Electromechanical Engineering Technology Program

Plan for

Assessment and Evaluation of Student Outcomes

Assessment Processes

The high-level process for defining, assessing, and evaluating student outcomes is shown in Figure 1. The assessment and evaluation processes are described below in some detail.

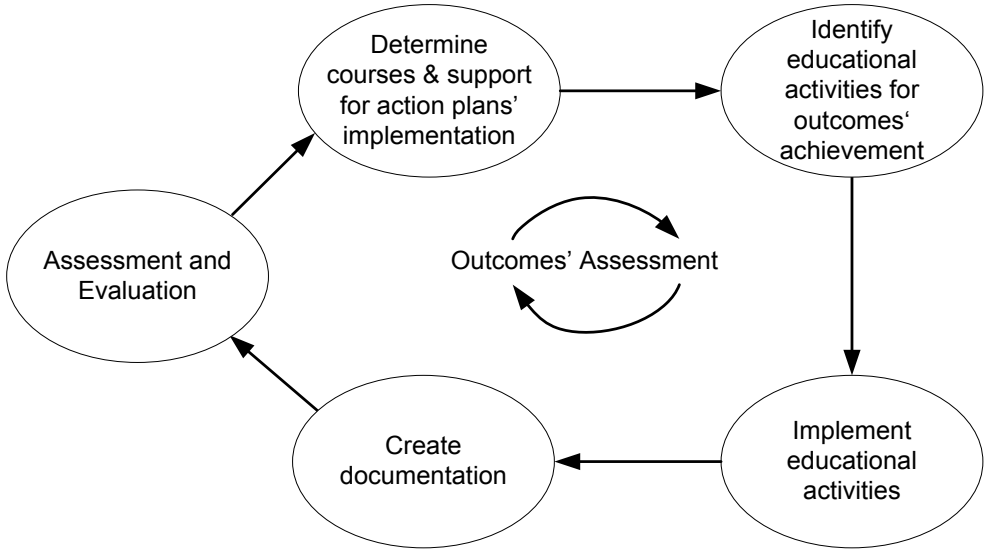

Figure 1. The process for defining, evaluating, and assessing program outcomes.

Assessment Reports

Assessment reports must include the following information:

- Grades: the number of students who obtain an A, B, C, D, F, or an incomplete/drop.
- Assessment tools/activities/instruments/data collection processes used to measure the level of attainment of student outcomes, presented in a table.
- A section with at least the following information:
    - Methodology: when/how much time students were given for this activity; tools (software/hardware/applications) students used to complete the activity; type of activity (theoretical, hands-on, simulation).
- Target: the expected level of performance of a student in a given activity. Since the activity is mapped to a student outcome, the target represents the expected level of attainment of the corresponding student outcome.
- Description: an explanation of the activity and how different items of the activity contribute to the achievement of student outcomes being assessed and evaluated; description of each question/task used for evaluation purposes.
- Results: comprehensive analysis of the results for all questions/tasks used for assessment and evaluation purposes; results may be broken down for each question or reported collectively.
- Conclusion and action plans: the instructor provides concluding remarks based on the analysis of the results of the activities. The instructor may highlight those activities that were successfully implemented and that might be worth repeating or strengthened. Action plans are recommendations (justified on evaluations of results) to be implemented in future offerings of the course and are intended to correct identified issues/deficiencies/problems. Recommendations are then presented during the assessment and evaluation meetings and confirmed/changed/denied by faculty members.

Each course of the Electromechanical Engineering Technology program has an assessment coordinator (a full-time faculty member who is usually the instructor of the course) responsible for the course. The assessment coordinators are listed in Table 1. Note that assessment and evaluation are not conducted in all classes of the program.

