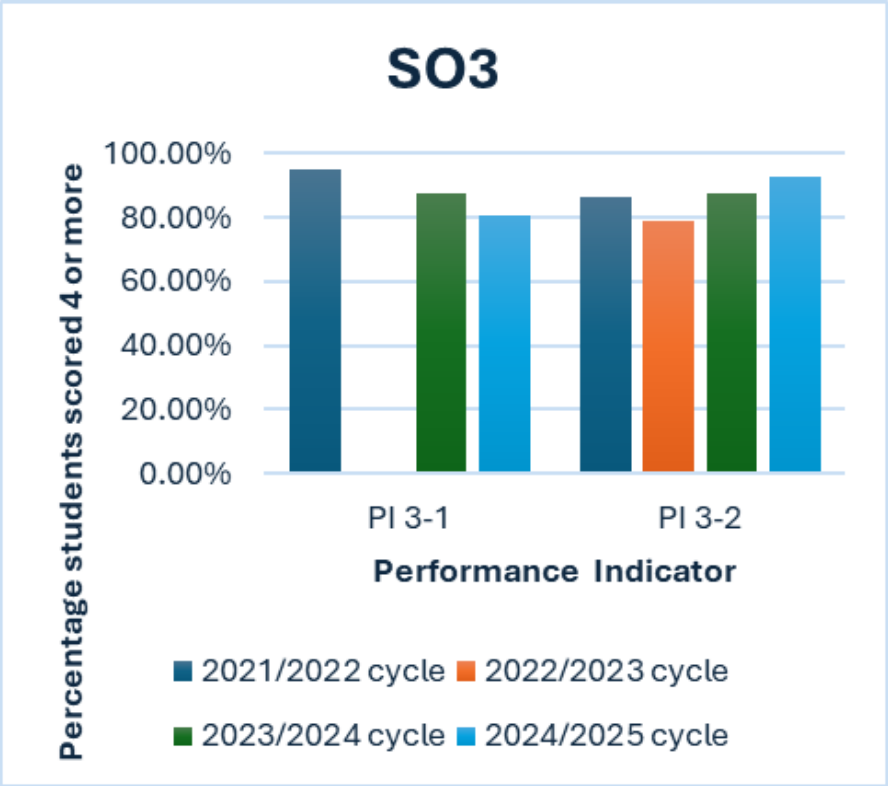
- Highly Satisfactory (HS) if the rating is 3.75 or above,
- Satisfactory (S) if the rating is between 3.00 and 3.74,
- Unsatisfactory (U) if the rating is less than 3.00.

Link to 'Tech Tomorrow' Strategic Plan:

Results and Analysis:







Comparing the assessment results for SO3 of the 2024/2025 cycle with the previous 3 cycles we notice that the percentage of students scoring 1 had decreased below the 10% threshold. At the same time the percentage of students scoring 4 and above had increased above the defined threshold of 70%. It is important to note that this seems to be an improvement over last cycle. And the IAB also noted that student communication seemed to have improved.

Use of Results to Improve Outcomes:

Even though the performance indicators reached their defined targets it is essential to try to improve the students' communication skills by giving them the opportunity to speak with hard time constraints, on a specific topic, in prior coursework with detailed feedback along multiple dimensions of communication. Also, the instructors suggest providing students with a template of a report including required sections with a clear rubric showing how the report will be assessed.

SLO4: Recognize Ethical and Professional Responsibilities and Make Informed Judgments

Define Outcome:

Students will demonstrate an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

Assessment Methods:

1. Capstone Assessment (Reviewer)
2. Senior Exit Survey

Criteria for Success (Thresholds for Assessment Methods):

1. Capstone Assessment (Reviewer)
2. Senior Exit Survey

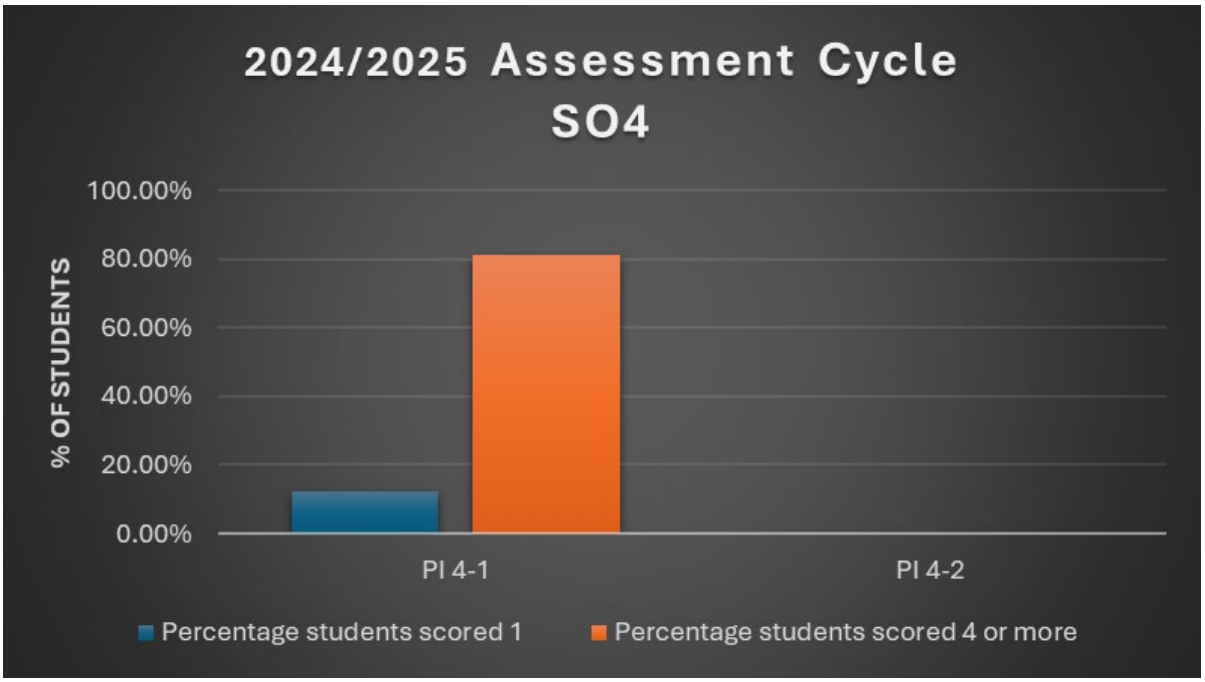
The raw data from most tools is obtained on a 1-5 scale with 5 being the best score. For the final exam assessment, scores on selected exam questions are reported out of 100%. For comparability, we translate this into a 5-point scale with the formula X/20, this translates into an average grade of 60 on the selected exam problems receiving a 3.0, the threshold for acceptability on our 5-point scale.

