PENNSTATE

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Self-Study Report – Part I

Baccalaureate Degree in Electro-Mechanical Engineering Technology (BSEMET)

The Pennsylvania State University

Berks Campus

June 2006

PREPARED FOR:

Accreditation Board for Engineering and Technology (ABET)

Technology Accreditation Commission (TAC)

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Appendices

A. Background Information

A.1. Titles

The Electro-Mechanical Engineering Technology (EMET) program is a two plus two year (2+2) program in engineering technology that awards a Bachelor of Science in Electro-Mechanical Engineering Technology diploma to successful graduates. Beginning in Fall 2006 the program is also offered as a four-year program admitting first-year students directly into the major. The EMET diploma is the only degree awarded; there are no options.

A.2. Program Modes

The EMET program is offered as a full-time day program and as a part-time evening program. Every prescribed course has an evening section scheduled at least once every three years. There are no off-site, co-operative, online, distance-learning, or other non-traditional offerings.

A.3. Actions to Correct Previous Findings

The Technology Accreditation Commission of the Accreditation Board for Engineering and Technology conducted an evaluation at Penn State Berks-Lehigh Valley College of the Electro-Mechanical Engineering Technology Program during 2001-2002. The baccalaureate degree program was newly accredited to September 2004, and then, reaccredited to September 2007.

A summary of the Final Statements for the four-year engineering technology program is illustrated in the table below. Strengths were noted for both the institution and for the program. Neither deficiencies nor concerns were identified. Weaknesses and Comments aligned with a few central themes, primarily regarding student recruiting and laboratory equipment.

TABLE 1: ABET TAC Findings at Penn State Berks

	Berks	EMET
Institutional Strength	1	-
Institutional Deficiency	0	-
Institutional Weakness	0	-
Institutional Concern	0	-
Institutional Comment	1	-
Program Strength	-	2
Program Deficiency	-	0
Program Weakness	-	1
Program Concern	-	0
Program Comment	-	1

The Penn State Berks Campus identified initiatives to address the TAC findings from the previous site visit. These initiatives are being used to demonstrate continuous improvement or closing the loop as required by the TC2K criteria for the upcoming 2006-2007 accreditation visit by ABET.

ABET suggested in its 2001-02 Institutional Comment that aggressive marketing steps be undertaken to market all ET programs in the immediate and surrounding communities. Berks developed seven actions to address this comment:

- Berks developed new program brochures and sent them to high school students indicating an engineering preference on the Scholastic Aptitude Test.
- Berks upgraded the program Web-site to include links to a degree overview, course sequences, current faculty, alumni perspectives, and admission's home page.
- Berks provided four annual Open Houses for students and parents to discuss the ET programs and to tour laboratory facilities.
- Berks developed stronger partnerships with local secondary schools through Project Lead The Way training institute for teachers.
- Berks developed articulation agreements with regional community colleges offering two-year ET degrees.
- Berks continues to offer evening classes for part-time students completing their degree while working full-time.
- Berks enhanced its First-Year Testing, Counseling, and Advising Program to inform engineering majors of interest in ET majors.

ABET required in its EMET Program Weakness that the program develop a set of measurable goals that can be used as the basis for the continuous improvement program. Berks implemented two actions to address this weakness:

- Berks published a set of program goals/objectives along with a detailed listing of intended learning objectives/outcomes in all academic areas of the program.
- Berks developed assessment strategies for the intended learning objectives in collaboration with Berks' Institutional Research and Assessment Officer and a continuous improvement plan in collaboration with SEDTAPP.

ABET suggested in its EMET Program Comment that the faculty develop guidelines for presenting a uniform and consistent spectrum of educational outcomes that will help to ensure uniformity in grading. Berks developed one action to address this comment:

- Berks coordinated instructors to maintain uniform standards for writing activities in the EMET 321W and the MET 210W courses.

Penn State Berks addressed areas for improvement identified by ABET during the last accreditation visit. A recruitment strategy was developed to stabilize the enrollment in the engineering technology programs and to provide an opportunity for growth. The strategy encompassed producing and distributing advertising brochures to prospective students; involving faculty and admissions staff at promotional events for parents and students; developing partnerships with secondary schools, career and technology centers, and community colleges; and enhancing program information available on our Web sites and during individual freshman advising sessions. A laboratory renovation and equipment upgrade was conducted to provide more laboratory experiences for students on industrial type equipment. Two laboratories were repainted, refurnished, and reequipped. Grants and gifts were secured to purchase over $100,000 worth of modern equipment for the engineering technology labs. Several initiatives closed the loop leading to quality improvements in the ET programs at the Berks Campus of the Pennsylvania State University.

B. Accreditation Summary

Current criteria of the Accreditation Board of Engineering and Technology (ABET) require that, to be accredited, engineering technology programs must adopt clearly defined and measurable *objectives* and *outcomes*. The meaning of these two terms are clearly and explicitly defined by ABET. *Objectives* represent those accomplishments that can reasonably be expected of program graduates in the first few years after graduation. *Outcomes* represent the skills, knowledge and capabilities that graduates should possess at the time of graduation so that they are properly prepared to achieve the *objectives* of the program.

The EMET program at Penn State is offered at four campuses within Penn State University, Berks being one of them. However, the program is academically controlled and administered by the School of Engineering Design, Technology, and Professional Programs (SEDTAPP), which is a department within Penn State's College of Engineering. Accordingly, the EMET program curriculum, its *objectives* and *outcomes* are common to all programs. Further, these program characteristics are established and maintained through a process that involves faculty and program constituents from all sites where the program is offered. The details of that process are described later in section B.3 – Assessment and Evaluation. The current EMET program *objectives* and *outcomes* established through that collective process are described below.

B.1 Criterion 1 - Program Educational Objectives

B.1.a – Philosophy of EMET Program Objectives:

To be valid, program objectives must be derived from the larger vision and mission of the University and the College that offers the program. In the case of the EMET program, this linkage is easily drawn. As stated in the latest University strategic plan, Penn State "*is a multi-campus, public land-grant university that improves the lives of people…through, integrated, high-quality programs in teaching, research and service*."[1] In the arena of academic programs, the University pursues this vision via a strategy that calls for "*review[ing] academic programs [for] quality, centrality, and demand [and] identify[ing] programs for enhancement, expansion, redefinition, merger, or elimination to achieve world-class excellence*."[2] Within the University, the College of Engineering (COE) is the primary agent responsible for pursuing this academic strategy for engineering technology programs. That responsibility is reflected in the College's most recent strategic plan, which states that the College's mission is to '*develop and deliver an*

[1] "Progress Amidst Challenge –Pennsylvania State University Strategic Plan – 2003-04 through 2005-06," pg. 4.
[2] Ibid, page 6.

undergraduate curriculum based on active, problem-based and professionally oriented teaching and learning'[3] and to do so in a way that gives Penn State engineering technology programs their '*own identity and decision making capability*,' '*strengthen[s] baccalaureate pathways for viable programs*,' and '*markets Penn State engineering technology programs nationwide*.'[4]

In the SEDTAPP's view, the University's and College's focus on '*problem-based, professionally oriented*' academics is consistent with the demands that future engineering technology graduates will face. That is, job challenges for future graduates will be driven more by two trends – rapid changes in technology (automation, digitization, miniaturization, embedded computerization, etc.) and market globalization – than by any other factors. In that context, it will not be so much the facts and information that graduates acquire while in school that matter, but will instead be their ability to apply new facts and information to the conceptualization, evaluation and solution to new problems, to be able to convey those solutions in clear fashion to others, and to do so in the context of local and international demands and constraints. Further, their professional success and advancement will hinge on their ability to respond to new problems with these skills.

In the arena of the electro-mechanical technologist, modernization, digitization, and automation will affect elements from almost all aspects of electrical technology. Analog sensors measure the state of the surroundings. Signal conditioners manage and digitize that information, and computers or embedded processors use the digitized information to determine desired actions and information. Computed results drive both digital and analog devices to move things, display things, alter things, communicate, generate or control power, or otherwise produce desired effects. Increasingly, emerging technologies, new materials, and innovative new devices dramatically change capabilities in all of these areas.

EMET graduates immersed in this environment will be obligated to understand, assemble, install, operate, troubleshoot, and help in the design of all aspects of these new technologies. To succeed, they will need a solid theoretical foundation across the spectrum of electrical, electronic, digital and computer topics. More important, they must understand how to apply those theories to quantify the practical capabilities and limitations of the emerging technologies. However, theoretical and practical understanding alone will not be enough. Increasing global competition requires more interaction and cooperation among individuals of differing cultures and backgrounds, regardless of occupation. Strong interpersonal and communication skills, and sound social, environmental, and ethical awareness will be as essential as technical skills.

Finally, the rapid pace of technological change in recent years has made it clear that the technical details that students learn in school will be obsolete long before their careers end; possibly even before the ink is truly dry on their diplomas. The only defense against technical obsolescence is a commitment to continual education, either self-directed or in an organized format. Technical specialists must accept this commitment or they will fail.

With this philosophical framework, the objectives *adopted for Penn State's EMET program are:*

[3] Penn State University College of Engineering Strategic Plan, 2005/6 – 2008/9, page 11.
[4] Ibid., page 13.

B.1.b – EMET Program Objectives:

Specific educational objectives of the program (first few years after graduation) are to:

I. *Provide graduates with a broad knowledge of electrical, electronic, mechanical, instrumentation, machine technology, computer applications, and controls applicable to electro-mechanical systems.*
II. *Prepare graduates who can apply technical knowledge to the development, operation, control, troubleshooting, maintenance, and management of electromechanical systems.*
III. *Prepare graduates who can communicate effectively and work collaboratively in multi-discipline teams.*
IV. *Prepare graduates who are productive professionals in technical careers and who continue to adapt to changes in the technical fields.*

B.2 Criterion 2 - Program Outcomes

The program *objectives* outlined above are the achievements that are expected of EMET graduates once they leave Penn State and embark on their careers. Program *outcomes*, on the other hand, are those skills and capabilities that are the foundation on which those achievements can be built. Stated differently, *outcomes* are the talents, skills, and capabilities that should be imparted to students so that, when they leave Penn State, they are well-equipped to succeed at their chosen careers. The Penn State EMET program has identified thirteen *outcomes* that provide that foundation.

B.2.a – EMET Program Outcomes

1. *Students should be able to identify, analyze, and solve technical problems related to integration of electrical, mechanical, instrumentation, computers, and control components to perform industrial and manufacturing functions.*
2. *Students should be able to apply concepts of calculus, differential equations, and probability and statistics, as appropriate to the applied design and analysis of electromechanical systems.*
3. *Students should be able to plan and conduct experimental measurements, use modern test and data acquisition equipment, and be able to analyze and interpret the results.*
4. *Students should be able to apply electrical, electronic, and mechanical devices; computers; and instrumentation systems, as appropriate, to the development, operation, troubleshooting, and maintenance of electromechanical systems.*
5. *Students should be able to apply advanced engineering mechanics, engineering materials, machine design, and fluid mechanics, as appropriate, to the development, operation, troubleshooting, and maintenance of electromechanical systems.*
6. *Students should demonstrate basic knowledge of control systems, including appropriate computer technologies and programming skills, as appropriate, for the applied as applied to the design, operation, troubleshooting, and maintenance of electromechanical systems.*

7. *Students should be able to choose appropriate technology to solve problems.*
8. *Students should be able to apply the engineering design process to solve open-ended problems.*
9. *Students should recognize the social, economic, safety, quality, reliability, and ethical issues in the work environment.*
10. *Students should be able to effectively communicate their ideas and solutions orally, in writing, and graphically.*
11. *Students should demonstrate the ability to work as professionals on a team and in a project environment.*
12. *Students should recognize the need for life-long learning, be prepared to continue their education through formal or informal study, and be able to adapt to a continuously changing work environment.*
13. *Students should have respect for diversity, and knowledge of social and global issues.*

B.2.b – Relationship Between Program Outcomes and ABET Criterion 2

The preceding discussion describes the views of Penn State faculty and administration regarding appropriate and effective *objectives* and *outcomes* for the EMET program. However, TAC of ABET also has expectations regarding program outcomes. Those expectations are defined in Criterion 2 of the General Accreditation Criteria and are typically referred to as the "a – k" requirements.

ABET General Criterion 2 (a-k):
"*An engineering technology program must demonstrate that graduates have:*

a. *an appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines,*
b. *an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology,*
c. *an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes,*
d. *an ability to apply creativity in the design of systems, components or processes appropriate to program objectives,*
e. *an ability to function effectively on teams,*
f. *an ability to identify, analyze and solve technical problems,*
g. *an ability to communicate effectively,*
h. *a recognition of the need for, and an ability to engage in, lifelong learning,*
i. *an ability to understand professional, ethical and social responsibilities,*
j. *a respect for diversity and a knowledge of contemporary professional, societal and global issues, and*
k. *a commitment to quality, timeliness and continuous improvement.*"

The following mapping shows how the EMET program outcomes encompass and relate to the ABET General criteria.

Table B2-1 Correspondence Between Program Outcomes and ABET General Criteria

		GENERAL CRITERIA										
PROGRAM OUTCOMES **Students should:**		**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
1	Be able to identify, analyze, and solve technical problems related to integration of electrical, mechanical, instrumentation, computers, and control components to perform industrial and manufacturing functions.	X			X		X					
2	Be able to apply concepts of calculus, differential equations, and probability and statistics, as appropriate to the applied design and analysis of electromechanical systems.	X	X				X					
3	Be able to plan and conduct experimental measurements, use modern test and data acquisition equipment, and be able to analyze and interpret the results.	X	X	X			X					
4	Be able to apply electrical, electronic, and mechanical devices; computers; and instrumentation systems, as appropriate, to the development, operation, troubleshooting, and maintenance of electromechanical systems.		X	X	X		X					
5	Be able to apply advanced engineering mechanics, engineering materials, machine design, and fluid mechanics, as appropriate, to the development, operation, troubleshooting, and maintenance of electromechanical systems.		X	X	X		X					
6	Demonstrate basic knowledge of control systems including appropriate computer technologies and programming skills as applied to the design, operation, troubleshooting, and maintenance of electromechanical systems.	X	X	X			X					
7	Be able to choose appropriate technology to solve problems.	X	X	X			X					
8	Be able to apply the engineering design process to solve open-ended problems.		X	X	X	X	X	X				X
9	Recognize the social, economic, safety, quality, reliability, and ethical issues in the work environment.							X	X	X	X	X
10	Be able to effectively communicate their ideas and solutions orally, in writing, and graphically.					X		X		X	X	X
11	Demonstrate the ability to work as professionals on a team and in a project environment.					X		X	X	X	X	X
12	Recognize the need for life-long learning, be prepared to continue their education through formal or informal study, and be able to adapt to a continuously changing work environment.		X						X	X	X	X
13	Have respect for diversity, and knowledge of social and global issues.					X		X	X	X	X	

B.2.c – Relationship Between EMET Program Outcomes and Program Objectives

If program *outcomes* are to provide the proper foundation for achieving program *objectives*, it is essential that there be a direct correlation between the *outcomes* and the expected *objectives*. The following mapping shows how the EMET program *outcomes* lead to the previously stated EMET program *objectives*.

