

## **Actions for Program Improvement**

(ME Website: Accreditation, Assessment, and Program Improvement)

Actions taken for program improvement during the preceding assessment cycle (2008 Fall to 2014 Spring) included:

<b>Item</b>	<b>Time Frame</b>	<b>Assessment Tool Data &amp; Collaborating Sources of Evidence</b>	<b>Actions Taken</b>	<b>Action Status &amp; Effects of Change(s)</b>
Need for more basic instruction in MATLAB™, which is used in several courses in the ME curriculum	2010-11 Mid-Cycle Review	Alumni Survey Employer Survey Senior Exit Oral Interviews with Chair	(1) Short courses in MATLAB offered (2) MATLAB became recommended programming language in ENGR 1120 Programming for Engineers (3) Additional instruction in MATLAB provided in ME3001 Mechanical Engineering Analysis	Completed. Improvement: Lack of MATLAB instruction is no longer mentioned as a comment in the Alumni surveys
Relatively low performance of students in the Statics/Dynamics topical areas on the FE Exam	2010-11 Mid-Cycle Review	FE Exam	Preliminary data analysis conducted by Hoy in 2013, but results were inconclusive. A more in-depth analysis to be done in Fall, 2014.	On-going
The topic of "Exergy" was not being covered in the ME curriculum	2010-11 Mid-Cycle Review	FE Exam	Exergy was included as a course topic in ME3220 Thermodynamics II in Fall, 2011	Completed. Improvement: Scores on the FE PM exam questions on "Thermo & Energy Conversions Process" have shown a slight increase since this was implemented.
No formal exposure to PLC programming available in the curriculum	2010-11 Mid-Cycle Review	Alumni Survey Employer Survey Senior Exit Oral Interviews with Chair ME External Advisory Board	(1) PLCs were added to ME4444 Senior Design. This was then moved to ME3023 Measurement Systems, and finally to ME3060 Dynamic Modeling and Controls. (2) At the request of ME and other CoE departments, the ECE department began offering ECE 3270 Programmable Logic Controller Lab in Fall, 2010. This can be taken by ME students as 1 cr-hr toward the AOE (Area of Emphasis) requirements in the BSME program	Completed. Too soon to see an improvement as PLCs were formerly incorporated as a required lab in ME 3060 in Spring 2014.
The need for improvement in communication skills (written and	2010-11 Mid-Cycle	Co-Op Employer Survey Alumni Survey	Two items were added to ME4444 Senior Design Project: (1) An evaluation of the group oral presentations by a	Completed. Improvement: Both

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oral) to meet the expectations of employers	Review	Employer Survey ME External Advisory Board	staff member with training in business presentations, both at the beginning of the semester (project proposal), and the end of the semester (2) Division of oral and written communications as separate items in the rating form used by the External Evaluator of the Senior Design Projects	the Written and Oral presentations/reports were rated between "High" and Superior" by the External Evaluators of ME 4444 Senior Design Project in Spring 2014.
Exposure to and depth of knowledge in electricity and magnetism needs to be strengthened	2010-11 Mid-Cycle Review	FE Exam	PHYS 2120/2121 Physics II–Electricity and Magnetism / with Lab was added to the BSME curriculum as a required course in Fall, 2011 as part of the Complete College Act-TN	Completed. Improvement: Scores on the FE AM exam questions on "Electricity & Magnetism" have shown an increase since this was implemented.
Increased exposure to matrix algebra and associated increased depth and performance in math	2010-11 Mid-Cycle Review	FE Exam Senior Exit Oral Interviews with Chair	MATH 2010 added to the curriculum as part of the Complete College Act-TN	Completed. Degree of improvement not known. (Not able to separate matrix algebra from overall "Mathematics" questions on FE Exam.
Improved access to up-to-date computing facilities, modern software tools, and improved IT response is needed	2010-11 Mid-Cycle Review	Senior Exit Written Survey Senior Exit Oral Interviews with Chair University-commissioned external review in 2012 of TTU Information Technology Services	(1) In response to the findings of the external report, the position of Chief Information Officer, reporting directly to the President, was created. (2) College and Departmental resources continued to be invested in modernizing and improving access to computing services within the College of Engineering (3) Coordination of IT-related personnel into a College-level group headed by the ITS liaison to the College of Engineering (4) Modernization of instructional and computing	Completed, but with continuous improvement

