



Program Assessment Report (PAR)

Electrical Engineering (EE) Masters Degree

REPORT PREPARED by: Ash, Josh

ACADEMIC YEAR COVERED BY THIS REPORT: 2020-2021

I. PROGRAM LEARNING OUTCOMES

The Department of Electrical Engineering offers a program of graduate study leading to a Master of Science in Electrical Engineering (M.S.E.E.) degree. The M.S.E.E. program is broad in scope and emphasizes portable concepts in the design and analysis of complex physical systems using modeling, synthesis, and optimization techniques, and bridges interdisciplinary engineering areas such as control systems, microwave engineering, power electronics, signal processing, very large scale integrated circuits (VLSI), and wireless communications.

Program Educational Objectives or goals (Program Learning Outcomes)

1. Graduates of the M.S.E.E. degree shall have the ability to apply advanced electrical engineering techniques to solve engineering problems in one or more of the following subject areas VLSI & Electronics, Controls, Signal Processing & Communications, and RF & Microwave.
2. Graduates of the M.S.E.E. degree shall have the ability to clearly communicate engineering solutions.

Assessment Team Members • Graduate Studies Committee, Department of Electrical Engineering

Alignment of program goals to course outcomes

Program Goal	Course Number	Course Outcome
VLSI & Electronics	EE 7530	Understand various level of VLSI Synthesis and corresponding algorithms.
Controls	EE 7020	Understand the solutions to linear state space model, controllability, observability, stability, and state feedback control.
Signal Processing & Communications	EE 7610	Understand the response of linear systems with stochastic inputs and discrete linear models.
RF & Microwave	EE 6420	Understand physics represented by Maxwell's equations and related mathematical and measurement techniques for analyzing and designing microwave transmission lines, couplers, and filters.
M.S. Thesis documents	EE7990	Communicate research results in a thesis document

II. PROCEDURES USED FOR ASSESSMENT

A. Direct Assessment

Assessment Schedule	Program Goal	Data Collection Term	Review Term	VLSI & Electronics
Fall of odd years	Subsequent term	Controls	Fall of even years	Subsequent term
Signal Processing & Communications	Fall of even years	Subsequent term	RF & Microwave	Fall of odd years
Subsequent term	M.S. Thesis documents	Per thesis defense	Subsequent year	Course outcomes to assignment
Course Number	Course Outcome	Assignment Title	EE 7530	Understand various level of VLSI Final project
Synthesis and corresponding algorithms.	EE 7020	Understand the solutions to linear state	Final exam	space model, controllability, observability, stability, and state feedback control.
EE 7610	Understand the response of linear systems	Final exam	with stochastic inputs and discrete linear models.	EE 6420
Understand physics represented by Maxwell's	Mid-term exams (x4),	Final exam,	lab practicum exam (x2)	equations and related mathematical and measurement techniques for analyzing and designing microwave transmission lines, couplers, and filters.
EE 7990	Communicate research results in a thesis document	Final thesis defense	As per collection schedule,	the collection of student artifacts for 2020-2021 include
Term Class	Collection Method	Fall 2020	EE 7020	Final exam
Fall 2020	EE 7610	Final exam	By MS thesis defense	EE 7990
Rubric completed by committee				

B. Scoring of Student Work

The program educational objectives are mapped to specific learning outcomes of the program major (track) areas. Each student in the program is required to complete at least three courses from at least one of the four major (track) areas as part of their Program of Study (POS). Consequently, program learning outcomes are measured over at least one core course in the selected track of a student's POS. Specific learning outcomes are directly assessed by evaluating the student's performance in corresponding course assignments, projects and/or exam problems. Course data is collected every two years per course. All MS thesis data are collected.

C. Indirect Assessment

The Electrical Engineering Department has established an active External Advisory Board (EAB) comprised of local and regional business leaders, hiring managers, practicing engineers and well-established alumni. Most of the EAB members are responsible for hiring departmental graduates or student-trainees for their respective organizations. The EAB meets with the department faculty twice a year in Spring and Fall when they review the department's current status and progress in existing programs, as well as future plans. EAB provides guidance on any proposed curriculum changes, new courses, and overall program evolution to meet local and regional market demand as well as industry expectations. The EAB participants make strategic recommendations and specific course and curriculum suggestions to the program based on their own organizations' requirement and to cater to general market direction. This is a continuous evaluation process and all major program changes and all program

learning outcomes as well as any new courses or new programs developed over the past five years were reviewed and approved by the EAB. College of Engineering and Computer Science's "Master of Science Assessment of Learning Outcome Survey" used during Exit Interview serve as additional measures for indirect assessment. The survey collects graduating students' assessment of self-efficacy for the learning outcomes. For each outcome the students are asked to rate their own level of ability/achievement that provide additional data point to the department faculty.

III. ASSESSMENT RESULTS/INFORMATION:

2020-2021 Assessment Items 1) EE 7020 Final exam 2) EE 7610 Final exam 3) EE 7990 Rubric completed by committee

For each assessment item, an individual scoring at least 70% is deemed satisfactory. Below, we summarize student performance as the percentage of students achieving satisfactory performance. 1) EE 7020 Percentage of students achieving satisfactory performance = 100% Course learning outcome achieved. No concern is raised. 2) EE 7610 Percentage of students achieving satisfactory performance = 91% Course learning outcome achieved. No concern is raised. 3) EE 7990 Percentage of students achieving satisfactory performance = 100% Course learning outcome achieved. No concern is raised.

Understand various level of VLSI Synthesis and corresponding algorithms. Understand the solutions to linear state space model, controllability, observability, stability, and state feedback control. Understand the response of linear systems with stochastic inputs and discrete linear models. Understand physics represented by Maxwell's equations and related mathematical and measurement techniques for analyzing and designing microwave transmission lines, couplers, and filters. Communicate research results in a thesis document.

IV. ACTIONS TO IMPROVE STUDENT LEARNING

Course outcome data were collected per schedule by the course instructors and transmitted to the Graduate Studies Committee, Graduate Academic Advisor, the Graduate Program Director and the Department Chair on schedule. The responses are reviewed to identify any potential issues. The Graduate Studies Committee, academic advisor and the Department Chair formally meet at least once every semester to review all program and track courses, relevance of pre-requisites, course modifications and new course additions to ensure that the program is aligned to the student education objectives. Note, we received university feedback from the previous year's report in November 2021. While this did not leave time for the committee to respond in the current 2020-2021 report, one of the charges of the EE Graduate Studies Committee in 2021-2022 will be to update

our assessment procedure to incorporate the advice provided alignment of learning outcomes, etc. Program changes that have been instituted in the last five years include, • Combine lecture/labs of 7000-level courses for efficient utilization of department resources (2020) • Remove some 7000-level service courses that are not aligned with EE student interests (2019) • Cross-list some CEG/CS courses that are aligned to EE Track requirements so that these courses can be treated as EE courses as part of a student's MS Program of Study (2019) • Added new courses that are more aligned to the current market needs on emerging technologies • Added new MS Certificate programs to provide students with theoretical concepts and practical know-how to earn university certified credentials on one of EE track specializations. (2018)

V. SUPPORTING DOCUMENTS

Additional documentation, when provided, is stored in the internal Academic Program Assessment of Student Learning SharePoint site.