Table B.2-2 – Correspondence Between Program Objectives & Outcomes

Program Outcomes		Program Objectives			
		I	II	III	IV
1	Students should be able to identify, analyze, and solve technical problems related to integration of electrical, mechanical, instrumentation, computers, and control components to perform industrial and manufacturing functions.	X			
2	Students should be able to apply concepts of calculus, differential equations. and probability and statistics, as appropriate to the applied design and analysis of electromechanical systems.	X			
3	Students should be able to plan and conduct experimental measurements, use modern test and data acquisition equipment, and be able to analyze and interpret the results.	X	X		
4	Students should be able to apply electrical, electronic, and mechanical devices; computers; and instrumentation systems, as appropriate, to the development, operation, troubleshooting, and maintenance of electromechanical systems.		X		
5	Students should be able to apply advanced engineering mechanics, engineering materials, machine design, and fluid mechanics, as appropriate, to the development, operation, troubleshooting, and maintenance of electromechanical systems.		X		
6	Students should demonstrate basic knowledge of control systems including appropriate computer technologies and programming skills as applied to the design, operation, troubleshooting, and maintenance of electromechanical systems.	X	X		
7	Students should be able to choose appropriate technology to solve problems.	X			X
8	Students should be able to apply the engineering design process to solve open-ended problems.		X	X	X
9	Students should recognize the social, economic, safety, quality, reliability, and ethical issues in the work environment.			X	X
10	Students should be able to effectively communicate their ideas and solutions orally, in writing, and graphically.			X	X
11	Students should demonstrate the ability to work as professionals on a team and in a project environment.			X	X
12	Students should recognize the need for life-long learning, be prepared to continue their education through formal or informal study, and be able to adapt to a continuously changing work environment.	X		X	X
13	Students should have respect for diversity, and knowledge of social and global issues.			X	X

B.2.d – Relationship Between EMET Program Outcomes and Course Outcomes

In general, EMET program *outcomes* are achieved through work in the various courses that make up the EMET curriculum. However, to ensure that result, it is necessary to take the final step of identifying and ensuring the relationship among the expected *outcomes* and the courses that are responsible for achieving those *outcomes*. That relationship, as currently constituted in the EMET curriculum, is illustrated in Table B.2-3. The table indicates those courses that are designed to be the primary venues for achieving the various *outcomes* defined above. Table B.2-3 indicates the primary courses where outcomes are to be focused, however, it is important to note that most, if not all, *outcomes* are achieved through the influence of many courses and activities. Table B.2-3 indicates only those courses where emphasis is placed specifically on the development of the indicated *outcomes*. They are not necessarily the only venues for development of the indicated outcomes. Specific details of the curriculum and the courses making up the curriculum are covered in a later section of this report.

Table B.2-3 Correspondence Between Program Outcomes and Specific Courses

PROGRAM OUTCOMES **Students should:**		EMET 310	EMET320	EMET321W	EMET 311	EMET 322	EMET 330	EMET 350	EMET 405	EMET 410	EMET 440	IET 105	GI/US/IL	LANGUAGE
1	Identify, analyze, and solve technical problems related to integration of electrical, mechanical, instrumentation, computers, and control components to perform industrial and manufacturing functions.						X			X				
2	Apply concepts of calculus, differential equations, and probability and statistics to the design and analysis of electromechanical systems.					X	X	X	X	X				
3	Plan and conduct experimental measurements, use modern test and data acquisition equipment, and be able to analyze and interpret the results.		X	X			X	X						
4	Apply electrical, electronic, and mechanical devices; computers; and instrumentation systems to the development, operation, troubleshooting, and maintenance of electromechanical systems.	X	X	X			X							
5	Apply engineering mechanics, engineering materials, machine design, and fluid mechanics to the development, operation, troubleshooting, and maintenance of electromechanical systems.					X			X					
6	Demonstrate basic knowledge of control systems including computer technologies and programming skills as applied to the design, operation, troubleshooting, and maintenance of electromechanical systems.									X				
7	Choose appropriate technology to solve problems.			X							X			
8	Apply the engineering design process to solve open-ended problems.				X					X	X			
9	Recognize the social, economic, safety, quality, reliability, and ethical issues in the work environment.							X				X		
10	Effectively communicate their ideas and solutions orally, in writing, and graphically.	X	X	X	X		X	X						
11	Demonstrate the ability to work as professionals on a team and in a project environment.										X			
12	Recognize the need for life-long learning, be prepared to continue their education through formal or informal study, and be able to adapt to a continuously changing work environment.										X			
13	Have respect for diversity, and knowledge of social and global issues.												X	X

B.2.e – Organization of Display Materials

To facilitate the accreditation team's review of the success of the EMET program in achieving its defined outcomes, Table B.2-3 is used as an organizing framework for display materials. The evidence is organized according to the thirteen program outcomes. Each of these thirteen 'Outcome' folders contains graduate exit survey results, course outcome survey data, class syllabi, and samples of relevant student work. The display material provides a high level to in-depth look at the development of each program outcome.

B.3 Criterion 3 – Assessment and Evaluation

B.3.a – EMET Program CQI Process

The SEDTAPP is the department for the College of Engineering with the academic authority to carry out the engineering technology mission as established by the College's strategic plan. SEDTAPP is also the office that coordinates the delivery of these programs for the University College, of which the Berks campus is one location. From the perspective of curriculum and programs, that mission for engineering technology is to '*develop and deliver an undergraduate curriculum based on active, problem-based and professionally oriented teaching and learning*'[5] and to do so in a way that gives Penn State engineering technology programs their '*own identity and decision making capability,*' '*strengthen[s] baccalaureate pathways for viable programs,*' and '*markets Penn State engineering technology programs nationwide*.'[6]

The SEDTAPP strives to achieve this mission via a three-pronged strategy that emphasizes ongoing assessment of and planning for the future vision of technology; systematic control, monitoring and evolutionary growth of existing program curricula; and coordinated resource allocation and professional development of faculty. The general responsibilities for carrying out these three strategies are embedded in three broad-based activities headed, respectively, by the Engineering Technology Council, the Engineering Technology Advisory Board, and the administrations of the SEDTAPP and the individual University campuses where technology programs are offered. Figure B.3-1, "Quality Assurance Organization and Functions," illustrates the organization and interaction among these activities. Ongoing monitoring, assessment, improvement, and strategic growth of all the engineering technology programs are inherent features of the activities depicted in the figure. Detailed descriptions of those activities and the responsibilities of each area follow.

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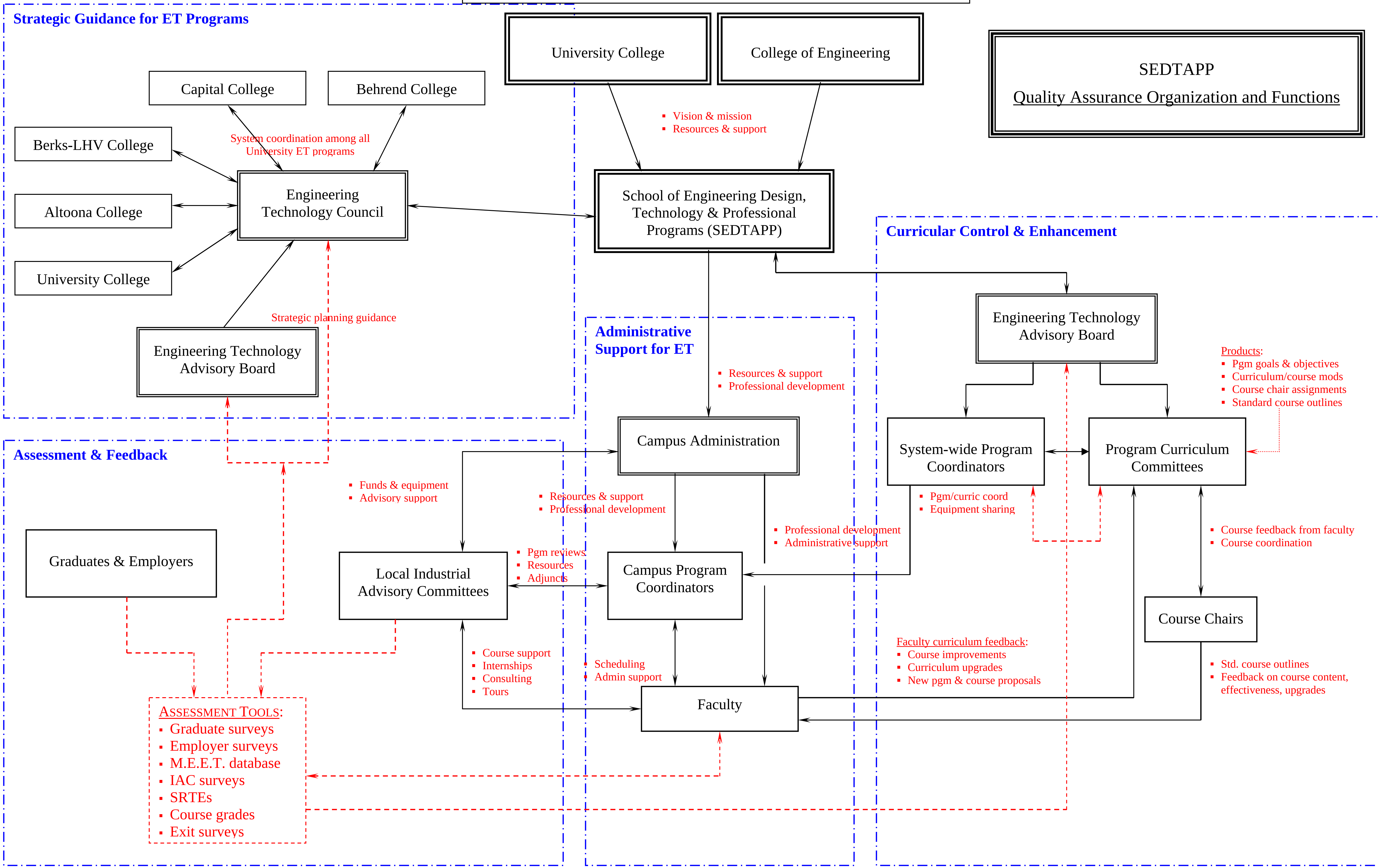
[5] Penn State University College of Engineering Strategic Plan, 2005/6 – 2008/9, page 11

[6] Penn State University College of Engineering Strategic Plan, 2005/6 – 2008/9, page 13

Figure B.3-1 – SEDTAPP Curriculum Control and Assessment Framework



THE ENGINEERING TECHNOLOGY COUNCIL (ETC)

In addition to the COE's engineering technology programs delivered by the University College, there are engineering technology programs offered, and in some cases academically controlled, by four other academic colleges within the Penn State system (The Capital College, the Altoona College, the Behrend College and the Berks College). Student movement among these programs is common, and in fact, is encouraged by the University to optimize the availability of programs to all Pennsylvania residents. As a result, it is essential that programs at all locations and colleges remain as compatible as possible to avoid creating artificial barriers to this flexibility of movement. Further, it is essential that technology programs at the University share a coordinated strategy of program and curriculum development to minimize unwanted duplication, optimize resource usage, avoid internal competition for students, and create an integrated system of opportunities for technology students. The ETC is the main vehicle for ensuring the inter-campus coordination necessary to bring these results about.

The ETC consists of the administrative leaders (department heads, division head, etc.) at each of the colleges involved in offering engineering technology programs. The Council typically meets four times a year, and the meetings typically focus on developing long-term vision and strategy to enhance ET throughout the Penn State system. These efforts involve developing a body-of-knowledge for ET, working with state-wide economic development initiatives, collaborating with state industry consortiums, and benchmarking with other institutions in the country.

THE ENGINEERING TECHNOLOGY ADVISORY BOARD (ETAB):

The ETAB serves both a strategic role and an operational role in the management of engineering technology at Penn State. Its strategic role is to serve as an advisory body to the ETC with the specific duty of helping to develop strategic visions for the orderly evolution of ET at Penn State. This duty includes identifying emerging issues likely to influence future technology education, assessing the relevance of those issues to Penn State ET programs, brainstorming effective responses to emerging trends, developing practical strategies for pursuing future visions, identifying potential funding sources for development activities, and preparing grant proposals to obtain funding.

The ETAB's operational role is to facilitate the consistent delivery of SEDTAPP's existing technology programs across the Penn State system, and to manage the orderly evolution of those curricula to meet changing demands. It does this by overseeing curriculum development activities in all the ET programs and by working to ensure that all programs evolve in a consistent and coordinated fashion. In this role, the ETAB establish consistent goals for all programs, correlates activities and courses that can be shared among programs, establishes and disseminates curriculum and course standards, responds to constituents' suggestions for curriculum improvement, and manages evolutionary changes in curricula.

The ETAB consist of selected faculty members, key administrators, and active curriculum and course coordinators from throughout the Penn State technology system. Because of ETAB's focus on curriculum evolution, the key constituents are the lead ET curriculum and course coordinators. It typically meets two to three times each year.

The ETAB accomplishes its operational objectives primarily by providing strategic direction to its three main support groups: the system-wide program coordinators, the program curriculum committees, and the engineering technology course chairs. The roles of each of these groups are described below :

System-wide Program Coordinators – though there are eight distinct ET programs in the SEDTAPP system (EET, MET, BET, TelET, NanoET, AET, BEST, and EMET)[7], commonalties in their curricula permit them to be grouped into three major programmatic areas: Electrical-based ET (EET, TelET, BET, & NanoET), Mechanical-based ET (MET, AET, & BEST), and Electro-Mechanical ET (EMET). The SEDTAPP has assigned a System-wide Program Coordinator for each of these programmatic areas. System-wide coordinators' job is to be the liaison among the individual program coordinators at all campuses where their respective programs are offered. The liaison function relates primarily to keeping campus program leaders abreast of curriculum developments, coordinating development activities that involve those leaders, identifying opportunities for resource sharing and/or exchange among programs, and identifying common needs and interests, and opportunities for shared effort, among faculty at different locations.

Program Curriculum Committees – as with the system-wide coordinators, there are three SEDTAPP Curriculum Committees, one for EET-related programs, one for MET-related programs, and one for the EMET program. These committees are responsible for establishing, controlling, monitoring, disseminating, and directing the orderly evolution of the SEDTAPP engineering technology program curricula. The committees meet twice during the year at the spring and fall SEDTAPP faculty meetings and at other times during the year as situations dictate. Committees consist of faculty representatives from all of the colleges within Penn State that deliver engineering technology programs. Committee functions, membership, and operating rules are governed by bylaws, which are available at <<http://cede.psu.edu/tc2k/contents/programs.htm>>. Each committee accomplishes its charge mainly through the following activities:

- Establishing and disseminating the TC2K *objectives* expected of the program, and periodically reviewing and updating those *objectives* based on assessment information.
- Establishing and disseminating the TC2K *outcomes* expected of the program, and periodically reviewing and updating those *outcomes* to ensure they support the current program *objectives*.

