NYIT Annual Program Assessment Report, June 2018

This report provides evidence that students are achieving end-of-program learning goals and that graduates are attaining achievement outcomes established by the program.

Name of the program: MS Electrical & Computer Engineering

Year (e.g., AY17-18) of assessment report: Academic Year 2017/18

Date Submitted:

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Contact: Steven H. Billis

The Statement of Program Learning Goals and Curricular Matrix are available and **updated** at:
http://www.nyit.edu/planning/academic_assessment_plans_reports**.**

I. Annual Program Learning Assessment:

1. **CLOSING THE LOOP: Many programs proposed improvement actions based AY 16-17 assessment results. Please report where the program are at implementing the improvement plan.**

We are using a cyclical method of assessment for assessing the SOs and we did not assess this particular SO last year. However, we do implement the course actions that were indicated for this SO in a previous semester's assessment of this SO.

2. **GOALS: List program-learning goals that have been assessed in AY17-18.**

The Student Outcomes (or Program Outcomes) of the MS in ECE are:

1.A comprehensive knowledge of computer architecture and system design.

2.A comprehensive knowledge of advanced topics in mathematics and stochastic processes.

3.A comprehensive knowledge of linear systems and digital communications.

4.A comprehensive knowledge of advances in areas such as parallel computing, networks, and VLSI designs.

5.Proficiency in specific areas of specialization such as computer security, quantum computing, nanotechnology, signal processing and information theory.

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Relationship between Program Courses and Program Student Outcomes

Course	SO 1	SO 2	SO 3	SO 4	SO 5
EENG 633 Parallel Computing Systems	x			x	
EENG 635 Probability & Stochastic Proc,		x			
EENG 641 Comp Arch. I	x				
CSCI 665 Linear Systems			x		x
CSCI 670 Electromagnetic Thy					x
EENG 675 Info. Theory		x			x
EENG 720 Modern Ctrl. Theory					x
EENG 725 Queuing Theory		x			x
EENG 726 Markov Processes		x			
EENG 730 Nanotechnology		x			x
EENG 741 Cptr. Arch. II	x			x	
EENG 751 Signal Processing I		x			x

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The SO that the CS faculty elected to assess during this academic year is SO 1.

A comprehensive knowledge of computer architecture and system design

The ECE courses which are strongly linked to this SO are:

EENG 633 “Parallel Computing Systems” (an elective)
CSCI 641 “Computer Architecture I” (cross-listed with EENG 641)
CSCI 741 “Computer Architecture II” (cross-listed with EENG 741)

3. **METHOD: Describe the method of assessment and attach measurement instruments (e.g., rubric, exam items, scoring guide for a particular task, supervisor evaluation form, and standardized assessment tool).**

Our direct method of assessment is based on Faculty Course Assessment Reports (FCARs) which are submitted by the faculty for each course they teach in the fall semester.

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 2), 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 (a - k) 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 (a – k) with appropriate documentation. To accomplish this task, the department formulated a set of criteria for each Student Outcome (a – k) 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, as explained below.

The EGMU Vector is obtained as follows:

Table 2 - EGMU Rubrics

EGMU	Rubric	Score
E - Excellent	Fully demonstrates/accomplishes the attributes and behavior in the rubric	3
G – Good	Mostly demonstrates/accomplishes the attributes and behavior in the rubric	2
M – Minimal	Minimally demonstrates/accomplishes the attributes and behavior in the rubric	1
U - Unsatisfactory	Does not demonstrate/accomplish the attributes and behavior in the rubric	0

A typical EGMU vector for a class with 19 students in which the APT was the third problem of the first exam might be (8, 9, 1, 1) which would signify that 8 students demonstrated a complete and accurate understanding, while 9 students applied appropriate strategies etc. The average score in this case being 43/19 = 2.26 which is Good

These course-embedded assessments serve as the primary tools to determine student outcome achievement and afford a direct link between learning outcomes and student outcomes as one aspect of curriculum change.