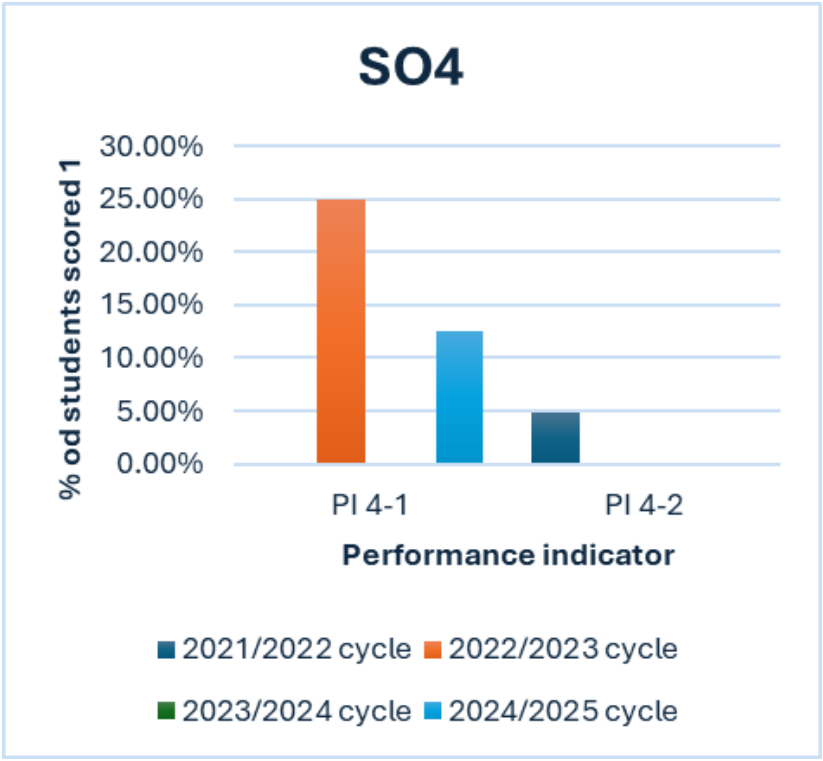
Our target for each student outcome and each assessment tool is to achieve greater than 3.5 out of 5. We categorize the attainment of each outcome using each assessment tool as:

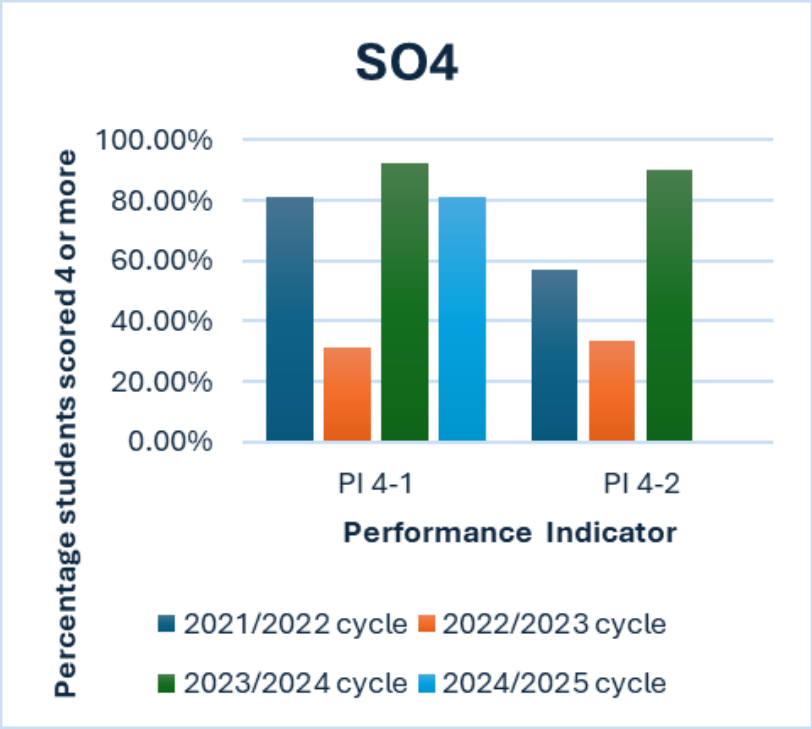
- Highly Satisfactory (HS) if the rating is 3.75 or above,
- Satisfactory (S) if the rating is between 3.00 and 3.74,
- Unsatisfactory (U) if the rating is less than 3.00.