[7] EET – Electrical Engineering Technology

MET – Mechanical Engineering Technology
BET – Biomedical Engineering Technology
TelET – Telecommunications Engineering Technology
NanoET – Nanofabrication Engineering Technology
AET – Architectural Engineering Technology
BEST – Building Energy Systems Technology
EMET – Electro-Mechanical Engineering Technology

- Establishing those courses and activities in the program curriculum that are to be the primary means by which program *outcomes* are achieved.
- Recruiting and managing course chairpersons to develop and maintain standard course outlines for all technical courses in the curriculum.
- Reviewing, approving, and disseminating standard course outlines to faculty.
- Receiving, reviewing, responding to, and acting on faculty recommendations for curriculum change and improvement.
- Managing the curricular change process though the colleges and the University Faculty Senate for official curriculum changes.
- Monitoring program-related assessment information from various assessment systems (employer, graduate, and student exit surveys; advisory body inputs; MEET[8] data system; etc.) and taking appropriate curricular action to respond to that information.
- Maintaining records to document curricular change activities.

Course Chairpersons – chairpersons in charge of SEDTAPP's standard course outlines hold a key place in the SEDTAPP curricular quality control structure. As noted above, curriculum committees establish the expected *objectives* and *outcomes* for programs, and then identify those courses in the curriculum that are the key producers of the expected *outcomes*. The committees rely on a set of approved, standard course outlines to ensure that the defined *outcomes* are consistently achieved everywhere a program is offered. They do this by requiring all faculty teaching in the SEDTAPP engineering technology programs to use the standard outlines as the basis for their in-course syllabi. In concert with this instruction, course outlines follow a standard format that requires explicit identification of the program *outcomes* that are supported by the course. More important, the outlines are required to expand program *outcomes* into specific course outcomes that have explicit relevance to the content of the course. Course outcomes identify specific tasks that students should perform and skills that they should acquire while in the course. The outlines also suggest example activities and practices that can help students achieve the prescribed course outcomes, and they suggest possible ways to assess and document students' success with respect to the outcomes.

Course chairs are the agents responsible for developing, maintaining, and revising course outlines. They are selected from among those faculty who have significant experience teaching each course, and they must be actively teaching any course that they chair. Once selected, chairs are responsible first to develop, and then to provide annual updates of the outlines to the curriculum committees. Annual updates are reviewed and approved by the appropriate curriculum committee, and when approved, are posted to the official curriculum committee websites. The annual update and approval process is completed around the middle of the fall

[8] M.E.E.T. – Measurement and Evaluations in Engineering Technology, available via <<https://www.engr.psu.edu/MEET/>>

semester, and new outlines become effective beginning in the following spring semester. The adoption of new outlines in mid-fall gives adequate time for faculty to incorporate changes in their course plans for both the spring and following fall semesters. Curriculum Committee websites, and links to standard outlines, can be found at <<http://cede.psu.edu/tc2k/contents/programs.htm>>.

In the process of developing and maintaining outlines, course chairs receive input from several sources. As noted above, curriculum committees identify the program *outcomes* to be supported by courses, and act as the review and approval body for changes to outlines. However, the primary inputs leading to improvement of outlines come from faculty. Each semester, the SEDTAPP surveys (via the MEET data system) the performance of every technology course at every location with reference to the established program *outcomes*. One element of the survey process offers faculty the opportunity to comment on the effectiveness of existing course outlines and course outcomes, and to offer suggestions for improvement. Course chairs have direct, online access to those suggestions and comments, and they are expected to discuss the comments with the appropriate faculty and develop suitable responses based on those discussions. Suitable responses may be anything from a discussion and one-on-one resolution of the comments with the interested faculty to the identification of necessary revisions to the outline. Course chairs are responsible for managing and documenting these activities and reporting the outcomes to curriculum committees on an annual basis. The flow chart in Figures B.3-2, 'Curricular Committee – Course Chair – Faculty Interactions,' clarifies the nature of these interactions. Additionally, examples of annual course assessment reports from course chairs to the curriculum committee can be viewed on the curriculum committee website at <<http://cede.psu.edu/tc2k/contents/programs.htm>>.

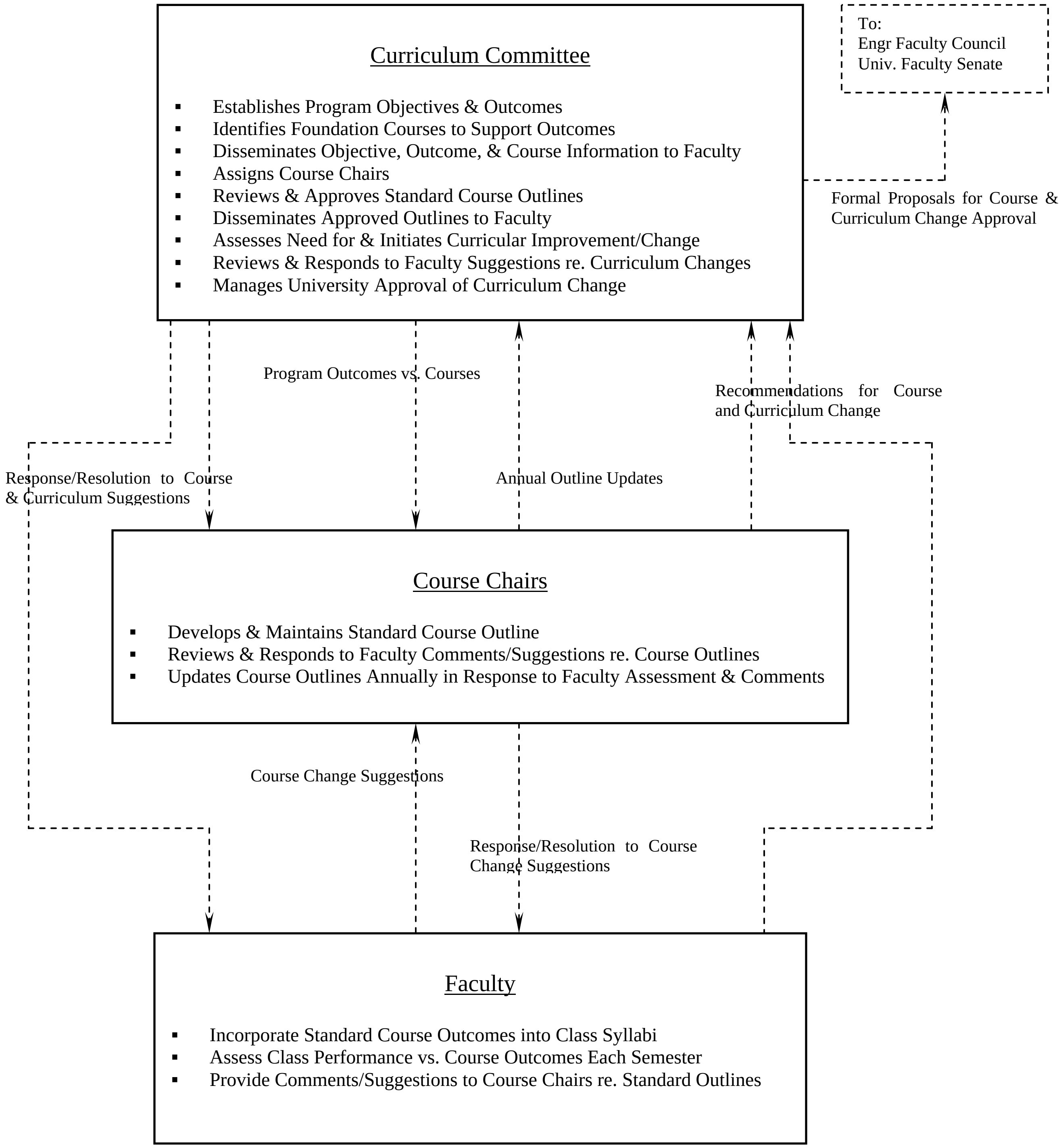


Figure B.3-2 – Curriculum Committee – Course Chair – Faculty Interactions

ADMINISTRATIVE SUPPORT STRUCTURE FOR ENGINEERING TECHNOLOGY:

The framework on which all of the above activities hang is the administrative infrastructure of the Penn State colleges that offer technology programs. The head of the SEDTAPP provides overall coordination of this function, primarily by interacting with the Berks Campus Division Head for Engineering, Business, and Computing (EBC) to keep him apprised of external demands and obligations on the technology programs (mostly related to accreditation), future directions and opportunities being pursued by SEDTAPP leadership, and funding and grant opportunities that may help support local programs. The SEDTAPP head also establishes workload guidelines for technology faculty, provides input to faculty performance evaluations, consults in and provides guidance for faculty hiring, and advocates, with the campus administration, for faculty promotion and tenure. Finally, the SEDTAPP provides some funds to the campuses to support professional development activities of faculty.

The Campus EBC Division Head is the local counterparts to the SEDTAPP head. He is directly responsible for technology faculty supervision and development. He is responsible for managing work assignments, providing necessary clerical and staff support, assessing and rewarding performance, planning for and supporting professional development, ensuring adequate resources and facilities for programs, hiring faculty, and advocating for faculty promotion and tenure.

A Campus Program Coordinator is the main administrative interface between the Division Head and the technology program and its faculty. The coordinator's core role typically includes establishing program class schedules, assigning standing faculty to classes, arranging for adjunct faculty when needed, advising students, and interacting with the System-wide Program Coordinator (see above). Coordinators also monitor and anticipate equipment and resource needs of the technology programs and keep campus administration aware of those needs. They also are expected to take the lead in identifying sources and possible funding to meet those needs. Much of this activity takes place via interactions with the local industrial advisory committees, which are typically orchestrated by the campus program coordinator. Finally, coordinators are typically leaders in campus recruitment and marketing efforts, and in identifying and organizing student internships, tours, and recruitment functions.

Finally, the faculty is the foundation for all the functions discussed above. In the context of ensuring quality of the technology programs, faculty members have four key roles. Primarily, they are obliged to teach the various courses in the program with particular emphasis given to accomplishing the course outcomes stipulated in the standard course outlines. Second, they are responsible for continually assessing the accomplishments in their courses against the expected outcomes, mainly by participating in the various assessment activities and surveys conducted by the SEDTAPP via the ETAB. They also routinely assess both their courses and the program with respect to developing trends and changing technology, and recommend to course chairs and curriculum committees, course and curriculum adjustments to adapt to these changes. Finally, faculty are expected to be actively involved with local industrial contacts, via the local advisory committee and elsewhere, to identify sources of resources, funding, and adjunct faculty candidates, and to create opportunities for tours, internship, student employment, and faculty development and consultancy.

B.3.b – Examples of Continuous Improvement:

As the previous discussion illustrates, the task of monitoring and improving the quality of Penn State's EMET programs is spread over multiple hierarchical levels, starting with the University-level SEDTAPP administration and its supporting committees and devolving down through the EMET curriculum committee and supporting course chairs finally to the local EMET program coordinators and faculty. The following paragraphs highlight several examples of specific assessment and improvement actions that have been taken at each level during the past two years. Though not exhaustive, these examples do provide a representative indication of the scope and depth of EMET quality improvement activities, both in general and locally at the Berks campus.

Example CQI Activities of SEDTAPP and Supporting Committees

Representative examples of quality improvement accomplishments of the SEDTAPP administration and supporting committees are:

- Development and implementation of the online, Internet-based MEET survey system. MEET data has been collected since fall of 2004 and is available online at <<https://www.engr.psu.edu/MEET/>>. ET faculty, program coordinators, curriculum committees, and administrators use the data to support both semester-based and annual course and program assessments (examples of EMET program assessments by the EMET curriculum committee and course assessments done by EMET faculty at Berks are discussed later).
- Development and implementation of an online, Internet-based exit survey of graduating ET students to determine their career directions and to obtain their overall assessment of the capabilities they acquired as a student at Penn State. Surveys have been conducted each semester since spring of 2005, and results are used by SEDTAPP administration and the EMET curriculum committees to identify program weaknesses and areas for improvement. Past survey results are available at <<http://www.cede.psu.edu/tc2k/>>.
- Development and implementation of an online, Internet-based survey of actual and potential EMET employers to determine the post-graduation performance of Penn State students and to gain industry feedback on the appropriateness and relevance of EMET program educational *objectives* and *outcomes*. Surveys have been conducted each semester since spring of 2005. As with the exit and MEET surveys, results from the employer/industry survey are used to identify program weaknesses and

areas for improvement. Past survey results are included in the display materials.

EXAMPLE CQI ACTIVITIES OF EMET CURRICULUM COMMITTEE & EMET COURSE CHAIRS

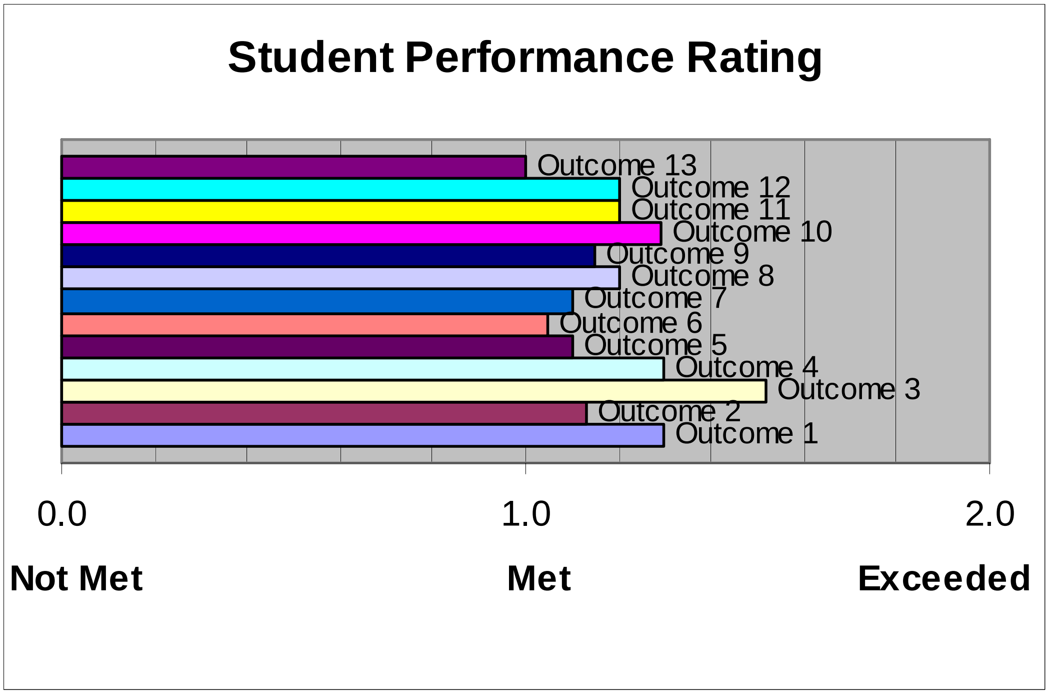
Representative examples of quality improvement accomplishments of the EMET curriculum committee and EMET course chairs are:

- Creation of a standard format for all EMET technical course outlines to include explicit indication of the correlation between EMET *program outcomes* and subsidiary *course outcomes*.
- Revision and online posting of all EMET course outlines following the new, standardized format. Current outlines are available via the EMET curriculum committee link at <<http://cede.psu.edu/tc2k/contents/programs.htm>>. Outlines have been available in this fashion since fall of 2004.
- Policy established requiring annual update of standard course outlines, including written justification for all modifications. Updates are to be based on MEET results and on a review and resolution of suggestions and concerns raised by faculty either via MEET or curriculum committee meetings. Update reports for the most recent revisions are maintained at the EMET curriculum committee site <<http://cede.psu.edu/tc2k/contents/programs.htm>>.
- Policy established requiring EMET curriculum committee chair to assess the system-wide performance of the curriculum with respect to expected outcomes. The assessment is based on data collected using the MEET data system described earlier. An example of the EMET curriculum committee chair's report for the 2004-2005 academic year is included in an appendix to this report.

