Undergraduate Program Assessment

Department of Electrical and Computer Engineering

Student Learning Objectives
ECE Program Outcomes:
Graduates awarded the BS degree in CSE or EE shall:
- Be able to apply knowledge of mathematics, science, and engineering.
- Be able to design and conduct experiments, as well as to analyze and interpret data.
- Be able to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health, and safety, manufacturability, and sustainability.
- Be able to function on multi-disciplinary teams.
- Be able to identify, formulate, and solve engineering problems.
- Have an understanding of professional and ethical responsibility.
- Be able to communicate effectively.
- Have the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- Recognize the need for, and be able to engage in, life-long learning.
- Have knowledge of contemporary issues.
- Be able to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Assessment tools

Direct:
- (i) Assessment courses: Outcomes are linked to assessment courses at the 200 and 300 levels. The instructor in each assessment course identifies specific graded components (exam problem, project report, lab report, etc.) that are appropriate for measuring outcome attainment. The instructor also develops a rubric for assessing attainment level for each student using the scale A (excellent) – B (good) – C (fair) – U (unacceptable). The graded components, the rubric, and the assessments for each individual student are recorded and reported to the ECE Department.

- (ii) Senior Design Project: Every outcome is assessed in the capstone two-course Senior Design Project sequence (E&C-ENG 415 and 416). In the Senior Design Project courses, teams consisting of 3 or 4 students design and build a device or system. The projects require the use of accumulated knowledge of engineering science and design, and are subject to realistic technical and non-technical design constraints. As part of the course requirements, each team submits a preliminary written report in the Fall and final report in the Spring that include descriptions of how outcomes attainment is demonstrated in the project work. The course coordinator uses the reports and knowledge of work done by the team throughout the year to make an assessment (on the same A – B – C – U scale) of attainment of each outcome for each individual team.

Indirect:
- (i) Senior Exit Survey: Graduating seniors are required to complete a survey that (among other questions) asks students to rate their levels of agreement with statements that they have attained each outcome, using the scale: strongly agree – agree – disagree – strongly disagree.

- (ii) Ad-hoc assessments based on course grades: Assessments based on course grades are occasionally performed to examine issues that are indirectly related to outcomes attainment (for example, comparing the success of transfer vs. non-transfer students in 300-level core courses, or the performance in E&C-ENG courses of students who have taken different Math sequences).
Process used to review evidence

Assessments are reported to the ECE Department’s Committee on Undergraduate Program Processes (CUPP) at the end of each semester. That committee compiles and evaluates the assessment data, and then reports the results and any recommendations for action to the department’s Instructional Development Committee (IDC). The IDC uses the assessments, CUPP recommendations, and other information to develop and implement program improvements. Significant program revisions are proposed, discussed and approved at meetings of the full ECE faculty.

Highlighted recent activities

- **Senior Design Project Revisions:** To help improve attainment of several outcomes, lectures were added in the first semester of the Senior Design Project on statistical data analysis, how to recognize and incorporate design requirements and constraints in engineering projects, and the societal contexts and impacts of engineering solutions.

- **Efforts to improve knowledge transfer in applications of math, science and engineering:** Evaluations of assessment data indicated that students were having difficulty applying concepts learned in basic math, science and engineering courses in the new contexts posed in upper-level core courses. The ECE and Math Departments worked together to better align material in Math courses with the requirements of E&C-ENG courses. Instructors of E&C-ENG courses developed diagnostic tests for students entering 300-level courses to help the students identify gaps in their knowledge or understanding that might impede progress. Instructors are currently developing other strategies for improving knowledge transfer from 200-level to 300-level E&C-ENG courses.

- **Improvements in transfer student advising:** Assessments showed that the average grades attained in upper-level courses were significantly lower for transfer students than for non-transfer students. In response, the ECE Department revamped its advising process for incoming transfer students. The students now take diagnostic exams on prerequisite material for 300-level courses before meeting with the Department’s Director of Transfer Advising to help ensure proper placement in courses. A summer review course in fundamental topics from 200-level courses has been made available to incoming transfer students to help prepare them for 300-level courses in the fall.

- **Assessments of achievements of graduates:** To better assess and evaluate the achievements of graduates of our programs, the ECE Department developed an assessment plan based on LinkedIn profiles in the ECE Alumni Group (now having several hundred members) – these profiles list current positions, employment history, education, professional society memberships, etc. An initial assessment based on data from the profiles is currently under way.