Link to 'Tech Tomorrow' Strategic Plan:

Results and Analysis:







Comparing the assessment results for SO4 of the 2024/2025 cycle with the previous 3 cycles we notice that the percentage of students scoring 1 is slightly above the 10% threshold. Meanwhile the percentage of students scoring 4 and more had passed the required threshold during the 2023/2024 and 2024/2025 cycles for PI4-1 but for PI4-2 it was not assessed during the 2024/25 cycle, but it was above the required threshold during the 2023/2024 cycle. The main reason for this is that students can identify ethical concerns but often fail to address them.

Use of Results to Improve Outcomes:
Suggestions for performance improvement:

- Continue monitoring these PIs.
- Talk to the students about methods to address ethical concerns.

SLO5: Teamwork

Define Outcome:

Students will demonstrate an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

Assessment Methods:

1. Capstone Assessment (Reviewer)
2. Senior Exit Survey

Criteria for Success (Thresholds for Assessment Methods):

1. Capstone Assessment (Reviewer)
2. Senior Exit Survey

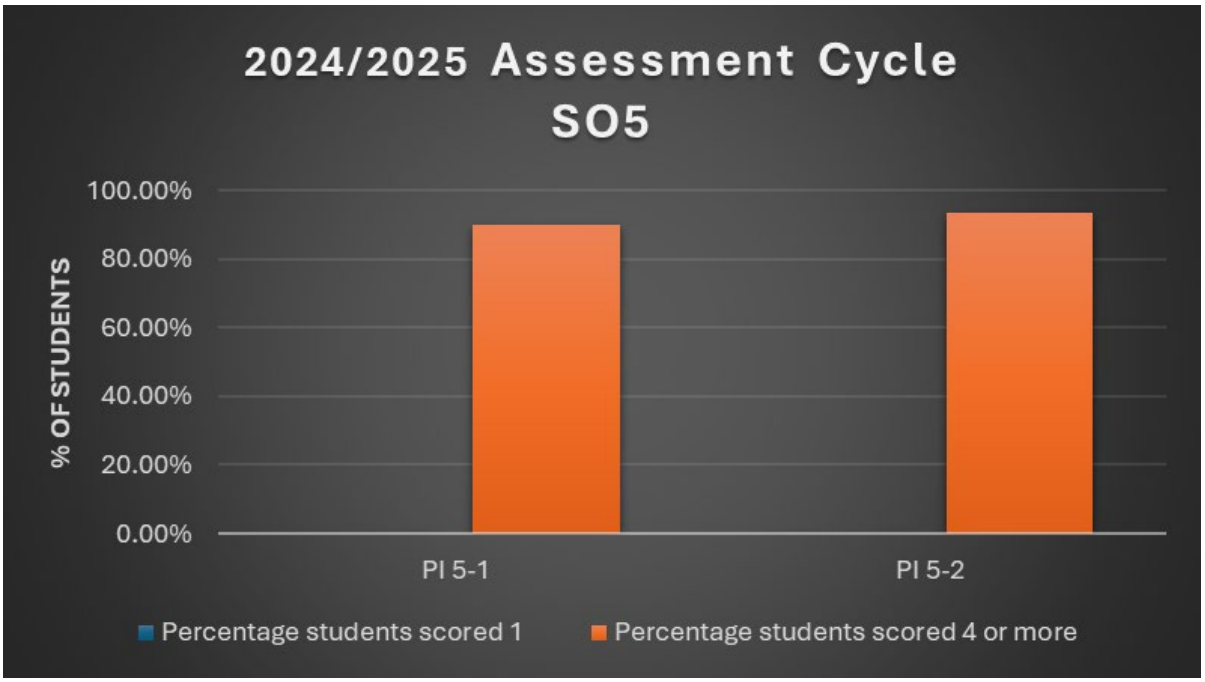
The raw data from most tools is obtained on a 1-5 scale with 5 being the best score. For the final exam assessment, scores on selected exam questions are reported out of 100%. For comparability, we translate this into a 5-point scale with the formula X/20, this translates into an average grade of 60 on the selected exam problems receiving a 3.0, the threshold for acceptability on our 5-point scale.

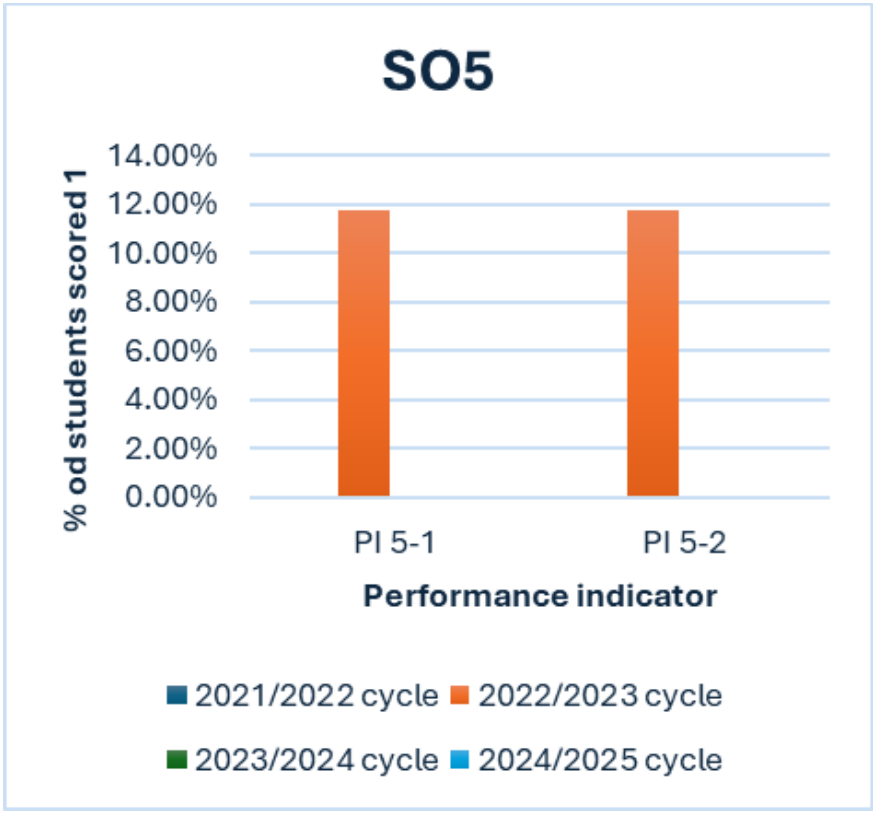
Our target for each student outcome and each assessment tool is to achieve greater than 3.5 out of 5. We categorize the attainment of each outcome using each assessment tool as:

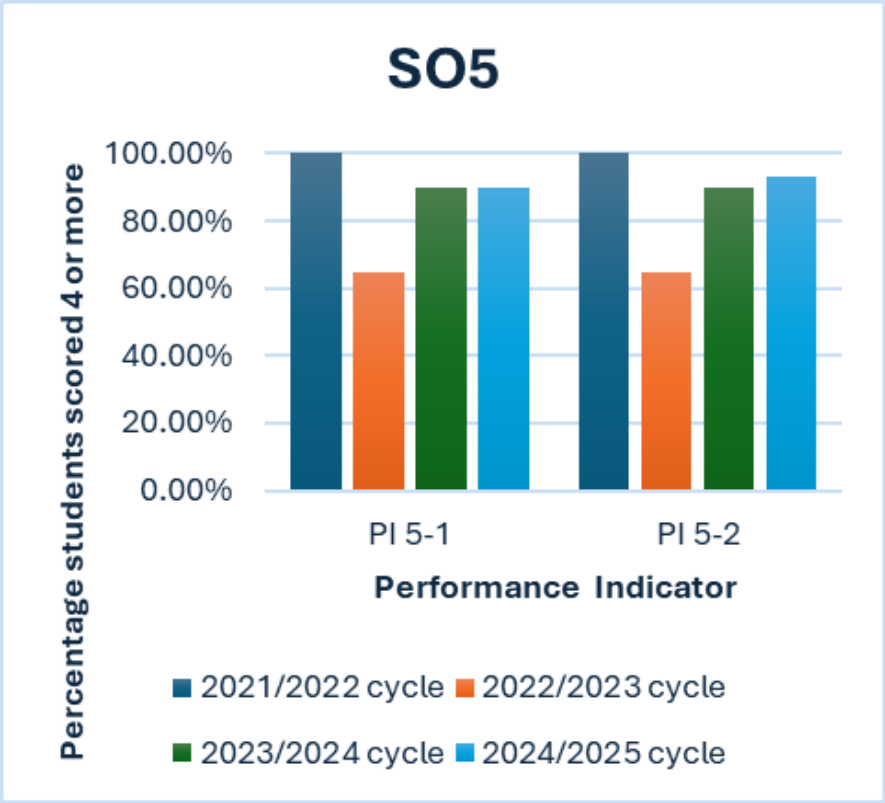
- Highly Satisfactory (HS) if the rating is 3.75 or above,
- Satisfactory (S) if the rating is between 3.00 and 3.74,
- Unsatisfactory (U) if the rating is less than 3.00.

Link to 'Tech Tomorrow' Strategic Plan:

Results and Analysis:







Comparing the assessment results for SO5 of the 2024/2025 cycle with the previous 3 cycles we notice that the percentage of students scoring 1 is below the defined target and decreasing from the 2023/2024 cycle. Also, the percentage of students scoring 4 and more is above the defined target and increased from the 2023/2024 cycle. This proves that the improvement actions suggested in the previous cycles and implemented during the 2024/2025 cycle had improved the student attainment.

Use of Results to Improve Outcomes:

The program will continue to offer tutoring, which helped the students a lot during the last cycle. In addition to these previous improvement actions, the instructor suggested to add more requirements to the labs by redesigning the labs assignments to increase the hands-on experience of the students with the boards.

SLO6: Experiment, Interpret Data, and Use Engineering Judgment

Define Outcome:

Students will demonstrate an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.

Assessment Methods:

1. Laboratory Assessment (through Fall 2020)
2. Student Outcome Assessment (beginning Spring 2021)
3. Senior Exit Survey

Criteria for Success (Thresholds for Assessment Methods):