EXAMPLE CQI ACTIVITIES OF EMET PROGRAM COORDINATOR AT BERKS:

At the end of the semester when SRTE's are administered, each student is requested to complete a course survey that asks him to rate his ability to accomplish the course outcomes and was that ability acquired in the course. The instructors are requested to complete a course survey that asks if the course addressed the outcome and to rate each student's performance against the outcome. The data is compiled at University Park and is available to all engineering faculty at all campuses.

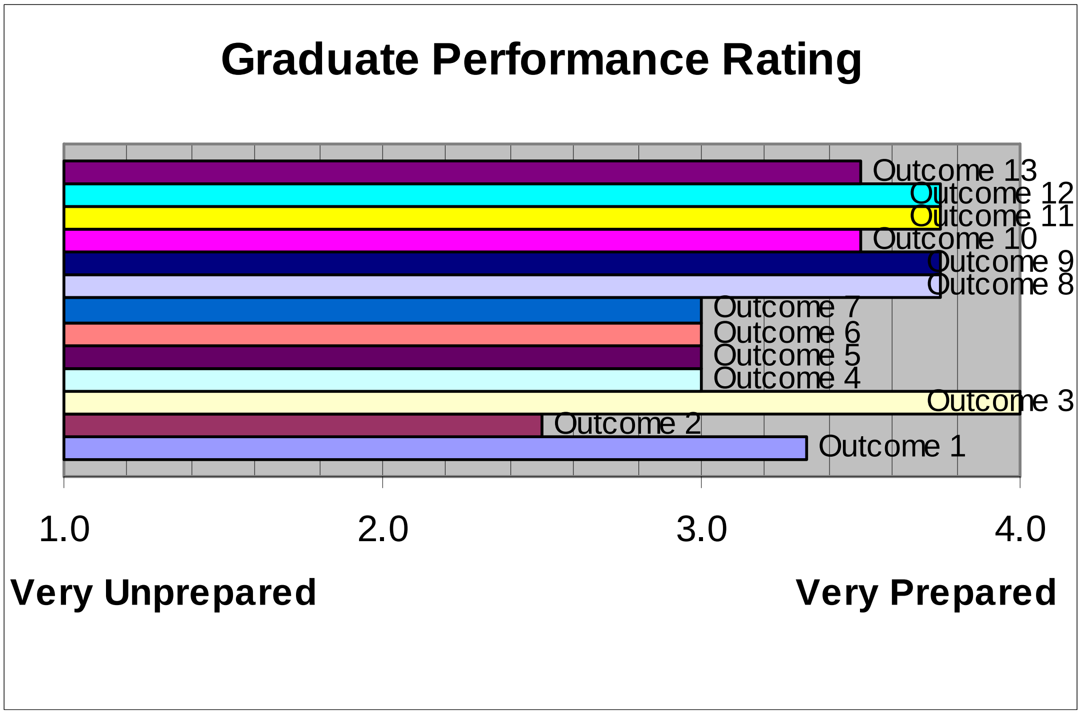
A rating of 0 indicates that the performance measure was 'not met' by the student; a rating of 1 indicates that the student 'met' the performance measure; and a rating of 2 indicates that the student 'exceeded' the performance measure.



EMET students at Berks are meeting the program outcomes in all categories with experimentation yielding the highest rating at 1.5 and social issues yielding the lowest rating at 1.0.

Upon graduation, each graduate is requested to complete a program survey that asks him to rate his ability to accomplish the program outcomes. The data is compiled at University Park and is available to all engineering faculty at all campuses.

A rating of 1 indicates that the graduate was 'Very Unprepared' to accomplish the program outcome; a rating of 2 indicates that the graduate was 'Unprepared', a rating of 3 indicates 'Prepared,' and a rating of 4 indicates 'Very Prepared.'



EMET graduates from Berks are meeting the program outcomes in all categories with problem solving yielding the highest rating at 3.8 and math skills yielding the lowest rating at 2.5.

B.4 Criterion 4 - Program Characteristics

Characteristics of the EMET curriculum are described in the following paragraphs. Information is organized according to the specific topics called out by Criterion 4 of the General Accreditation Criteria.

B.4.a – EMET Program Curriculum

The EMET curriculum and course sequencing are illustrated in Table B.4-1a/b on the following pages. The first column indicates the year and semester in which students typically take courses; however, special needs of individual students may cause alteration of the schedule in occasional instances. Course prerequisites, which are stipulated in the University Bulletin, dictate required sequencing of certain courses.

Students accepted into the BSEMET program must have an earned AS degree from an ABET accredited program in mechanical or electrical engineering technology with a minimum of 67 credits, at least 36 of which must be in technical courses, 10 in college-level mathematics, including calculus, six in basic sciences, 6 in communications, and nine in general education. These requirements satisfy all of the communication, math, and science requirements set forth by ABET for associate degree programs. Students entering from non-ABET accredited programs have their AS work evaluated and any deficiencies from ABET requirements are corrected before they are allowed to start the BSEMET program. While in the EMET program, students must earn a minimum of 63 additional credits for a total of 130 credits to complete the baccalaureate degree. This exceeds the minimum of 124 credits required by the ABET. Specifics of the additional, upper-division credits are outlined in the following tables.

Note – the following tables show only upper-division courses and credits; entering credits required for admission are not shown.

Table B.4-1a – Curriculum for Incoming Electrical Engineering (2EET) Graduates

Table 1a lists the course sequencing for students entering the BSEMET program with an Associate Degree in Electrical Engineering Technology.

Table B.4-1b– Curriculum for Incoming Mechanical Engineering (2MET) Graduates

Table 1b lists the course sequencing for students entering the BSEMET program with an Associate Degree in Mechanical Engineering Technology.

Table B.4-1c – General Education Courses – All Students

Table 1c lists typical courses taken by EMET students to satisfy Penn State’s general and diversity education requirements.

Table B.4-1a – EMET Program Curriculum – Entering EET Students

Year and Semester	Course (Department, Number, Title)	Category (Credit Hours): Communications	Mathematics	Physical & Natural Sciences	Social Sciences & Humanities	Technical Content
	EMET Courses[1]					
Yr 3, Sm 1	EMET 322 Mechanics for Technology					4
Yr 4, Sm 2	EMET 350 QC, Inspection, & Design					3
Yr 4, Sm 1	IET 105 Economics of Industry					2
Yr 3, Sm 1	EMET 311 Spatial Analysis & Adv CA					3
Yr 3, Sm 2	EMET 330 Meas. Theory & Instr.					3
Yr 4, Sm 2	EMET 405 Fluids & Thermodynamics					4
Yr 4, Sm 1	EMET Technical Elective					3
Yr 4, Sm 1	EMET410 Automated Control Systems					4
Yr 4, Sm2	EMET440 Electro-Mech. Design Project					3
Yr 3, Sm 2	MET 210W Product Design[2,3]					3
Yr 3, Sm 2	IET 215 Production Design					2
Yr 3, Sm 2	IET 216 Production Design Laboratory					2
					Total credits =	36
	Computer Course[1]					
Yr 3, Sm 1	CMPSC101 Intro. to Algorithm. Processes					3
					Total credits =	3
	Mathematics Courses[4]					
Yr 3, Sm 1	Math 141 Calculus II		4			
Yr 3, Sm 2	Math 250 Differential Equations		3			
		Total credits =	7			
	Physical Sciences Courses[5]					
Yr 4, Sm 1	Chem12 Principles of Chemistry			3		
			Total credits =	3		
	Communications Courses[2]					
Yr 4, Sm 1	English 202C Technical Writing	3				
	Total credits =	3				
	General Education Courses (one course in each discipline is required)[6]					
Yr 3, Sm 2	Social Sciences, Humanities or Arts[7]				3	
Yr 4, Sm 2	Social Sciences, Humanities or Arts[7]				6	
Yr 3, Sm 1	Exercise and Sport Science				3	
				Total Credits =	12	
	Totals Required for the Degree (by Category) =	3[3]	7	3	12	39
	Percent of Upper-Division Total =	5[3]	11	5	19	61
					Total Upper-Division Credits Required in the Program =	64[8]

Table B.4-1b – EMET Program Curriculum – Entering MET Students

Year and Semester	Course (Department, Number, Title)	Category (Credit Hours): Communications	Mathematics	Physical & Natural Sciences	Social Sciences & Humanities	Technical Content
	EMET Courses[1]					
Yr 3, Sm 1	EET 220 Fundamentals of PLCs					2
Yr 3, Sm 2	EMET 350 QC, Inspection, & Design					3
Yr 3, Sm 2	IET 105 Economics of Industry					2
Yr 3, Sm 2	EMET 310 Digital Electronics					3
Yr 3, Sm 2	EMET330 Meas. Theory & Instr.					3
Yr 4, Sm 1	EMET 405 Fluids & Thermodynamics					4
Yr 4, Sm 1	EMET Technical Elective					3
Yr 4, Sm 1	EMET410 Automated Control Systems					4
Yr 4, Sm2	EMET440 Electro-Mech. Design Project					3
Yr 4, Sm 2	EMET320 Analog Electronics					4
Yr 4, Sm 2	EMET 321W Electrical Machines[2,3]					4
					Total credits =	35
	Computer Course[1]					
Yr 3, Sm 1	CMPSC101 Intro. to Algorithm. Processes					3
					Total credits =	3
	Mathematics Courses[4]					
Yr 3, Sm 1	Math 141 Calculus II		4			
Yr 3, Sm 2	Math 250 Differential Equations		3			
		Total credits =	7			
	Physical Sciences Courses[5]					
Yr 3, Sm 2	Chem12 Principles of Chemistry			3		
			Total credits =	3		
	Communications Courses[2]					
Yr 3, Sm 1	English 202C Technical Writing	3				
	Total credits =	3				
	General Education Courses (one course in each discipline is required)[6]					
Yr 3, Sm 2	Social Sciences, Humanities or Arts[7]				3	
Yr 4, Sm 2	Social Sciences, Humanities or Arts[7]				6	
Yr 3, Sm 1	Exercise and Sport Science				3	
				Total Credits =	12	
	Totals Required for the Degree (by Category) =	3[3]	7	3	12	38
	Percent of Total =	5[3]	11	5	19	60
					Total Upper-Division Credits Required in the Program =	63[8]

Table 1a/b – Notes	
1	The breadth and depth of the technical sciences and supporting technical courses are designed to satisfy the Technical Content requirement of Criterion 4 of the GENERAL CRITERIA. Details of how individual courses address specific elements of this criterion are covered elsewhere in this report.
2	This course has specific and significant relevance to the Communications requirements specified by Criterion 4 of the GENERAL CRITERIA. The public speaking course is required by the University of all graduates. Further, the "W" designated course requires extensive and focused development of written and oral communication skills within the specific context of the program discipline. The requirement for a discipline-specific "W" course in all degree programs is also a University-wide requirement.
3	These totals and percentages do not include the contribution of the "W-designated" technical course to the communications training of students. If that contribution is included, the communications credit total would be 6 or 7, and the percentage would be ~10%
4	The technical math sequence includes topics in advanced calculus and ordinary differential equations. Entering students must have completed a first course in engineering calculus before being admitted to the program. This range of coverage exceeds the minimum Mathematics requirements of Criterion 4 of the GENERAL CRITERIA.
5	The physical chemistry course is the sole natural sciences course in the upper-division EMET program. Students are required to have six credits of natural science studies to be admitted to the program. Typically, these credits are in physics and cover topics in mechanics, heat, wave motion, sound, electricity, light, and basics of modern physics. This content and focus is consistent with the Physical and Natural Sciences requirement of Criterion 4 of the GENERAL CRITERIA.
6	All baccalaureate degree graduates at Penn State University must complete a minimum of 18 credits in the study of the Social Sciences, Humanities, and Arts. Two courses in each area are generally required. Additionally, at least one of the courses must be *intercultural* in nature, and a second must be *international* in focus to satisfy University-wide requirements for breadth and diversity in programs' societal and global perspectives. Entering EMET students must have completed nine of these 18 credits prior to being admitted to the program. The additional nine credits are earned as part of the EMET curriculum. These requirements are consistent with the Social Sciences and Humanities requirement of Criterion 4 of the GENERAL CRITERIA.
7	Examples of Social Sciences, Humanities, and Arts courses typically available at the campus are listed in Table 1c, which follows.
8	Total program credits (130 or 131) exceed the minimum of 124 specified by Criterion 4 of the GENERAL CRITERIA.

Table B.4-1c – General Education Courses

Prior to entering the EMET program, associate degree students are required to complete three credits each of Social Sciences, Humanities, and Arts studies for a total of nine General Education credits. Once in the EMET program, students are required to complete three additional credits in each of these same topical areas. At Penn State, at least one of these courses must be an "International and Intercultural Competency" (GI) designated course. Typical courses available at the Berks campus to satisfy these requirements are listed below. GI designated course are shown in *Italics*.

Subject	Course	Description
		Arts
Art	Art 20	Introduction to Drawing
Art History	ArtH 112	Renaissance to Modern Art
Integrative Arts	InArt 1	The Arts
Music	Music 005	An Introduction to Western Music
	Music 007	*Evolution of Jazz*
Theatre Arts	Thea 102	Fundamentals of Acting
		Humanities
Comparative Literature	*CmLit 10*	*The Forms of World Literature*
English	Engl 129	Shakespeare
	Engl 139	*Black American Literature*
	Engl 191	Science Fiction
	Engl 194	*Women Writers*
History	Hist 1	The Western Heritage I
	Hist 2	The Western Heritage II
	Hist 20	American Civilization to 1877
	Hist 21	American Civilization since 1877
	Hist 175	*The History of Modern East Asia*
	Hist 191	*Early African History*
	Hist 192	*Modern African History*
Philosophy	Phil 103	Introduction to Ethics
Religious Studies	*Rl St 001*	*Introduction to World Religions*
	Rl St 101	*Comparative Religion*
		Social & Behavioral Sciences
Anthropology	*Anth 045*	*Cultural Anthropology*
Economics	Econ 002	Introductory Microeconomic Analysis
	Econ 004	Introductory Macroeconomic Analysis
Geography	Geog 020	Human Geography: An Introduction
Political Science	Pl Sc 001	Intro to American National Government
	Pl Sc 003	Introduction to Comparative Politics
	Pl Sc 014	International Relations
Psychology	Psy 002	Psychology
	Psy 213	Intro to Developmental Psychology
	Psy 243	Psychology of Personal Well-Being
Sociology	Soc 001	Introductory Sociology
Women's Studies	*WmnSt 001*	*Introduction to Women's Studies*

B.4.b – Minimum Credits and Distribution:

Footnotes in Tables B.4-1a and B.4-1b indicate the correlations between various elements of the EMET curriculum and minimum credit hours and credit distributions specified in ABET Criterion 4. Details of these relationships are described below.