Code	Name	Assessment Coordinator
ENGR 110	**Introduction to Engineering**	Ashis Nandy
ENGR 110	**Introductory Math for Engineering Applications**	Vishal Mehta
DRFT 100	**Computer Aided Drafting I**	Ashis Nandy
MET 201	**Applied Mechanics I**	Ashis Nandy

MET 301	**Applied Mechanics II**	Ashis Nandy
EECE 152	**Computer Programming I**	Steve Cox
EET 400/L	**Control Systems and Instrumentation**	Ivan Lopez
EET 200	**Electrical Systems I**	Ivan Lopez
EET 200L	**Electrical Systems I Lab**	Raul Peralta
EET 300	**Electrical Systems II**	Ivan Lopez
EET 300L	**Electrical Systems II Lab**	Ivan Lopez
ENGR 480	**Engineering Management and Project Management**	Ivan Lopez
MET 302	**Strength and Properties of Materials**	Ashis Nandy
IT 491	**Manufacturing Processes & Automation**	Ashis Nandy
MET 303	**Thermodynamics**	Ashis Nandy
MET 317	**Fluid Mechanics**	Ashis Nandy
EECE 472	**Photovoltaics Devices**	Vishal Mehta
EMET 402	**Robotics**	Ivan Lopez
EMET 454	**Solar Thermal Applications and Energy Storage**	Vishal Mehta
MET 421	**Heat Transfer**	Vishal Mehta
EMET 400	**Advanced Electro-Mechanical Design**	Vishal Mehta
EMET 490	**Capstone I**	Vishal Mehta

Table 1. Per course assessment coordinators.

Instructors and assessment coordinators identify educational activities such as laboratory development and rubrics to measure and judge performance, exams, quizzes, educational materials, and hands-on activities. If educational activities are changed or added to a course, then these activities may require a modification of specific knowledge, techniques, and skills that are subsequently mapped to student outcomes.

Guidelines for the Assessment Cycle Fall 2015 - Spring 2018

Student Learning Outcomes

- Each of the 20 student learning outcomes has a course identified where it will be measured during the three-year cycle.
- Every outcome has a full-time faculty member identified and responsible for the measurement and the report.
- Timelines were identified for every sub-outcome to be measured.
- Table I provides the above information.
- Every weekly departmental meeting will provide time for discussion and updates on assessment and measurement instruments.

Data Sampling

- Data will be collected only from students enrolled in the class for credit.
- Any possible graduate student will not be considered for assessment if the class is cross-listed with graduate classes.
- Students from other institutions enrolled in shared classes (i.e., sun-online, UNM-TUES, etc.) are not considered for assessment.
- Since current classes are typically less than 20 students, there is no sampling for assessment. This will be revisited if the size of the classes increases.
- Dropouts are not considered to evaluate the achievement of the outcome if the measurement is taken after the drop.

Definitions of Performance

- Assessment instruments will be peer-reviewed before using them.
- Data will be presented in histograms/table.

Level of Attainment of outcomes per student:

- Target Met: a student achieves a 70% of the instrument scale.
- Target Not Met: a student does not achieve a 70% of the instrument scale.

Level of Attainment of outcomes per class:

- Target met: 75% of all students achieve target.
- Target in progress: less than 75% of all students achieve target.

Level of Attainment of outcomes for the Program:

- For 100-level and 200-level classes, the department assigns 1 point if the level of attainment is marked as "Target in progress".
- For 100-level and 200-level classes, the department assigns 2 point if the level of attainment is marked as "Target met".
- For 300-level and 400-level classes, the department assigns 2 point if the level of attainment is marked as "Target in progress".
- For 300-level and 400-level classes, the department assigns 4 point if the level of attainment is marked as "Target met".

The level of attainment of a student outcome considering all courses where the student outcome is measured, is defined as:

$$\boldsymbol{Level\ of\ attainment\ of\ outcome} = \frac{\boldsymbol{Points\ achieved}}{\boldsymbol{Maximum\ points\ in\ outcome}}$$

Action Plan Development:

- A meeting at the end/beginning of the current/next semester will be held and the actions plans will be develop after analyzing all the data collected.

Discuss Program Educational Objectives

- Program Educational Objectives for this new proposed program were developed by the faculty and the external advisory committee.
- Program Educational Objectives will be reviewed and updated every 3 years. They will be reviewed by all constituencies including: external advisory committee, employers, alumni, faculty and current senior students.
- The data will be collected from employers and alumni to help faculty and the advisory group to review the Program Educational Objectives.

Course Materials used for Assessment.

- One white binder per course (only for courses where outcomes were assessed).
- Tab one (yellow) for the syllabus.
- Tab two (yellow) for the assessment report.
- For every outcome assessed in the course, a tab (red) will be used to separate them.