1. Laboratory Assessment (through Fall 2020)
2. Student Outcome Assessment (beginning Spring 2021)
3. Senior Exit Survey

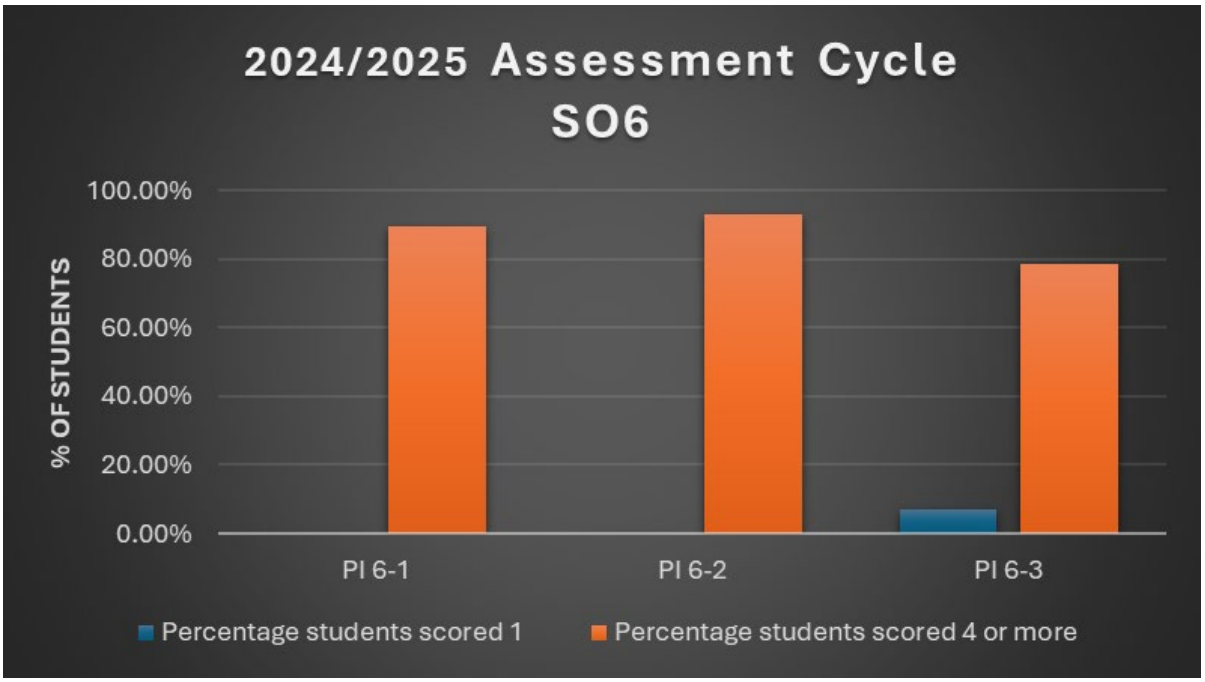
The raw data from most tools is obtained on a 1-5 scale with 5 being the best score. For the final exam assessment, scores on selected exam questions are reported out of 100%. For comparability, we translate this into a 5-point scale with the formula X/20, this translates into an average grade of 60 on the selected exam problems receiving a 3.0, the threshold for acceptability on our 5-point scale.

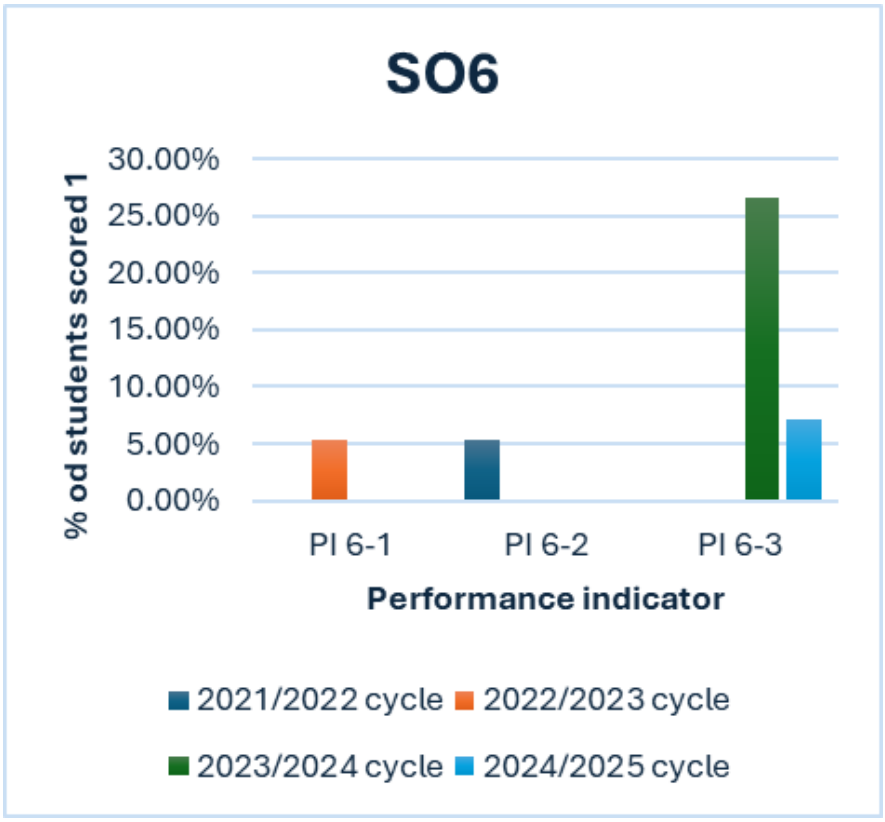
Our target for each student outcome and each assessment tool is to achieve greater than 3.5 out of 5. We categorize the attainment of each outcome using each assessment tool as:

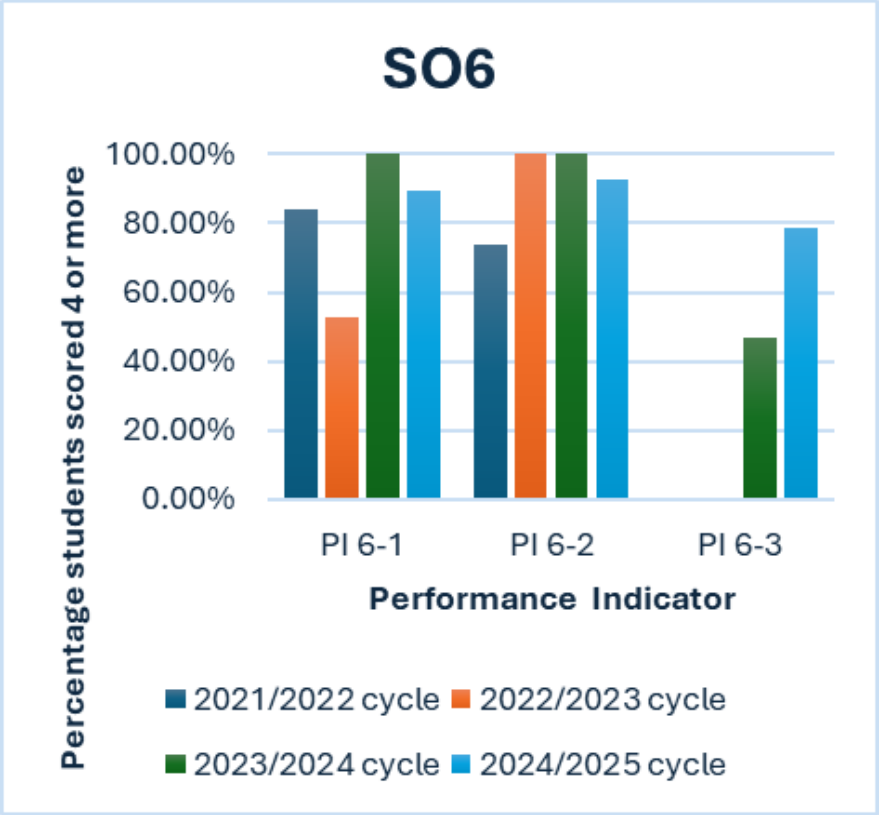
- Highly Satisfactory (HS) if the rating is 3.75 or above,
- Satisfactory (S) if the rating is between 3.00 and 3.74,
- Unsatisfactory (U) if the rating is less than 3.00.

Link to 'Tech Tomorrow' Strategic Plan:

Results and Analysis:







Comparing the assessment results for SO6 of the 2024/2025 cycle with the previous 3 cycles we notice that PI6-1 and PI6-2 defined targets had been attained for both the percentage of students scoring 1 or the percentage of students scoring 4 and more. The main reasons for this are:

- PI6-3 was assessed in ECE 3060 during the 2022/2023 cycle and in ECE 3330 starting from the 2023/2024.
- Poor math preparation and too much material as main reasons for the failure to attain the defined targets. He also suggested that ECE 3330 contains material that should be taught in two courses not only one.
- The curriculum needs revision. The new curriculum for the courses on Electronics and Circuits are not well articulated. It is impossible to cover the contents

Use of Results to Improve Outcomes:

Suggestions for performance improvement:

- Train the students to use LTSpice and a bit of MATLAB during a dedicated set of either lab sessions of tutorials
- Review the curriculum for the ECE 2050 and ECE 3050 as well as the ECE 3330 courses

SLO7: Ability to Acquire and Apply New Knowledge

Define Outcome:

Students will demonstrate an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Assessment Methods:

1. Capstone Assessment (Reviewer)
2. Student Outcome Assessment (beginning Spring 2021)
3. Senior Exit Survey

Criteria for Success (Thresholds for Assessment Methods):

1. Capstone Assessment (Reviewer)
2. Student Outcome Assessment (beginning Spring 2021)
3. Senior Exit Survey

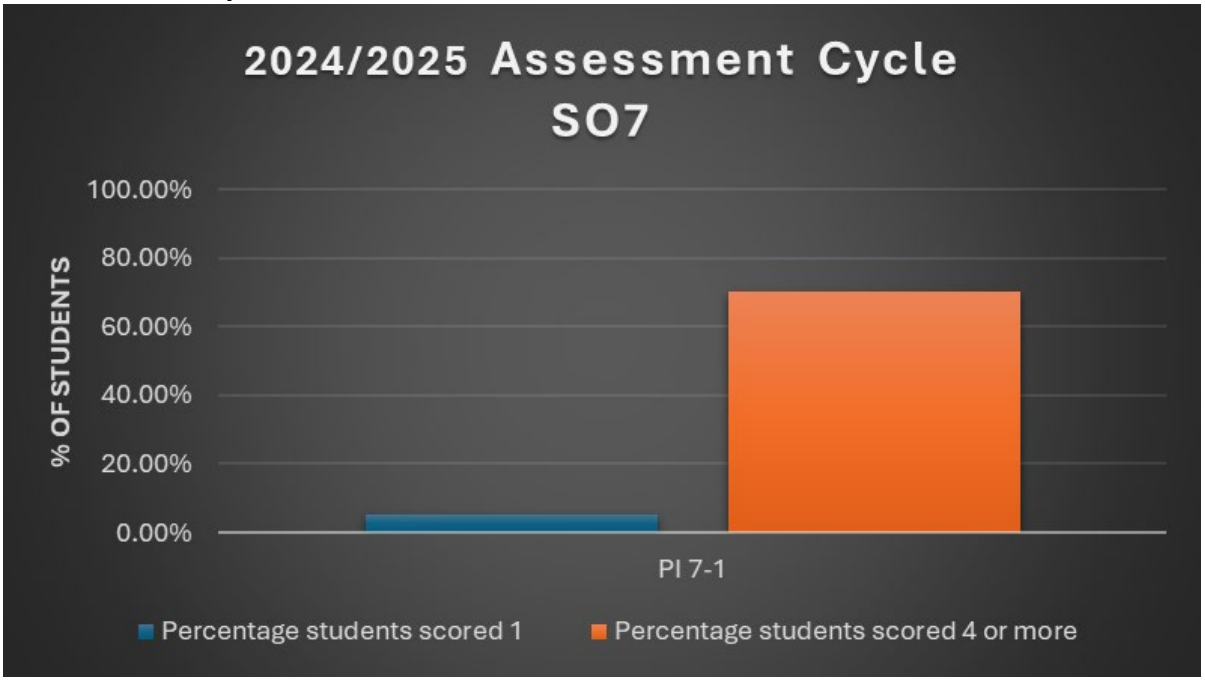
The raw data from most tools is obtained on a 1-5 scale with 5 being the best score. For the final exam assessment, scores on selected exam questions are reported out of 100%. For comparability, we translate this into a 5-point scale with the formula X/20, this translates into an average grade of 60 on the selected exam problems receiving a 3.0, the threshold for acceptability on our 5-point scale.