TOTAL CREDITS

As noted earlier, the EMET program consists of a minimum of 130 total credits, which exceeds the 124 credit minimum requirement of Criterion 4.

COMMUNICATIONS

Students enter the EMET program with a minimum of six credits of communications education, which includes three credits of college-level composition and three credits of effective speaking. Once in the EMET program, students are required to complete an additional 3-credit course in Technical Writing (Engl 202C).

In addition to the direct training in composition, technical writing, and effective speaking, the University requires all students to complete at least three credits of writing-intensive course work within their major. Further, "W" courses must include writing assignments that relate clearly to the course objectives and serve as effective instruments for learning the subject matter of the course. Typically, assignments are designed to help students investigate the course subject matter, gain experience in interpreting data, shape writing and/or speaking for a particular audience, or practice the type of writing and/or speaking associated with a given profession or discipline. "W" courses also provide opportunities for students to receive written feedback from the instructor and to apply that feedback to future efforts. "W" courses often include peer review of student communications, tutorial assistance, instructor conferences, group writing projects, use of writing or learning centers, and classroom discussions of writing and/or speaking assignments. From a grading perspective, it is typically expected that 25% of the grade in a "W" course will be determined from the communications-related activities. In the EMET curriculum, this training occurs in EMET 321W (Electrical Machines) for students entering from an electrical technology program, and in MET 210W (Machine Design) for students entering from a mechanical technology program.

While the English composition, speech communications, and "W" courses provide special emphasis to the development of EMET students' communications skills, it is also possible to point out specific examples of written, oral, and graphical communications exercises in other parts of the technical curriculum as it is taught at the Berks campus.

> <u>Technical Writing Exercises</u> – Essentially all lab courses within in the EMET curriculum require students to prepare formal written reports to document lab exercises. Specific examples of technology course-based writing exercises will be provided in the display materials.
>
> <u>Oral Presentation Exercises</u> – Speech communications classes, which all entering EMET students must have completed, is the obvious place where students' oral presentation skills are developed. However, within the EMET curriculum, oral presentations are a standard element of the senior project course. Students in that course are required to make formal presentations, including visual and written reports, of their project design proposals, biweekly progress reports, and final project demonstrations. Presentations are expected to combine results from various software tools (word processing, spreadsheet tables and graphs, CAD drawing, project scheduling tools, etc.) into a professional slide-based presentation.
>
> <u>Graphical Presentation Exercises</u> – Graphical presentation of visual and numerical information is a critical skill in technology professions. The

EMET curriculum imparts this skill in several courses. Visual presentations using CAD are a fundamental part of EMET 311. Graphical representations of numerical data is required in many labs, but the EET 321W courses gives particular emphasis to this topic in several lab exercises.

Library Research & Use of Technical Literature – Though there are numerous occasions in the EMET curriculum where EMET students are required to investigate and use library and technical data resources. However, the capstone project course, EMET 440, brings all these prior practices into focus in developing and researching their designs and identifying suitable equipment from manufacturers' data and information sources.

Teamwork Skills – Essentially all lab courses in the EMET curriculum are team-based exercises involving teams of two or three students conducting lab exercises.

MATHEMATICS

The EMET technical math sequence includes topics in engineering calculus and ordinary differential equations. This range of coverage exceeds the minimum requirements of Criterion 4 for a baccalaureate degree program.

PHYSICAL AND NATURAL SCIENCES

Entering EMET students are required to have a minimum of six credits of basic science. Typically, these credits are in mechanical and electrical physics. The EMET curriculum advances this background by requiring students to take a 3-credit course in college-level physical chemistry. This content and focus is consistent with the physical and natural sciences requirement of Criterion 4 for a baccalaureate degree program.

SOCIAL SCIENCES AND HUMANITIES

Students entering the EMET program are required to have completed a minimum of nine credits in the study of the social sciences, humanities, and arts. One course in each area is generally required. Once in the EMET program, students are required to complete an additional 3-credit course in each of these same three areas of study. Additionally, at least one of these courses must be either intercultural in nature or must be international in focus to satisfy University-wide requirements for breadth and diversity in programs' societal and global perspectives. These requirements are consistent with the social sciences and humanities requirement of Criterion 4 for a baccalaureate degree program.

TECHNICAL CONTENT

The technical content of the EMET curriculum consists of the combination of EMET-, EET-, IET, and MET- designated courses (see Table B.4-1a/b above). The combination of these courses represents 38 or 39 of the total of 63 or 64 credits in the program. Thus, technical content represents ~60% of the total curriculum, which is between the minimum of 33% and the maximum of 67% required by the General Criteria.

Because the EMET curriculum encompasses only junior- and senior-level courses, essentially all the technical courses are *technical specialty courses* that build on fundamentals that students learned as associate degree technology students.

Laboratory activities: a variety of technical courses in the EMET curriculum involve laboratory exercises that require students to use standard laboratory equipment to excite and monitor the response of electrical and electronic devices, electrical machines, and engineering materials. In most cases, the data determined through these measurements are analyzed and synthesized into formal laboratory reports.

Integrating Experiences are a part of several courses in the EMET program. These activities require students to apply various technical and non-technical skills to solve problems or complete assigned tasks. Examples include:

- The electrical machines course (EET 321W) includes a major research report on a controversial use of technology and a design analysis of a 3-phase induction motor, both of which require students to integrate a variety of technical and non-technical skills. The research report involves library research, completion of multiple tasks according to a pre-imposed schedule, assimilation, and synthesis of differing technical and non-technical perspectives, and formal reporting in both written and oral formats. The motor design project requires a comprehensive, computer-based analysis of the full range of motor operating characteristics using only basic motor design parameters and, based on the computations, a determination of appropriate motor design designations consistent with industrial motor standards. Results are compiled into a motor design package that includes both graphical and tabular presentations of motor performance data and nameplate design information. Completion of the project requires students to conceptualize and implement a suitable computer-based computational strategy, interpret the results with respect to accepted industrial standards, and assemble the results in a student-defined professional format.
- Approximately the final third of the programmable logic controls course (EET 220) consists of a series of exercises in which students conceptualize, design, and develop sub-modules of a steam turbine control system. At the end of the process, students are required to integrate the various sub-modules into a complete turbine control and test and debug the system. In the process, students are exposed to and practice concepts of job segmentation, specification and control interface requirements, and design integration.
- The capstone senior project course (EMET 440) provides the ultimate integrating experience for students. In this course, two- and

occasionally three-person teams are presented with an engineering problem and are required to conceptualize, propose, design, build, test, and ultimately demonstrate a working product to solve that problem. Problems are free-form and open ended, and students must deal with the entire spectrum of design activities. These include working effectively with teammates, brainstorming solutions, researching literature, locating and interpreting manufacturers' data sources and product specifications, budgeting project expenditures, procuring materials, working to schedules, assembling actual devices and making them work as designed, and presenting results in formal settings.

Design practices and the use of design tools: various courses in the EMET curriculum require students to become familiar with standard electrical and mechanical design tools and concepts. However, the senior design project described above provides the key culminating design experience for EMET students.

CO-OPERATIVE EDUCATION

The EMET program has no co-operative education or internship provisions.

B.4.c – Quality Assurance of Courses

Section B.3.a describes the general quality control process and administrative features implemented by SEDTAPP to monitor, maintain, and improve the courses that make up the EMET program. However, the EMET coordinator and program faculty at Berks also employ individual practices that provide added monitoring, assurance, and improvement in course delivery. These are:

- <u>Student Review of Teaching Evaluations</u> (SRTEs) – all EMET faculty conduct the University-sponsored student reviews of classes at the end of each semester. SRTEs provide student input to both the quality of courses and the quality of instruction. Compiled results of SRTEs are provided to faculty early in the following semester so that they may incorporate the student input into future classes.
- <u>Measurement and Evaluation of Engineering Technology (M.E.E.T.) surveys</u> – all EMET faculty and their classes participate in the M.E.E.T. surveys (see section B.3.a. for information on M.E.E.T.) to evaluate the success of their classes and the students in achieving expected course outcomes.
- <u>Annual Program Review</u> – at the end of the academic year, the EMET program coordinator prepares a written assessment of the status of the EMET program at the Berks campus. The report is based on M.E.E.T. data, graduating student exit surveys, and industrial employer surveys. The report identifies and suggests actions to address any areas of

concern. Copies are provided to all program faculty and campus administration for review.

B.4.d – Course Descriptions

Standard course outlines can be viewed at <<http://cede.psu.edu/studentguide/baccalaureate/4emet.htm>>. Detailed outlines/syllabi for the technical core and specialty courses listed in Table B.4.1, as conducted at the Berks campus will be part of the display during the visit. Hard copy and CD versions of the course outlines are also provided.

B.4.e – Demonstration of Attention to Key Components

The following table shows the breakdown, by credit count, to the distinct curricular elements of the EMET program:

Table B.4-2 – Credit Allocations to Key Curricular Topics
(Upper-Division Courses Only)

Curricular Area	Total Credits	Percent of Program
Technical Core[1]	0	0
Technical Specialties[1]	38/39	60
Mathematics	7	11
Physical Sciences	3	5
Communications[2]	3 (6/7)	5 (10)
Soc. Sc/Hum/Arts	12	19
Totals	63/64	100

Notes:

1 – Because the EMET curriculum consists of only upper-division courses, all technical courses are technical specialty courses. Students enter with core technical skills from their required associate degree programs.

2 – Numbers in () include credits for "W-designated" courses in the 'Communications' category. Numbers not in () reflect only the Engl-202C (Technical Writing) course. Students enter the program with three credits of college-level composition and three credits of public speaking training.

As the table shows, almost two-thirds of the upper-division curriculum is dedicated to technology subjects. Further, more than three quarters of the program is dedicated to technology subjects supported by critical math and science topics. The remaining ~25% of the program is committed to essential communications skills and exposure to core topics in the humanities and social sciences. This distribution of studies is typical of similar programs at other schools.

B.4.f – Co-operative Education Provisions

The EMET program has no co-operative education or internship provisions.

B.4.g – Additional Review Materials

Most review materials demonstrating the above described characteristics are included in the 'Outcomes' and 'Course' files described previously in section B.2.e. Information not contained in those files generally will be found in appendices to this report or online at SEDTAPP-maintained websites. Where appropriate, the text herein indicates the relevant appendix or identifies the Internet address to the relevant website. (Note – if viewing an electronic version of this report from an Internet-connected computer, links to online sources are active, and the information may be accessed directly by 'clicking' on the link while holding down the 'Ctrl' key).

B.5 Criterion 5 – Faculty

B.5.a – Faculty Analysis

Table B.5-1 summarizes the qualifications of all faculty teaching in the EMET program. Activity assessments reflect the last three years. Curriculum vita follow the table.

Table B.5-1. Faculty Analysis

Name	Rank	FT or PT	Degrees Earned Degree, Year, & Institution	Years of Experience			Professional Registration (Indicate State)	Level of Activity (high, med, low, none)* in:		
				Govt./Industry Eng/ET	Teaching Eng/ET	This Institution		Professional Development	Professional Society	Work in Industry
John Gavigan	Asst.	FT	PhD, 1981, PSU MSEM, 1967, PSU BSME, 1965, Drexel	25	19	12		med	low	high
Terry Speicher	Asst.	FT	MSEE, 1984, USC MSME, 1981, USC BSME, 1979, RPI	21	8	6	CA PA	med	low	high
Tom Gavigan	Asst.	FT	MSEM, 1977, PSU BSME, 1970, Drexel U.	4	8	22	PA	med	med	low
Barbara Mizdail	Lect.	FT	MSE, 1977, Michigan BSME, 1972, Arizona	20	4	2		low	high	high
Dale Litwhiler	Asst.	FT	PhD, 2000, Lehigh Univ. MSEE, 1989, Syracuse U. BSEE, 1984, PSU	13	7	3	PA	high	high	med
Robert Buczynski	Assoc.	FT	MSEE, 1964, Northeastern U. BSEE, 1961, Bucknell U.	10	35	24	PA	med	high	med
Gregory Stanton	Lect.	FT	MSEE, 1998, PSU BSEET, 1992, PSU ASEET, 1990, PSU.	11	2	2	PA	low	low	med
Henry Ansell	Asst.	FT	PhD, 1962, Poly. Inst. Brooklyn MEE, 1958, Poly. Inst. Brooklyn BEE, 1957, Cooper Union A.S.A.	25	18	18		med	med	high
Hank Haraschak	Inst.	PT	MS, 1964, Franklin & Marchall BSEE, 1958, PSU	26	32	32				

Eric Tappert	Inst.	PT	MS, 1998, Colorado BSEE, 1969, Pennsylvania	27			PA NJ			
Samir Serhan	Inst.	PT	PhD, MSCE	16	12	10	PA	med	low	high
Kailasam Satyamurthy	Inst.	PT	PhD, 1979, Clemson University MBA, 2003 Penn State MSCE, 1976, Clemson University BSCE, Univ. of Madras, India	20	15	3		med	low	high

Name:	Thomas Gavigan
Date Hired:	Sept 1, 1982
Rank:	Assistant Professor
Degrees:	BS in Mechanical Engineering, Drexel University, 1970 MS in Engineering Mechanics, Penn State University, 1977
Other Teaching:	Lafayette College, Easton, PA, Instr of Engineering Science, 1977-82 Penn State University, Graduate Teaching Assistant, 1974-77
Industrial (Full-time):	Bechtel Power Corporation, Gaithersburg, MD Assistant Mechanical Engineering Group Supervisor, 1970-74 U.S. Army Corps of Engineers, Draftsman 1967-68 (Co-Op)
Registration:	Registered Mechanical Engineer, State of PA, PE-033746-E
Publications:	Mackertich,, Seroj, Gavigan, T.H., "Using the Microcomputer for the Analysis of a Truss", Journal of Engineering Technology, Spring, 1991.
Societies:	ASEE- present member, Chairman, Middle Atlantic Section 1991, Newsletter Editor, 1987-1990.
Awards:	Penn State Berks Beaver Community Service Award, 2002 Penn State Berks Campus Outstanding Advisor Award, 2004
Programs:	Leadership Workshop for ASEE Officers, Nov. 1990 Collaborative Learning Workshops, April, June 1993
Duties (Salary):	Instructor of Engineering and Engineering Technology College of Engineering Representative, coordinate Academic Advising activities
Duties (Comp.):	Additional Teaching Loads throughout the Academic year.
Prof. Service:	Reading Area Community College, Tutor adult students Reading Jewish Community Center, Board of Directors
Prof. Development:	Attendance at numerous ASEE Conferences
Summer:	Advisor in First Year Student Counseling and Advising Program Occasional teaching during summer