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			technology within CoE classrooms and labs (5) A "help-ticket" system was implemented in the College of Engineering to coordinate and improve IT response time	
Need for a post-FE Exam survey (as recommended by NCEES) to gain more insight into ways to improve student performance on the FE exam	2009-2011	FE Exam	A post-FE Exam survey was given to students in ME4444 Senior Design from Spring, 2009 to Spring, 2010 (3 sem.). The results of this survey were used by the ME Goals & Assessments Committee to better understand student's perceived level of preparation & performance (Good), compared to their actual performance (Satisfactory)	Completed
Create a dedicated Computer Lab for ME students with updated hardware and increased access	2008	Senior Exit Oral Interviews with Chair	The ITS Computer Lab in Brown Hall Room 207 was taken over by the ME & ECE departments and turned into a 24/7 card-swipe access lab for CoE majors. New hardware was purchased for this lab by ME and ECE.	Completed
Provide courses in software tools such as ANSYS, Pro-E, Fluent, etc.	2010-2012	Senior Exit Oral Interviews with Chair	To address this need, short courses in ANSYS, MATLAB, and Pro-E were offered on a pilot basis. Lack of available resources has prevented the continuation of these efforts.	Instituted, but not sustained due to lack of available instructor resources
Provide more training in hands-on skills such as welding, machining, etc.	2008-2013	Senior Exit Oral Interviews with Chair	(1) M.E. Machine Shop technician took a course in welding from the Manufacturing & Industrial Technology Department to improve his welding skills in preparation for offering workshops in welding to interested M.E. students. (2) Offer short courses in hands-on skills such as welding and machining	(1) Completed (2) Not implemented so far due to lack of personnel resources
Lack of consistency in instructor expectations of student performance in some courses	2011-2013	Senior Exit Oral Interviews with Chair Senior Exit Written Survey Comments	(1) Introduction of the Instructional Outcomes-Faculty Assessment in Spring, 2014 as a measurement tool will help address this issue by providing documentation of instructor expectations of level of student performance corresponding to level-of-attainment of course instructional outcomes (2) Review and continued monitoring of the Faculty Assessments in Item (1) by a yet-to-be-designated faculty group(s) will help improve consistency among different instructors of the same course	(1) Completed (2) On-going
MATH 4510 Adv. Math for	2008-2011	Senior Exit Oral Interviews with Chair	In order to address these concerns, MATH 4510 was	Completed

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Engineers not useful/relevant to the M.E. students		Senior Exit Written Survey Comments	dropped as a curricular requirement in Fall 2011 and replace by a new course, ME3001 Mechanical Engineering Analysis. ME3001 retains a number of important topics from MATH 4510, but with applications to mechanical engineering problems.	
Insufficient course and career advising	2008-2013	Senior Exit Oral Interviews with Chair	Improved advising has become a top priority for both the College and University, as evidenced by their presence in in the strategic plans of both, and the increased resources and effort being expended in this area. Included among these are: (1) Formation of a College of Engineering "Student Success Center", with a director, a staff person, two advisors (one part time for international students), and student ambassadors (2) Four additional permanent advisors being hired for the CoE by the University	(1) Completed (2) In-process
Exposure and knowledge of probability and statistics needs to be strengthened	2013-14 End-of-Cycle Review	FE Exam ME External Advisory Board	Bring request to ME Undergraduate Committee to explore ways to increase student exposure to Probability and Statistics in the curriculum	Pending
Expected performance in statics and dynamics needs to be raised	2013-14 End-of-Cycle Review	FE Exam Faculty feedback in subsequent courses	(1) Recitation session added to ME2330 Dynamics in Spring, 2014 (2) Data analysis to be conducted of grades received in Statics & Dynamics and their relationship to student performance in subsequent courses	(1) Completed (2) Pending
Expansion and development of the ME Senior Design Course into a Senior Design "Program"	2014-15	ME External Advisory Board (Spring, 2014 meeting)	Due to the increasing growth in enrollment and a new focus on externally funded senior design projects, the current ME4444 Senior Design course has become overwhelming and unsustainable if it were continued in its current, single-instructor format. Instead, a Senior Design Project program will be developed, involving several faculty and staff assistance, project advisors and evaluators from industry, development of a steady revenue stream, and increased visibility throughout and beyond the campus. Extension of the course into a two-semester design sequence from its current one-semester format is also being examined.	Development started, Spring, 2014.