The data from FCARs are then evaluated at the spring Faculty Assessment meetings. At these meetings all full-time faculty members and those regular part-time faculty members wishing to participate identify and propose strategies to improve ABET Student Outcomes and, hence, our program educational objectives through course work.

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. (If each of the EGMU scores is adjusted to correspond to the grade points associated with A, B, C, D, a 1.5 is a C.)

The department also uses E&G / All Percentage: This single number indicates for a student outcome, program-wide, what percentage of all scores were E or G. This number is used as a benchmark to study the percentage of individual scores falling above Minimal or Unsatisfactory. The benchmark for this value for graduate programs is 75%.

While many courses may satisfy a particular outcome, the assessment committee has picked a subset of these courses that it finds most appropriate to determine the minimum metric for each outcome.

The recommendations of the assessment committee meetings are generally of two types:. One set of recommendations can be implemented solely through the faculty member making internal changes to the courses (i.e. textbook changes, pedagogical changes). The other set of recommendations would need to be forwarded to the curriculum committees of the School of Engineering and Computing Sciences and then to the Academic Senate for adoption (i.e. new course, prerequisite/co-requisite changes, catalog description).

We have found that each of our assessment tools must be used in conjunction with one another if we are to undertake changes that are meaningful.

4. **ANALYSIS: Report assessment results per learning criteria (e.g., per row of rubric, subset of test items, components of a learning task).**

In EENG 633:

Midterm exam: Problem 1, students were graded on their ability to **Evaluate** and **analyze** the performance of processors, memory hierarchy and I/O devices in a parallel processing system
Midterm exam: Problem 3, students were graded on their ability to **Compute** pipeline speedup under given conditions.
Final exam: Problem 3, students were graded on their ability to **Compute** the speedup of a given parallel computing architecture for a given set of parameters.

In CSCI 641:

Midterm exam: Problem 2, students were graded on their ability to **Identify** and **calculate quantitative measurements** of the values of important characteristics of computer designs such as performance and dependability

Final exam: Problem 1, students were graded on their ability to **Design** a memory hierarchy by analyzing the performances of various alternatives to satisfy the required cost-performance specifications

Final exam: Problem 3, students were graded on their ability to **Compare** instruction level parallelism with thread-level parallelism and **describe** fine-grained multithreading, course- grained, and simultaneous multithreading

In CSCI 741:

Midterm exam: Problem 2, students were graded on their ability to **Derive** expressions for time complexity of various communication operations.
Final exam: Problem 1, students were graded on their ability to **Apply** metrics to quantify the performance of parallel algorithms.
Final exam: Problem 3, students were graded on their ability to **Apply** graph theory to formulate graph algorithms

5. **INTERPRETATION: Provide an interpretation of student strengths and weaknesses for a given program learning outcome.**
6. **IMPROVEMENTS – If any weakness has been identified, provide a plan for improvement, including timeline, and personal responsibility for completion.**

The program level score for this outcome was 2.19 and 79% of the students achieved scores of E and G. Both of these scores met our benchmark values.

An examination of the FCARs for CSCI 641 revealed that students had trouble with the design of a memory hierarchy through an analysis of the performance of various alternatives in order to satisfy cost-performance specifications.

There was also an indication that students had trouble with understanding instruction level parallelism and thread-level parallelism.

The instructor was asked to spend more time on these important topics.

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

All FT and adjunct faculty were required to submit FCARs for the fall 2017 semester. The decision to assess SO 1 was made by the FT faculty

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III. Annual Program Achievement Goals:

Please provide examples of readily available *data* on program student achievement (e.g., first-year retention rates, six-year graduation rates, average time to degree completion, certification exam pass rate, student satisfaction survey results, employer satisfaction results, % pursuing an advanced degree, % of job placement, etc.)

Note. Please contact Associate Director of Planning and Assessment, Shifang Li (sli09@nyit.edu) for assessment support.