Name:	John J. Gavigan
Date Hired:	September 1, 1999
Rank:	Assistant Professor
Degrees:	B.S., M.E., Drexel University, 1965 M.E., EMCH, Penn State University 1967 Ph.D., EMCH, Penn State University, 1981
Other Teaching:	1990 – Present Adjunct Professor, Penn State University, Great Valley Graduate Center 1997 – 1999, Adjunct Professor, Drexel University 1995 – 1998, Adjunct Professor, Penn State University, Abington 1976 – 1981, Assistant Professor, Lafayette College, Easton, PA 1971 – 1975, Instructor, Penn State University, University Park
Industrial: (full-time)	1985 – 1999, Member of Technical Staff, Sarnoff Corporation, Display Technology Laboratory, Princeton, NJ 1981 – 1985, Research Engineer, Bethlehem Steel Corporation, Homer Research Laboratories, Bethlehem, PA 1969-1971, Engineer, RCA Corporation, Burlington, MA 1967 – 1969, Military: Commissioned Officer, U.S. Army Corps of Engineers
Industrial: (part-time)	1961 – 1965, Various Co-op Assignments in industry as a Drexel University Student
Consulting:	1999 – 2001, Consultant, Sarnoff Corporation, Princeton, NJ 2000 – Present, Consultant, Thomson Consumer Electronics, Lancaster, PA 2000 – 2001, Consultant, Epitaxx Corporation, Lawrenceville, NJ
Publications:	Gavigan, J. J. , Opresko, S. T. Hutzler, R. W., Modeling of Conventional and True Flat CRT's During the Frit-Sealing Process the 1st International_Display Manufacturing Conference, Seoul, Korea, September, 2000 Gavigan, J.J., Opresko, S.T., Hutzler, R.W., "CRT Glass Modeling," *SID IDW '99* The Sixth International Display Workshops, Sendal, Japan, December 1999 Gavigan, J.J., Davis, T.J., Opresko, S.T., Hutzler, R.W., "Stress And Thermal Analysis Techniques for Television Picture Tube Bulb Design," *SID* Display Manufacturing conference, February 1996.
Societies:	American Society of Mechanical Engineers Society for Information Display
Honors:	National Aeronautics and Space Administration Postdoctoral Summer Faculty Fellowship Award (1976, 1977) 1994 and 1989 Sarnoff Technical Achievement Award
Other Duties: (base salary)	EMET Program Coordinator, Outreach

Name:	Terry L. Speicher
Date Hired:	17 August 2000
Rank:	Assistant Professor of Engineering
Degrees:	M.S.E.E., Univ. of Southern California, 1984, Los Angeles, CA M.S.M.E., Univ. of Southern California, 1981, Los Angeles, CA B.S.M.E., Rensselaer Polytechnic Institute, 1979, Troy, New York
Other Teaching:	1985 – 1994 Hughes Advanced Technical Education Program, El Segundo, California
Industrial: (full-time)	1996 – 2000 Nearfield Systems Incorporated, Carson, California 1979 – 1996 Hughes Space & Communications, El Segundo, CA
Industrial: (part-time)	1977 – 1979 National Aeronautics & Space Administration, Cleveland, Ohio
Registration:	California Board for Professional Engineers & Land Surveyors, Mechanical Engineer, M31188 Project Management Institute, Project Management Professional, 188295 Pennsylvania Board for Professional Engineers, Land Surveyors and Geologists, Professional Engineer, PE071190
Publications:	Speicher, Puzella & Mulcahey, "Raytheon 23' x 22' 50-GHz Pulse System." *Antenna Measurements Techniques Association Symposium*. Philadelphia, Pennsylvania: 2000 p. 216.
Societies:	American Society of Mechanical Engineers American Society of Engineering Education Institute of Electrical and Electronics Engineers
Other Duties: (base salary)	Coordinator – Electro-Mechanical Engineering Technology Advisor – Electro-Mechanical Engineering Technology students Member – Engineering Technology Accreditation Advisory Board Chair – Electro-Mechanical Curricular Committee Chair- Spatial analysis and Advanced CAD Course Member – New Academic Classroom Building Committee
Other Duties: (extra comp.)	Instructor - independent study courses Advisor – Freshman, Testing, Counseling and Advising Program
Prof. Service:	Member – Lehigh Career and Technical Institute Occupational Advisory Board for Pre-Engineering Pennsylvania Affiliate Professor – Project Lead The Way
Prof. Development:	ABET Assessing Success in Technology Education 2006, Washington, DC ASEE Engineering Design Graphics Division Conference 2005, Ft. Lauderdale, FA and 2004, Williamsburg, VA ASEE Annual Conference 2003, Nashville, TN ABET Technology Education Initiative 2002, New Brunswick, NJ ASME Annual Conference 2001, New York, NY

Name:	Barbara Mizdail
Date Hired:	Fall 2002
Rank:	Lecturer
Degrees:	BS Mechanical Engineering, 1972, Univ. of Arizona MSE, Master of Science in Engineering, 1977, Univ. of Michigan
Other Teaching:	Adjunct Positions: Cleveland State, UNCC, Lehigh One Year Appointment: Temple University
Industrial: (full-time)	Chrysler Institute of Engineering, Chrysler Corp., Ford Motor Co., Mack Trucks, Dana Corp., Agere Systems Inc.
Consulting:	Community College of Philadelphia
Publications:	"Manufacturing Systems Engineering Programs", ASEE Regional Conference, Philadelphia, PA, 1995. "Manufacturing Systems Engineering Programs in the University", Proceedings of the International Symposium of the National Council on Systems Engineering, Seattle, WA, July 20-22, 1992. "A Systems Perspective Needed For Engineering Education", SAE Congress, Detroit, MI, March 2004.
Societies:	SAE, Society of Automotive Engineers SME, Society of Manufacturing Engineers
Awards:	SAE, Outstanding Younger Member Award, SAE, Distinguished Younger Member Award, SAE, Chairperson Lehigh Valley Section
Programs:	Mechanical Engineering/Mechanical Engineering Technology
Duties (Salary):	Full Time, 3 Year Contract
Prof. Service:	Faculty Advisor, SAE Student Chapter; Advisory Board Member, Berks Career and Technical Institute
Prof. Development:	Continuing Education through Seminars, Conferences, etc.
Summer:	Participant in FTCAP
Other:	United Way, Industrial Advisory Council for Engineering, Academic Advisory Council, Faculty Senate Representative for the EBC Division

Name:	Robert J. Buczynski
Date Hired	August 1982
Rank:	Associate Professor of Engineering
Degrees:	BSEE, Bucknell University MSEE, Northeastern University
Other Teaching:	Luzerne County Community College, Nanticoke, PA, Associate Professor and Chairman of Engineering Technology, 1967-78.
Industrial: (full-time)	Western Electric, Reading, Senior Engineer, 1980-82 Metropolitan Edison, Reading, Supervisor, 1979-80 Bell Telephone Laboratories, MTS, 1978-79 RCA, Applications Engineer, 1965-67
Registration:	Professional Engineer, Pennsylvania
Publications:	Buczynski, R. J. "Audio Evaluation of Laboratory Reports", Proceedings of the ASEE Mid-Atlantic Conference, April, 2003.
Societies:	IEEE - Senior Member. Served as secretary of IEEE Committee on Technology Accreditation Activities, 1990 & 1991. IEEE – TAC of ABET Program Evaluator, 1985-1994 ASEE - Member of Engineering Technology Division; Reviewer for Annual Conference Proceedings, 1998-2005; Participant at: ASEE Mid-Atlantic Conferences – 2002, 03 & 04; ASEE National Conferences – 1993 & 97
Honors:	Recipient of ASEE Centennial Certificate, June 1993. Selected as Senior Member of IEEE, September 1989. Recipient of the Penn State Engineering Society Outstanding Teaching Award, May 1988.
Programs:	Participant –ABET TC2K Accreditation Workshop, May, 2004. Invited Participant – ABET TEI Workshop, June, 2002. Participant – IEEE TAC of ABET Accreditation Workshop, Chicago, IL, June 1993.
Other Duties: (base salary)	Advisor for Engineering and Engineering Technology students. EET Program Coordinator – Berks Campus, 2002-05 Co-Chair – Penn State Berks-Lehigh Valley College Industrial Advisory Committee 1990-2002 Member – College Promotion & Tenure Committee, 1997-99, 2001-03, 2005-06 Chair – EBC Division Promotion & Tenure Cmte, 2004-05 Member – ETCE Promotion & Tenure Cmte, 2003-04 Chair – BKLV College Engineering Search Cmte, 2002 Member – College Search Committees, 1998, 2004, 2006
Other Duties (extra comp.)	Administrative Evaluator of engineering faculty for Division Head Spring 2001.
Summer:	Freshman Testing, Counseling and Advising Program – Faculty Advisor, 1999-2005.
Other:	Judge -Annual Science Fairs at area schools, January 1995 – 2005.

Name:	Dale H. Litwhiler
Date Hired	August 2002
Rank:	Assistant Professor of Engineering
Degrees:	BSEE, Penn State University, 1984 MSEE, Syracuse University, 1989 Ph. D. EE, Lehigh University, 2000
Other Teaching:	Lehigh University, Bethlehem, PA. Teaching assistant 1989 – 1993.
Industrial: (full-time)	Lockheed Martin, Newtown, PA. Staff Engineer, 1994 – 2002. IBM Federal Systems, Owego, NY. Senior Associate Engineer, 1984 – 1989.
Industrial: (part-time)	IBM Federal Systems, Owego, NY. 1989 – 1994.
Registration:	Professional Engineer, Pennsylvania
Publications:	Litwhiler, D. H., "A Simple Software and Hardware System Solution for Process Measurement and Control in Engineering Technology Student Design Projects," Proceedings of the ASEE Annual Conference, ASEE, Salt Lake City, UT, June, 2004. Litwhiler, D. H., "A Versatile LabVIEW™ Environment for Communicating with Dallas-Maxim 1-Wire™ Devices," Computers in Education Journal, (to be pubished). Litwhiler, D. H., "More Meaningful PSpice™ Simulations via LabVIEW™," International Journal of Engineering Education, (to be pubished). Litwhiler, D. H., "Listening to PSpice™ Simulations with LabVIEW™," International Journal of Engineering Education, (to be pubished).
Societies:	ASEE - Member of Engineering Technology and Instrumentation Divisions. Reviewer for the 2004 Annual Conference Proceedings; Reviewer for the 2005 Annual Conference Proceedings; Moderator for the 2005 Annual Conference.
Honors:	None
Programs:	Participant – ABET TC2K workshop, Greensburg, PA, October, 2003.
Other Duties: (base salary)	Advisor for Engineering Technology students. Member – Penn State Berks Industrial Advisory Committee Member – BKLV College Engineering Search Committee, 2004 Member – BKLV College EET Lab Supervisor Search Committee, 2004. Supervisor – EET Student Laboratory Assistant, 2003 – 2005. Co-Supervisor – EET Lab Supervisor, 2004 - Present. Member – ABET CQI team, 2004 – Present. Member – University EET Curriculum Committee, 2002-2005.
Other Duties (extra comp.)	Freshman Testing, Counseling and Advising Program – Faculty Advisor, July, 2004.

Name:	Gregory D. Stanton
Date Hired	August 2004
Rank:	Lecturer of Engineering
Degrees:	ASEET, Penn State University, 1990 BSEET, Penn State University, 1992 MSEE, Penn State University, 1998
Industrial: (full-time)	Bulova Technologies, LLC; Lancaster, PA, 2003 – 2004. Smiths Aerospace Electronic Systems; Germantown, MD, 2001 – 2003 Hughes Network Systems, Inc.; Germantown, MD, 1997 – 2001
Societies:	IEEE
Other Duties: (base salary)	Advisor for Engineering Technology students. Member – Penn State Berks Industrial Advisory Committee Member – ABET CQI team, 2004 – Present.

Name:	Henry G. Ansell
Date Hired:	August 1987
Rank:	Assistant Professor
Degrees:	B.E.E., The Cooper Union for the Advancement of Science and Art, 1957 M.E.E., Polytechnic Institute of Brooklyn, 1958 Ph.D. (Electrophysics), Polytechnic Institute of Brooklyn, 1962
Other Teaching:	Penn State University Park, course EE367, Summer of 1988
Industrial (full time):	1962-1974, AT&T Bell Laboratories, Whippany, NJ, engineer. Responsibilities included research studies for the military. 1974-1987, AT&T Bell Laboratories, Reading, PA, integrated circuit designer. Responsibilities included circuit design; also specifications, test hardware and software prototype, current engineering to do design modifications if problems arose.
Publications:	(with R. V. Staus) "ET Students' Perceptions of the Most Important Means of Learning", Proceedings ASEE Annual Conference 2001
Societies:	ASEE, IEEE, Sigma Xi
Awards:	All students admitted to Cooper Union are on a full scholarship.(1953-1957) Graduate Fellowship while a graduate student at Polytechnic Institute of Brooklyn. (1957-1962)
Other Duties (Salary):	Academic advising
Other Duties (Comp.):	Freshman Testing, Counseling and Advising Program – Faculty Advisor, Summer 2004.
Prof. Service:	Judge at Reading-Berks Science & Engineering Fair
Prof. Development:	Attendance at ASEE Annual Conference, 1996, 1997, 1998, 2001.
Other:	Member of Board of Directors of Project Reach, a non-profit corporation dedicated to bringing higher education to people with severe disabilities, especially quadriplegia and ventilator dependence.