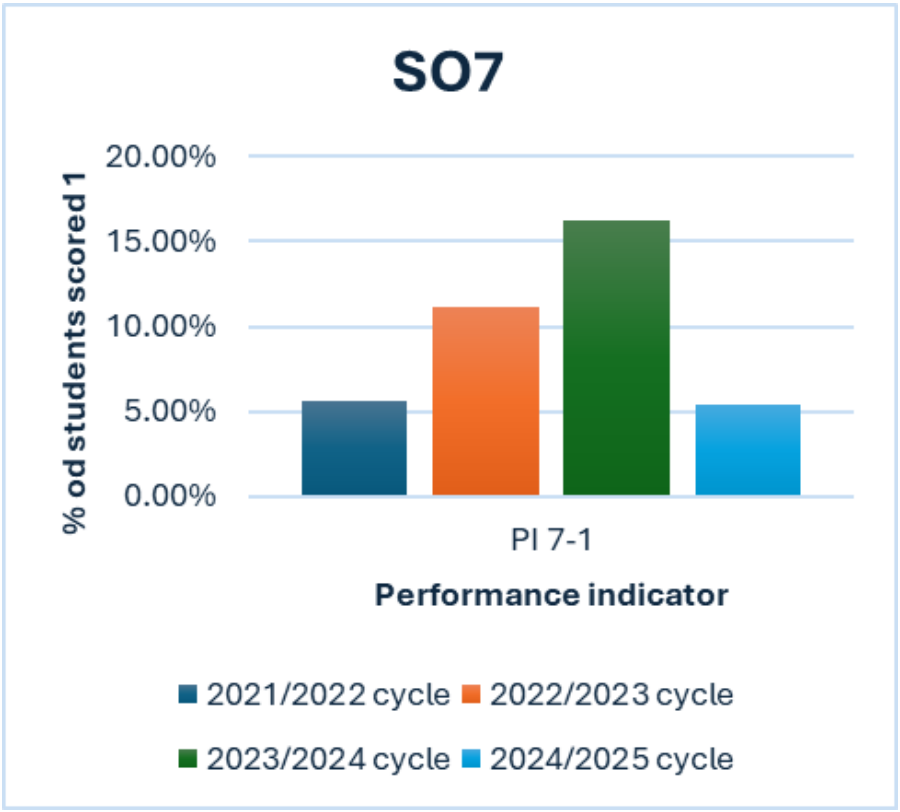
Our target for each student outcome and each assessment tool is to achieve greater than 3.5 out of 5. We categorize the attainment of each outcome using each assessment tool as:

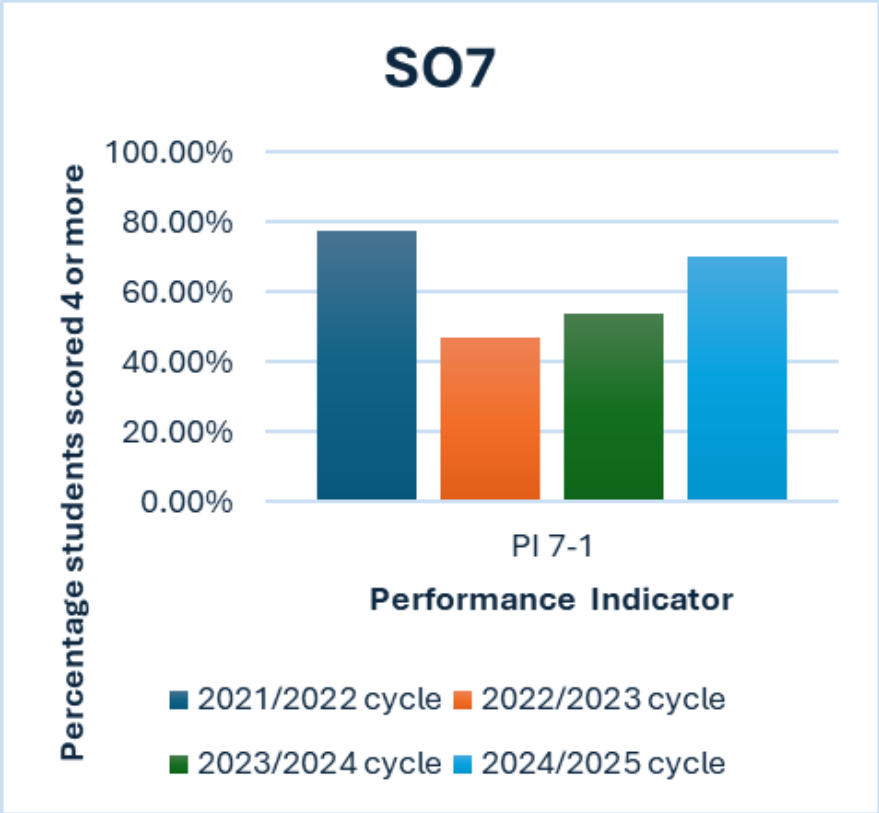
- Highly Satisfactory (HS) if the rating is 3.75 or above,
- Satisfactory (S) if the rating is between 3.00 and 3.74,
- Unsatisfactory (U) if the rating is less than 3.00.