- At the beginning of every outcome, a brief description of the instrument(s) used to measure the outcome.
- The tab will contain the ALL student work (unless sampling was used for assessment: see sampling instructions) and the instrument used.

Courses Material (for all classes)

- Syllabus
- Samples of exams, homework, quizzes, projects, etc. Three samples of each instrument.

This will be kept electronically in a cloud-based system and printed as needed.

Program Educational Objectives

1. Graduates will be situated in growing careers involving design, development, and support of Electro-Mechanical Engineering Systems.

2. Graduates will perform effectively both individually and in teams.

3. Graduates will demonstrate involvement in high technical and leadership roles.

4. Graduates will continue personal and professional growth to remain globally competitive.

Curriculum Map for Electro-Mechanical Engineering Technology

(Student Learning Outcomes)

A preliminary draft of the curriculum map is shown next. The document is focused on student learning outcomes assessment in upper division courses (which is ABET's recommendation). This evolving document will be updated after the proposal is reviewed by the External Advisory Committee and the Curriculum Committee.

	Student Learning Outcomes (ABET)																			
Technical Mandatory Courses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Introduction to Engineering									A											
Introductory Math for Engineering Applications		A																		
Computer Aided Drafting I	A											A								
Applied Mechanics I		A																		
Applied Mechanics II														A						
Computer Programming I															A					
Control Systems and Instrumentation															A	A		A	A	
Electrical Systems I						A					A									
Electrical Systems I Lab			A																	
Electrical Systems II											A		A				A			
Electrical Systems II Lab					A								A							

Engineering Management and Project Management									A											A
Strength and Properties of Materials		A	A																	
Manufacturing Processes & Automation												A		A						
Thermodynamics	A																			
Fluid Mechanics			A														A			
Photovoltaics Devices				A																
Robotics										A					A			A		
Solar Thermal Applications and Energy Storage							A	A												
Heat Transfer										A										
Advanced Electro-Mechanical Design	A															A			A	
Capstone I				A	A	A	A	A												A

Student Learning Outcomes:

SO1. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;

SO2. An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;

SO3. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;

SO4. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program

educational objectives;

SO5. An ability to function effectively as a member or leader on a technical team;

SO6. An ability to identify, analyze, and solve broadly-defined engineering technology problems;

SO7. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;

SO8. An understanding of the need for and an ability to engage in self-directed continuing professional development;

SO9. An understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;

S10. A knowledge of the impact of engineering technology solutions in a societal and global context;

S11. A commitment to quality, timeliness, and continuous improvement;

S12. Use computer-aided drafting or design tools to prepare graphical representations of electromechanical systems;

S13. Use circuit analysis, analog and digital electronics, basic instrumentation, and computers to aid in the characterization, analysis, and troubleshooting of electromechanical systems;

S14. Use statics, dynamics (or applied mechanics), strength of materials, engineering materials, engineering standards, and manufacturing processes to aid in the characterization, analysis, and troubleshooting of electromechanical systems;

S15. Use appropriate computer programming languages for operating electromechanical systems;

S16. Use electrical/electronic devices such as amplifiers, motors, relays, power systems, and computer and instrumentation systems for applied design, operation, or troubleshooting electromechanical systems;

S17. Use advanced topics in engineering mechanics, engineering materials, and fluid mechanics for applied design, operation, or troubleshooting of electromechanical systems.

S18. Use basic knowledge of control systems for the applied design, operation, or troubleshooting of electromechanical systems;

S19. Use differential and integral calculus, as a minimum, to characterize the static and dynamic performance of electromechanical systems; and

S20. Use appropriate management techniques in the investigation, analysis, and design of electromechanical systems.

Student Learning Outcomes Assessment Plan
Fall 15-Fall 16

Fall 2015
Applied Mechanics I: Outcome 2
Introductory Math for Engr. Applications: Outcome 2
Electrical Systems I: Outcome 11
Computer Aided Drafting: Outcome 12

Spring 2016
Computer Aided Drafting: Outcome 1
Strength and Properties of Materials: Outcome 3
Electrical Systems I: Outcome 6

Fall 2016
Thermodynamics: Outcome 1
PV Devices: Outcome 4
Applied Mechanics II: Outcome 14

Future semesters will be planned later.