Name:	Henry P. Haraschak
Date Hired:	August 1974
Rank:	Lecturer
Degrees:	BSEE, The Pennsylvania State University, 1958 MS, Physics, Franklin & Marshall College, 1964
Other Teaching:	Reading Area Community College Continuing Education – Penn State Berks Campus Technician Review Course – Keystone Technical Associates
Industrial: (full-time)	AT&T Technologies - 26 years Senior Design Engineer, 1959 - 1985
Publications:	
Societies:	Sigma Pi Sigma -Physics Honor Society
Awards:	

Name:	Eric Tappert
Date Hired:	August 2002
Rank:	Lecturer
Degrees:	BSEE, University of Pennylvania, 1969 MS Telecomm, University of Colorado, 1998
Other Teaching:	Northampton County Area Community College Associate Professor Electronics Technology, 1981 – 1984.
Industrial: (full-time)	Agere Systems, Member Technical Staff, 1996 – 2001. AT&T Bell Labs, Member Technical Staff, 1995 – 1996. AT&T Microelectronics, Member Technical Staff, 1993 – 1994. PEComm, Chief Engineer, 1991 – 1993. All-Control Systems, Project Manager, 1990 – 1991. AT&T Microelectronics, Technical Support Mgr., 1984 – 1989. Western Electric, Senior Engineer, 1969 – 1981.
Registration:	Licensed Professional Engineer, New Jersey and Pennsylvania.
Publications:	
Societies:	IEEE, ACM, NSPE, PSPE
Awards:	Eta Kappa Nu

Name:	Samir Serhan
Date Hired:	1995
Rank:	Instructor
Degrees:	PhD MSCE
Other Teaching:	Reading Area Community College 1 yr. Temple University 3 yr.
Industrial (full time):	Parsons Energy Chemicals – Department Manager Civil/structural engineering 10yr.
Publications:	"Natural Phenomenon Hazard Evaluation of an Aged DOE Plant," 58th American Power Conference, Chicago, IL 1996.
Societies:	ASCE
Awards:	

Name:	Kailasam Satyamurthy
Date Hired:	2002
Rank:	Instructor
Degrees:	PhD Clemson University MBA Penn State University MSCE Clemson University BSCE University of Madras, India
Other Teaching:	University of Akron 4 yr. Virginia Tech 2 yr. Clemson University 4 yr. University of Madras 2 yr.
Industrial (full time):	Vanguard Group, Valley Forge, PA; Project Manager 6 yr. ALCO Management, Alliance, OH; Plant Manager 1 yr. GenCorp, Akron, OH; Sr. Technologist 19 yr.

B.5.b – Relevance of Faculty Backgrounds

All full-time faculty members and part-time adjunct instructors, in the EMET program have advanced degrees in engineering, which ensures that they have the necessary knowledge to teach the courses in the program. This range of backgrounds provides important redundancy that ensures coverage for all courses is available at all times.

The Bachelor of Science in Electro-Mechanical Engineering Technology curriculum at Penn State Berks is supported by eight full-time faculty members. The electro-mechanical nature of the program requires a faculty academic credential mix that includes electrical and mechanical engineering course work. Equal division exists between the mechanical and electrical disciplines. The nature of the BSEMET program demands instruction in both electrical and mechanical competencies, and the faculty at Penn State Berks provide the discipline and course topic balance required as illustrated in Table B5-2.

Table B5-2 Faculty Background versus Curricular Areas

	Computer-aided Design	Electrical Systems	Mechanical Systems	Control Systems	Management Techniques
Gavigan, J.	X		X		
Gavigan, T.	X		X		
Mizdail			X		X
Speicher	X		X		X
Satyamurthy			X		X
Serhan			X		X
Ansell		X		X	X
Buczynski		X	X		
Litwhiler		X	X	X	
Stanton		X		X	
Haraschak		X		X	
Tappert		X		X	

B.5.c – Adequacy of Interactions

Faculty from the EMET program as well as from the 2EET and 2MET programs participate in student activities by supporting student organizations and by encouraging students to include participation in student activities as a part of their college experience. An ongoing and popular project highlighting student faculty interaction at Penn State Berks is the preparation for the SAE Mini Baja Competition, which takes place each year summer. A student team from Berks has competed in the annual event since 2005. The competition encourages students to integrate a multidisciplinary team to design and construct an SAE Mini-Baja vehicle. Students from Engineering, Engineering Technology, and other majors collaborate under a corporate project structure.

Advising Electro-Mechanical Engineering Technology students is given highest priority by program faculty. One result of having a relatively small group of students is that faculty student interaction is enhanced due to repeated contacts with students in courses, in student activities, and in advising situations. Students are quick to seek help from program faculty and advisors, which is available in a variety of forms. Regular contact is made with students through electronic mail, to make them aware of scheduling issues, deadlines, and activities and offerings that may be of interest to them. Program Coordinators regularly contact advisors to promote student reminders regarding program issues and deadlines as well.

B.5.d – Technical Currency

In addition to having extensive industrial experience prior to teaching in the EMET program, all the faculty intimately involved in teaching the EMET program maintain significant involvement with current technology via either consulting or active participation in professional organizations.

B.5.e – Professional Development

EMET Program faculty participate in a wide variety of professional development activities. Several faculty attend conferences and workshops on various subjects in order to remain current in their fields and to increase exposure to new methods and technology. Faculty have authored technical papers and presented at various conferences. Other professional development activities include networking with industry leaders, and visiting local companies to see the latest endeavors, and performing research linked to local industry. Specific details can be found in the faculty vitae.

B.5.f –Faculty Input

Program *objectives* and *outcomes* for the EMET program, and the expected relationships among these and the program curriculum, are established by the EMET Curriculum Committee, which includes representation from all the colleges that offer the EMET program. This information is maintained online at an open-access Internet site available to all faculty. The process for establishing and updating the online documents involves Committee representatives notifying EMET program faculty of proposed changes, which are posted online, and asking for comment and reactions. All feedback received is reviewed by the Committee before modifications are adopted as final. As a result, all faculty have the opportunity to be involved in the creation of and modifications to program *objectives* and *outcomes*.

Faculty are also included in the annual distribution of standard course outlines, which are first distributed in draft form for comment. Further, the online course assessment system (M.E.E.T. see section B.3.a.) gives all faculty the opportunity each semester to provide feedback to Course Chairs regarding appropriateness of, problems with, or suggestions for improvement of standard course outlines. These comments are reviewed by Course

Chairs, who are responsible for responding to and resolving all such comments with both the faculty and the Curriculum Committee.

Finally, all Berks EMET faculty are involved in the annual meetings of the EMET Industrial Advisory Committee, which provides feedback on program and curriculum issues related to the program. These meetings provide the faculty an opportunity to discuss with active industry practitioners issues related to the topics they teach.

B.5.g –Faculty Workloads

Faculty workloads for the 2005 – 2006 academic year are shown in Table B.5-3. Workload guidelines, which describe expected credit loads and class contacts for each faculty rank, are available at <<http://www.cede.psu.edu/tc2k/Engineering_8-05.pdf>>.

Table B.5-3. Faculty Workload Summary

	Range	Average
Credit Hours	6-9	9
Contact Hours Per Week	9-12	11
Laboratory Size	5-20	13
Class Size	10-35	26
Advisees	20-40	30

Credit Hours 9 Contact Hours 12

A full-time load is considered to be 9 credit hours or 12 contact hours per week except for faculty on tenure track. Contact hours for tenure track faculty are reduced to 9 hours to accommodate research expectations.

B.5.h –Faculty Teaching Assignments

Teaching assignments for courses offered in 2006 are shown in Table B.5-4.

Table B.5-4 – Faculty Teaching Assignments		
Instructor	Semester	
	Spring 2006	Fall 2006
John Gavigan	EMch011, 012 & 013; MchT111	EMch011; EMET322
Terry Speicher	EDG100; EMET440	EDG100
Gregory Stanton	EET220; PSU005; EMET410 & 430	PSU005; EET109; EMET430
Henry Ansell	CSE275; EE210; EMET440	CSE271; EMET310 & 410
Kailasam Satyamuthy	EMET350	
Samir Serhan	EMET405	IET105
Dale Litwhiler	EET216 & 221; EMET330	EET101, 205 & 210
Tom Gavigan	EDG100; MET210W	EDG100
Barbara Mizdail	IET101 & 215	PSU005; IET216
Hank Haraschak	EET117 & 120; EMET440	EET109 & 211
Eric Tappert	EMET321W	EMET 310 & 320
Robert Buczynski	EET114; EMET321W	EET213W & 320

B.6 Criterion 6 - Facilities

B.6.a – Classrooms

Lecture and laboratory facilities are very good with a new academic classroom building in the planning stage. Facilities are adequate for present enrollment and the additional building will accommodate increases in enrollment.

B.6.b – Laboratory Facilities

Additions to the physical facilities and equipment for the engineering technology programs at Berks are listed as follows:

2005: Allen Bradley Servo Motors w/ accessories
ABB Commander Controller
Nova-Strobe, BA115, Stroboscope
AEMC Digital Power Meter, Model 3910
Lab-Volt Electro-Mag Break, 3152-20
BK Precision LCR Meter, 875B
PAD-234 Digital Trainer
Miller Syncrowave 180SD GTAW or TIG welder
Millermatic 251 MIG welder
Emco Super 11 CD Engine Lathe

Tabletop 3-ton Ratcheting Arbor Press
Comprehensive set of mechanic's AirTools
2004: Craftsman 18" Vertical Wood/Metal Bandsaw
Craftsman 15.5" Commercial Drill Press
6" grinders
Intelitek Scorbot model ER-4U
Dell Optiplex Dektop Personal Computers
Tektronix Digital Oscilloscopes, TDS-1002
HP iPAQ Handheld Computers
2003: Brown and Sharpe Gage 2000 CMM w/ PC-DMIS
Trak TL 1440S Engine Lathe w/ CNC capability
Trak K2 3-axis vertical mill w/ 2-axis CNC capability
Surfometer Series 400 Profilometer
14" abrasive disk cut-off or chop-saw
Feedback Process Control Simulator, PCS327
Feedback Level/Flow Process Rig, 38-100
Ross 2 Pen Recorder, Model 202
LabJack U12 Data Acquisition & Control Divice
2002: Feedback Instrumentation Modules w/ transducers
Tektronix Digital Oscilloscopes, TDS220
2001: LP Tek Spectrum Analyzer w/AM+FM, LPT-2250

Physical facilities for the engineering technology technical courses are located in the Luerssen Building and are managed by two full time lab supervisors, one for electrical labs and one for mechanical labs:

Room 2 is the electrical lab that covers an area of about 900 square feet. It includes a 25-seat classroom area, supported by chalkboard space, a technology podium (Dell computer with internet and LAN access, CD/DVD/VCR players), projection system, retractable screen, and an overhead projector. The principle lab area is equipped with seven teaching stations with each one having 120VDC, 120V 1ϕ, 120V 3ϕ and 208 3ϕ supplies. The room is equipped with DC motors and generators, AC motors and generators and five mobile DC/AC motor control stations. Also, four networked Dell Dimension computers are located here running Windows XP with Office XP, Netscape Communicator, MATLAB 5, LabVIEW 7.1, and PSpice Eval 8. A networked laser jet printer is also located in this room. There are three storage cabinets in the rear of the room.

Room 3 is the stockroom that separates the electrical and PLC laboratories. The room is comprised of a general area, approximately 500 square feet, and two smaller areas (a repair room and a power room), each of about 77 square feet in size. Components, instruments, and a collection of reference materials are stored here. This area also houses the office of the laboratory supervisor. Switches and breakers to control all voltages to the power panels for each teaching station are located in the power room.

Room 4 is the programmable logic controller lab that is composed of a 12 seat classroom area and a formal laboratory area covering about 900 square feet. Both areas are supported with whiteboard space, an electronic smart-board, a data projector, an overhead projector and screen, and general storage cabinets. The formal lab area contains six teaching stations and each is equipped with two 120VDC supplies and 120V 1ϕ, 120V 3ϕ, and 208V 3ϕ supplies. The PLC equipment includes six SLC-500 stations, two PLC-5 stations and an instructor station. Also, nine Dell Optiplex Gxa computers are located here running Windows NT with Office 97, Netscape Communicator, MATLAB 5, LabVIEW 7.1, PSpice Eval 8, RSView 32, RS Logix 5, RS Logix 500, RS Linx, and Panel Builder software.

Room 20 is a combined projects classroom and materials testing laboratory utilized for courses in Strength of Materials and in Materials and Processes. Equipment includes a tensile testing machine, strain gage apparatus, hardness testers, surface roughness tester, microscope, robotic arm, and coordinate measurement machine. Workstations with seats of MasterCam, Solidworks, Inventor and Pro/Engineer.

Room 21 is a prototype fabrication facility, the Hintz Manufacturing Technology Laboratory, utilized for courses in Production Design. Equipment includes vertical mill, CNC mill, manual lathe, CNC lathe, grinder, band saw, and drill press.

Room 22 is the electronics lab that covers about 600 square feet and is composed of six student workstations each with dual power supply, function generator, digital multimeter, timer/counter and oscilloscope. A Dell Dimension computer is located at each station that is connected to the network and contains software programs such as PSpice version 8, B-Square Logic, MATLAB 5 and LabVIEW 7.1. There is a separate workstation that is used to program PLDs and this computer has CUPL and the EMUP program installed on it. Three storage cabinets are located in this laboratory. The room is equipped with an overhead projector and screen and a TV and VCR.

Room 123 is a mechanical design classroom utilized for courses in Technical Drawing and in Machine Design. Equipment includes 24 individual work tables with chalkboard space, instructor’s podium with DVD & VHS data projection system and networked computer, file and storage cabinets.

Room 141 is a computational graphics classroom utilized for courses in Computer-Aided Drafting. Equipment includes 24 networked Pentium PC’s with Windows, Office, AutoCAD, SolidWorks & I-DEAS, network laser jet printer, chalkboard space, instructor’s podium with DVD & VHS data projection system and networked computer.

B.6.c – Computing Facilities

Additional computer equipment is centrally located in rooms 142 – 146 of the Luerssen building and it is connected to servers at University Park with related interactive terminals and backup equipment. Also there are microcomputers and twenty handheld iPAQ pocket PC devices available for implementation into classroom work and for student use. A sampling of available analytical software relevant to the EET program would include, among others, PSpice, MultiSim, Mathcad, Matlab, and Labview. Help services are provided via reference desk, which is manned by both administrative staff and work-study students

B.6.d – Information Infrastructure

The campus has recently renovated and expanded the library, which has computer labs and meeting rooms. Students typically gather their information using the internet to access periodicals, manufactures catalogs, and society publications. The campus has campus-wide high speed internet access.

B.6.e – Sharing of Facilities

The facilities described above are used by the Engineering Technology department; however the labs are shared by the associate ET programs and the baccalaureate EMET program. At present, the facilities are adequate to accommodate all enrollment demands without scheduling conflicts among the programs. Enrollment trends indicate that this situation should not change in the near future.

B.7 Criterion 7 - Institutional and External Support

B.7.a –Resources for Acquisition, Maintenance & Operation of Facilities & Equipment

Historically, funds to replace laboratory equipment has come from several sources, including grant proposals, tuition surcharges, targeted fund drives, matching funds from the College of Engineering (COE), Berks College equipment funds, engineering endowments, and campus general funds. Generally, major renovations and equipment upgrades are handled through grant activities, while smaller purchases and expendable resources are covered from general funds and surcharge accounts.

In recent years, funding for equipment purchases and repairs in most of the labs has become more available because of tuition surcharges imposed on the baccalaureate EMET students who also use these labs. Those funds are earmarked exclusively for lab maintenance and equipment purchases for those labs supporting the EMET program, which includes the EET and MET programs since the same labs are used by both.

All students also pay a computer surcharge to the University each semester, and a portion of the surcharge is returned to the campus in proportion to campus enrollment. This money is dedicated to maintaining state-of-the-art computers on campus, which has resulted in annual purchases of new computers. The campus practice has been to install the newest computer equipment in the campus Computer Center and to move existing computers out to other areas on campus. Engineering labs are typically one of the first areas to be considered in these moves, and essentially all technology lab computers have been upgraded in the last three years through this process.