Link to 'Tech Tomorrow' Strategic Plan:

Results and Analysis:







Comparing the assessment results for SO7 of the 2024/2025 cycle with the previous 3 cycles we notice that it is continuously failing to reach the defined target for the percentage of student scoring 4 and more. The instructor of the ECE 3330 course where it is assessed reported poor math preparation and too much material as main reasons for the failure to attain the defined targets. Students often need to be reminded that acquiring new knowledge is their responsibility. Many habitually wait for instructors or supervisors to assign the next task—a pattern likely reinforced by courses where every step is explicitly directed.

Use of Results to Improve Outcomes:

Suggestions for performance improvement:

- Next semester, give three major tests instead, with each test covering only two chapters
- Review the curriculum for the ECE 2050, ECE 3050 and ECE 4050 as well as the ECE 3330 courses

Summative Evaluation:

SLO 1: Identify, Formulate, and Solve Engineering Problems:

Student performance in PI 1-1 consistently exceeds the 70% benchmark in all courses and terms. Notably, the Capstone project shows full attainment, suggesting successful culmination of identification and formulation skills. Performance in PI 1-2 is mixed. While Capstone students excelled, performance in **ECE 4120 (Spring 2025)** was significantly below the expected benchmark of 70%. The instructor reported that the main reason was the number of topics taught in the course which gave the student less time to work on the course project. The improvement actions applied to ECE 3130 and ECE 3140 shows an improvement to the student attainment and should be continued next semesters. Capstone assessment shows a great improvement also to the student attainment and that reflects the new Capstone improvements implemented in the last 2 cycles. The Capstone assessment process also better assesses the students work and attainment.

SLO2: Apply Engineering Design to Produce Solutions that Meet Specified Needs:

The assessment of the student outcome shows that there is continuous improvement from cycle to cycle. The improvement actions that had been implemented last cycle had proven to increase student attainment. Even though the results are promising and shows improvement the program will continue to seek improvement for the following issues:

- Students are often unfamiliar with electrical codes and industry standards. Even when they recognize these requirements, they typically acknowledge their existence without exserting effort to comply.
- Although students often identify a few critical design criteria, it's rare that they consider them all. For instance, when designing a power supply, they tend to focus on voltage and current requirements but overlook factors like power dissipation and thermal management.

SLO3: Communicate Effectively

Performance is generally strong across the board, especially in Capstone, indicating improved oral communication by graduation. A dip in Spring 2025 ECE 3920 suggests a need for more consistent preparation or support earlier in the curriculum. Performance in written communication improves as students progress through the program. While the Fall 2024 ECE 2140 course was close to the threshold, the Spring 2025 results reflect targeted improvements. Upper-level courses consistently show strong results.

SLO4: Recognize Ethical and Professional Responsibilities and Make Informed Judgements

SO4 is largely being met, especially as students advance through the curriculum, with Capstone assessments showing strong attainment. There is strong improvement from junior (ECE 3920) to senior (Capstone) level, indicating positive development over time. High performance in Spring 2025 indicates effective curriculum implementation.

SLO5: Teamwork

There is a clear upward trend in student performance from Fall 2024 to Spring 2025 across both indicators. This suggests successful instructional improvement or curriculum alignment between semesters. High percentages of students meeting or exceeding benchmarks, especially in Spring 2025. Instructional methods appear effective, particularly in the Capstone course. We suggest to continue using collaborative and leadership-oriented projects and integrate team performance feedback and peer evaluations.

SLO6: Experiment, Interpret Data, and Use Engineering Judgement

SO6 is largely being met across the program, with strong evidence of proficiency in experimentation and data analysis. Students demonstrate consistently high proficiency in conducting experiments and interpreting results across both classroom and capstone environments. Student capability in developing experiments is highly proficient, with a significant improvement observed in the capstone project. The 100% achievement in Spring 2025 suggests the curriculum effectively supports the development of experimental design skills. There is a concern in applying engineering judgment within ECE 3330, requiring instructional intervention. However, capstone results indicate that students ultimately acquire the necessary skills, possibly through cumulative learning or applied experience.

SLO7: Ability to Acquire and Apply New Knowledge

SO7 assessment shows an upward trend in performance from Fall 2024 to Spring 2025, particularly in ECE 2140 and Capstone, suggesting curricular or pedagogical improvements. Capstone data confirms that by graduation, most students demonstrate strong competence in acquiring and applying new knowledge.

Assessment Plan Changes:

None

List of Appendices:

Appendix 1: Curriculum Map

Appendix 1: Curriculum Map

	Student Outcome (SO)		Performance Indicator (PI)	CmPE Program
SO 1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	**PI 1-1**	Identify, formulate complex engineering problems	3130, 3140, Capstone
		PI 1-2	solve a complex engineering problem	4120, Capstone
SO 2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	**PI 2-1**	An ability to apply engineering design to produce solutions that meet specified needs	3050, Capstone
		PI 2-2	The design considers public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	Capstone
SO 3	An ability to communicate effectively with a range of audiences.	**PI 3-1**	An ability to communicate effectively with a range of audiences (oral presentation)	3920, Capstone
		PI 3-2	An ability to communicate effectively with a range of audiences (written report)	2140, 3050, Capstone
SO 4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	**PI 4-1**	An ability to recognize ethical and professional responsibilities in engineering situations, make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	3920, Capstone
SO 5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	**PI 5-1**	An ability to function effectively on a team whose members together, create a collaborative and inclusive environment and meet objectives	3130, Capstone
		PI 5-2	An ability to function effectively on a team whose members together to provide leadership, establish goals, and plan tasks	3130, Capstone
SO 6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	**PI 6-1**	Develop and conduct appropriate experimentation	3050, Capstone
		PI 6-2	analyze and interpret data	3050, Capstone
		PI 6-3	use engineering judgment to draw conclusions	Capstone
SO 7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	**PI 7-1**	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	2140, 3330, Capstone