

CPI _ Improving Program Learning Outcomes Report

CPI Improving PLO Report (AY22-23)

Name of the program Mechanical Engineering



Dean' signature _____

Expected Date of Submission 6/30/2023

Department Chair or Director: Dr. Xun Yu

NYIT's CPI process is implemented to meet *MSCHE Standard V: Educational Effectiveness Assessment: Assessment of student learning and achievement demonstrates that the institution's students have accomplished educational goals consistent with their program of study, degree level, the institution's mission, and appropriate expectations for institutions of higher education.*

All degree program's PLO assessment plan (2022-2025) are posted through the link:

http://www.nyit.edu/planning/academic_assessment_plans_reports.

This is a report of its implementation for year 2022-2023. The report should address the following points:

I. The Annual Program Learning Outcomes (PLOs) Assessment should include the followings.

1. PLO (Program Learning Outcomes) assessed. list the PLOs that have been assessed in AY 22-23 based on your three-year plan(AY22_25)

CPI _ Improving Program Learning Outcomes Report

As this program is accredited by ABET, we assess the learning outcomes following ABET guideline which requires the assessment of a set of (1)-(7) Student Outcomes (SOs):

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
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
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

2. **METHOD:** Describe the method of assessment and attach measurement instruments (e.g., rubric, exam items, scoring guide for a particular task, supervisor evaluation form, survey instrument, and other assessment tools).

The assessment is based on Faculty Course Assessment Reports (FCARs) which are submitted by the faculty for each course they teach during the academic year. The FCAR requires:

- The faculty member to identify course-specific learning outcomes (LO's) for his/her course and to establish appropriate performance tasks (APTs) with appropriate documentation to assess to what extent the Student Outcomes are being met. These APTs may be quizzes, exam questions, reports, projects, presentations, etc. Each student's APT is then scored with the method shown below (Table

CPI _ Improving Program Learning Outcomes Report

- 1), to create an EGMU vector for that specific Student Outcome and a corresponding assessment metric.
- Each faculty member must satisfy a minimum set of Student Outcomes (1 - 7) for his/her course as established by the department. This is accomplished by using a subset of the Appropriate Performance Tasks (APTs) to satisfy the COs. Here the faculty member is required to show what part of each task is being used to form a metric for the Student Outcomes (1 – 7) with appropriate documentation. To accomplish this task, the department formulated a set of criteria for each Student Outcome (1 – 7) that can be used as a guiding rubric to explain and help faculty evaluate what that outcome requires for an EGMU score of 3 (or “Excellent”). EGMU scores of 2, 1, and 0 represent partial satisfaction of the rubric.

The department has determined that the minimum level of quality that it felt was necessary in order to produce graduates that will ultimately achieve our Program Educational Objectives is **an EGMU score of 2.0 for each Student Outcome**. This score of 2.0 was chosen by the department because in the EGMU score of 2.0 indicates Good and therefore represents what a student would need in order to satisfy the requirements for graduation.

3. ANALYSIS of the assessment results: provide criteria based disaggregate and aggregate data analysis.

The table below shows the EGMU values of the Student Outcomes 1-7:

<u>Outcome #</u>	<u>E</u>	<u>G</u>	<u>M</u>	<u>U</u>	<u>Average</u>
1: Engineering, science, math	750	620	407	328	1.85
2: Design, solve engineering problems	101	111	39	16	2.11
3: Communication	355	195	70	66	2.22

CPI _ Improving Program Learning Outcomes Report

4: Ethical and professional responsibilities	106	91	13	4	2.39
5: Team	225	140	63	49	2.13
6: Experiment	151	140	73	54	1.92
7: Learning new knowledge	190	72	13	13	2.52

4. INTERPRETATION: to what degree did students achieve the program learning outcomes based on your data analysis and expected learning outcomes?

- Overall, the Student Outcomes score is good (generally above 2.0) in most outcomes.
- **Outcome 1.** The students are generally not as facile with mathematics and physics as most of the faculty would like, resulting in poor preparation for engineering courses. The online teaching of high school students during the pandemic made the situation even worse. We had major discussions with the New York Tech Department of Mathematics and Department Physics to see what can be done individually and jointly to improve the outcomes. The dean and faculty also formed a Task Force that benchmarked minimum Math and Physics grades in sister institutions in an effort to improve the preparedness of students before they register in MENG courses. That effort resulted in a new engineering-specific Academics Standards policy that requires student must have a grade of C- or higher for all Math and Physics courses. Other recommendations include more applied problems in early mathematics courses, more use of software to develop facilities with their use and more rigorous school-specific academic standards. Meanwhile, we need to strengthen the services of the Math Center and the newly established Physics/Science Center to better assist the students.

CPI _ Improving Program Learning Outcomes Report

- **Outcome 2.** Students showed satisfactory performance on designs and solving engineering problems. In addition to the senior capstone design course, we have two high-level design courses which help the students to learn and practice on this aspect.
- **Outcome 3.** Overall, students present decent oral communication skills in course and design project presentations. Their technical writing skills need some improvement. In addition to the required FCWR 304 Engineering Writing, students gain more training in communication skills in lab and design courses such as MENG 270 Measurement Lab, MENG 343 Thermal/fluid Lab, and all MENG design courses. IENG 400 and MENG 470 have multiple oral presentation assignments.
- **Outcome 4.** We have strengthened Outcome (4), Ethical and Professional Responsibility. Several courses have added ethics components, such as MENG 470 Senior Design and IENG 400 Technology and Global Issues.
- **Outcome 5.** Students work satisfactorily in teams but improvement is still needed. Currently, MENG 470 Senior Design and MENG 343 Thermal/Fluid Lab have nice teamwork components. More team projects will be incorporated in other courses such as IENG 400 Technology and Global Issues.
- **Outcome 6.** For Student Outcome (6) experiments, we were a little disappointed with the students' performance. Typically, we have small class size, the students would have lots of opportunities to learn in the labs and to perform well in experiments. One possible reason is the hiatus of in-person labs during the pandemic. We will review the lab courses to renew some lab components to excite the students.

CPI _ Improving Program Learning Outcomes Report

- **Outcome 7.** The life-long learning results seem consistent with the nature of the information age, where students understand the use of search tools and the availability of information. They are eager to learn about new technologies and follow the new trends in the field.
5. **CLOSE THE LOOP** – If the expected program learning outcomes were successfully met, describe how the program will keep or expand the good practices, if not, refine or create the next cycle of [PDSA](#)

II. Brief Description of Faculty Engagement in the Current Annual Assessment Report:

All faculty members are engaged in the annual assessment as all faculty members are required to submitted the FCARs for the courses they taught.

Last updated 4/14/23