Equipment repair and maintenance are handled in two ways. Minor repairs and maintenance are done by the technical support staff on campus. Major repairs are contracted out either to the equipment repair center at the University Park campus or to equipment vendors. Funds for these repairs come from the same sources indicated above.

B.7.b –Support Personnel and Institutional Services

The campus provides financial aid services, advising, tutoring, and career placement services. Students on work study or wage payroll are the support personnel for the maintenance of laboratory equipment; other than that, the faculty maintain the equipment. In the past, administrative assistants would be the support personnel for the Engineering Technology faculty; however, with the advent of the personal computer, the Engineering Technology faculty prepare their own exams, reports, etc.

B.7.c –Selection, Supervision & Support of Faculty

Faculty positions are publicly advertised. A search committee is delegated with the responsibility of screening all candidates for the advertised position. Instructors are required to hold a minimum of a master's degree, more recently however a PhD degree is being required. Instructors are hired having varying degrees of industrial experience. All faculty hold some professional affiliation. Faculty within the university are appropriated monies annually for the purposes of remaining current in their field of expertise and also for professional development.

B.7.d –Selection, Supervision & Support of Students

The campus has an open enrollment policy. Students are administered the FTCAP test at the time of acceptance into the university to determine their placement in math and English. If the results of the test scores are such then the students are placed in remedial math and remedial English courses. Students do not receive credit toward their degree work for these courses.

An advisor is assigned to each student in the engineering technology programs. Near the conclusion of each semester students are advised of the courses that he or she should take in the following semester. If a student should require individualized advising then the student arranges a meeting with his or her advisor.

The campus currently has a career services officer. Employment opportunities are posted by this office. There is no longer any on-campus interviewing. Because of the loss of manufacturing jobs in the United States, jobs are difficult to come by. A lot of job opportunities are by word of mouth. Employers are only interested in conscientious, productive employees.

B.7.e – Support Expenditures for the Program

Table B.7-1 Support Expenditures For The Program

Expenditure Category	Two years ago	Last Year	Current Year	Budgeted for the Year of the Visit
Operations, excluding staff	$ 8,624	$12,526	$15,140	$15,000
Travel				
Equipment: (a) Institutional Funds	$10,000	$ 2,735	$ 2,000	
(b) Grants and Gifts	$81,000	$14,000	$46,000	$15,000
Temporary (non-teaching) Assistance				

B.7.f – Characteristics of the Industrial Advisory Committee for the EMET program

The Industrial Advisory Committee comprised of individuals representing a cross section of local industries meets annually in the fall.

Table B.7-2 Characteristics of the Industrial Advisory Committee

Name	Title	Organization
Mr. Richard P. Aulenbach	President and CEO	RPA Associates, Inc.
Mr. Scott Benner	Plant Manager	Hofmann Industries, Inc.
Mr. John Eagelman	Supervisor – Electrical & Software Engrg.	Magnatech International, L.P.
Dr. Terry D. Hand, P.E.	Manager of Civil Engineering	Spotts, Stevens and McCoy, Inc.
Mr. Frank Kaczmarczyk	Consultant	
Mr. Charles Kopicz	Chief Advocate for Positive Change	Performance Advocates
Ms. Kim Loudis	Vice President	Barbey Electronics
Mr. Neil F. McCormick	Engineering Leader, Control Systems	Arrow International
Mr. William B. Meister, AIA		Meister Architects
Mr. Michael A. Melnick, P.E.	Principal Electrical Engineer	Air Products and Chemicals, Inc.
Mr. Donald C. Miller	Manager-Industry Issues	GPU Energy
Mr. Kenneth A. Orr	Engineer	World Electronics
Mr. Josh Perlman	Project Engineer	Reading Body Works
Ms. Jennie Rodriguez	Manager, Employment and Diversity	Carpenter Technology Corporation
Mr. Brian Roth	Project Engineer	Arrow International
Mr. Keith Sanford	Executive Vice President	Neapco, Inc.
Mr. Michael R. Schmehl	Plant Administrative Manager	Reliant Energy
Dr. Jerry F. Shoup	Associate Director, School of Science, Engineering and Technology	Penn State Harrisburg
Mr. Leonard Stump	Staff Specialist	Carpenter Technology Corp.
Mr. Ronald J. Tomasello	Director, Global Engineering	Dana Corporation
Mr. Norman A. Ulrich, Jr.	Executive Vice-President of Operations	Can Corporation of America
Mr. Hani Wahba	Electrical Engineer	Nexans
Ms. Bernette D. Wrobel	President	Pagoda Electrical & Mechanical, Inc.

B.8 Criterion 8 - Program Criteria

When the faculty at Penn State began to prepare for the ABET visit in 2006, Program Criteria were not yet available from the Accreditation Board for Electro-Mechanical Engineering Technology programs. Since there was no way of knowing precisely when EMET Program Criteria would become available, a decision was made to meet the criteria for both Electrical Engineering Technology and Mechanical Engineering Technology baccalaureate degree programs. Recently, ABET Program Criteria have been approved for Electro-Mechanical Engineering Technology programs. The Electro-Mechanical Engineering Technology baccalaureate degree program does meet the criteria for Electro-Mechanical Engineering Technology programs, and also meets the criteria for Electrical Engineering Technology as well as Mechanical Engineering Technology baccalaureate degree programs. The following tables B.8-1 and B.8-2 illustrate the mapping of ABET program specific *objectives* and *outcomes* to the EMET program *objectives* and *outcomes*. Both the general and the program-specific criteria were considered in the development of and are encompassed by the EMET program *outcomes*.

Table B.8-1 ABET PROGRAM OBJECTIVES MAPPED TO EMET PROGRAM OBJECTIVES

ABET PROGRAM-SPECIFIC OBJECTIVES	EMET Program Objectives			
EET Degree	I	II	III	IV
An accreditable program in Electrical/Electronic(s) Engineering Technology will prepare graduates with the technical and managerial skills necessary to enter careers in the design, application, installation, manufacturing, operation and/or maintenance of electrical/electronic(s) systems. Graduates of associate degree programs typically have strengths in the building, testing, operation, and maintenance of existing electrical systems, whereas baccalaureate degree graduates are well prepared for development and implementation of electrical/electronic(s) systems.	X	X	X	X
MET Degree				
An accreditable program in Mechanical Engineering Technology will prepare graduates with knowledge, problem solving ability, and hands-on skills to enter careers in the design, installation, manufacturing, testing, evaluation, technical sales, or maintenance of mechanical systems. Level and scope of career preparation will depend on the degree level and specific program orientation. Graduates of associate degree programs typically have strengths in specifying, installing, fabricating, testing, documenting, operating, selling, or maintaining basic mechanical systems, whereas baccalaureate degree graduates typically have strengths in the analysis, applied design, development, implementation, or oversight of more advanced mechanical systems and processes.	X	X	X	X
EMET Degree				
An accreditable associate degree program in electromechanical engineering technology will typically prepare graduates with technical skills necessary to enter careers in the building, installation, application, and operation and/or maintenance of electromechanical hardware and software systems. An accreditable bachelor degree program in electromechanical engineering technology will typically prepare graduates for applied design, development, and management of electromechanical systems.	X	X	X	X

Table B.8-2 ABET PROGRAM OUTCOMES MAPPED TO EMET PROGRAM OUTCOMES

ABET PROGRAM-SPECIFIC OUTCOMES	EMET Program Outcomes												
	1	2	3	4	5	6	7	8	9	10	11	12	13
EMET Associate Degree graduates must demonstrate:													
a. Use computer-aided drafting or design tools to prepare graphical representations of electromechanical systems.								X		X			
b. Use circuit analysis, analog and digital electronics, basic instrumentation, and computers to aid in the characterization, analysis, and troubleshooting of electromechanical systems.			X	X									
c. Use statics, dynamics (or applied mechanics), strength of materials, engineering materials, and manufacturing processes to aid in the characterization, analysis, and troubleshooting of electromechanical systems.					X				X				
EMET Baccalaureate Degree graduates must demonstrate:													
a. Use appropriate computer programming languages for operating electromechanical systems.	X					X							
b. Use electrical/electronic devices such as amplifiers, motors, relays, power systems, and computer and instrumentation systems for applied design, operation, or troubleshooting electromechanical systems.	X		X	X			X						
c. Use advanced topics in engineering mechanics, engineering materials, and fluid mechanics for applied design, operation, or troubleshooting of electromechanical systems.					X			X	X				
d. Use basic knowledge of control systems for the applied design, operation, or troubleshooting of electromechanical systems.		X				X							
e. Use differential and integral calculus, as a minimum, to characterize the static and dynamic performance of electromechanical systems.		X					X						
f. Use appropriate management techniques in the investigation, analysis, and design of electromechanical systems.										X	X	X	X

<u>Appendix</u>

C.1. Program Assessment Report

Introduction

The Measures & Evaluation in Engineering Technology (MEET) is an online survey system developed to measure course outcomes each semester from faculty and students. The EMET Curricular Committee defined thirteen Program Outcomes consistent with ABET TAC Criterion 2. The eleven technical courses were mapped to these Program Outcomes. The Course Chairs established Course Outcomes or Performance Measures for each Program Outcome identified with that EMET course as shown in the table. At the end of the semester, the instructor and the enrolled students are asked to complete an online survey for the course. For each Course Outcome, the instructor is asked to rate the student performance and faculty perception and the student is asked to rate self perception and course perception as '0' corresponding to 'not met,' '1' corresponding to 'met,' or '2' corresponding to 'exceeded.' The data is available to all Penn State Engineering Technology faculty.

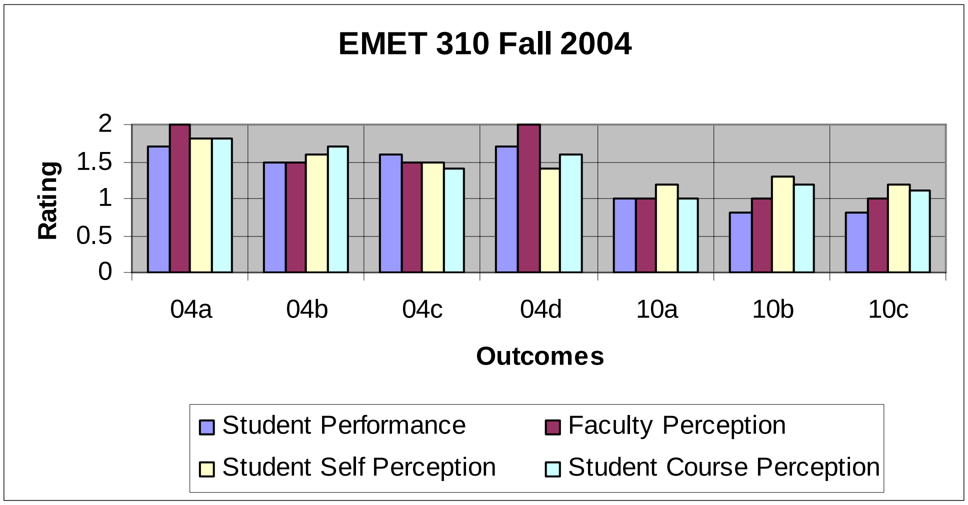
Mapping Program Outcomes to Courses 2005

	PROGRAM OUTCOMES **Students should:**	EMET 310	EMET320	EMET321 W	EMET 311	EMET 322	EMET 330	EMET 350	EMET 405	EMET 410	EMET 440	IET 105	DF	LANGUAGE
1	Identify, analyze, and solve technical problems related to integration of electrical, mechanical, instrumentation, computers, and control components to perform industrial and manufacturing functions.						X			X	X			
2	Apply concepts of calculus, differential equations, and probability and statistics to the design and analysis of electromechanical systems.		X			X	X	X	X	X				
3	Plan and conduct experimental measurements, use modern test and data acquisition equipment, and be able to analyze and interpret the results.		X	X			X	X		X				
4	Apply electrical, electronic, and mechanical devices; computers; and instrumentation systems to the development, operation, troubleshooting, and maintenance of electromechanical systems.	X	X	X			X			X	X			
5	Apply engineering mechanics, engineering materials, machine design, and fluid mechanics to the development, operation, troubleshooting, and maintenance of electromechanical systems.					X			X	X	X			
6	Demonstrate basic knowledge of control systems, including computer technologies and programming skills as applied to the design, operation, troubleshooting, and maintenance of electromechanical systems.									X	X			
7	Choose appropriate technology to solve problems.			X							X			
8	Apply the engineering design process to solve open-ended problems.				X					X	X			
9	Recognize the social, economic, safety, quality, reliability, and ethical issues in the work environment.							X			X	X		
10	Effectively communicate their ideas and solutions orally, in writing, and graphically.	X	X	X	X		X	X		X	X			
11	Demonstrate the ability to work as professionals on a team and in a project environment.										X			
12	Recognize the need for life-long learning, be prepared to continue their education through formal or informal study, and be able to adapt to a continuously changing work environment.										X			
13	Have respect for diversity, and knowledge of social and global issues.												X	X

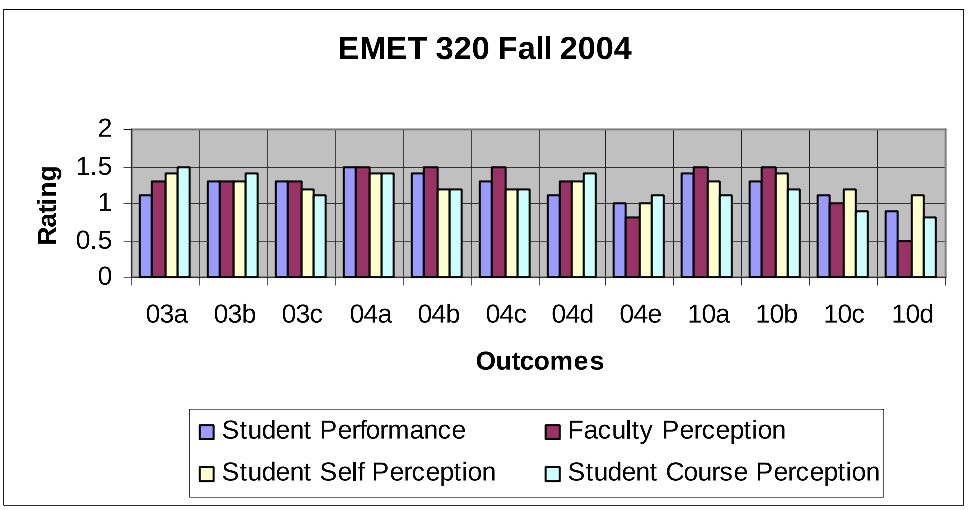
Assessment

Each course's MEET results from the four campuses (Altoona, Berks, New Kensington, and York) were plotted and presented at the Fall 2005 Faculty Meeting to identify areas for improvement.

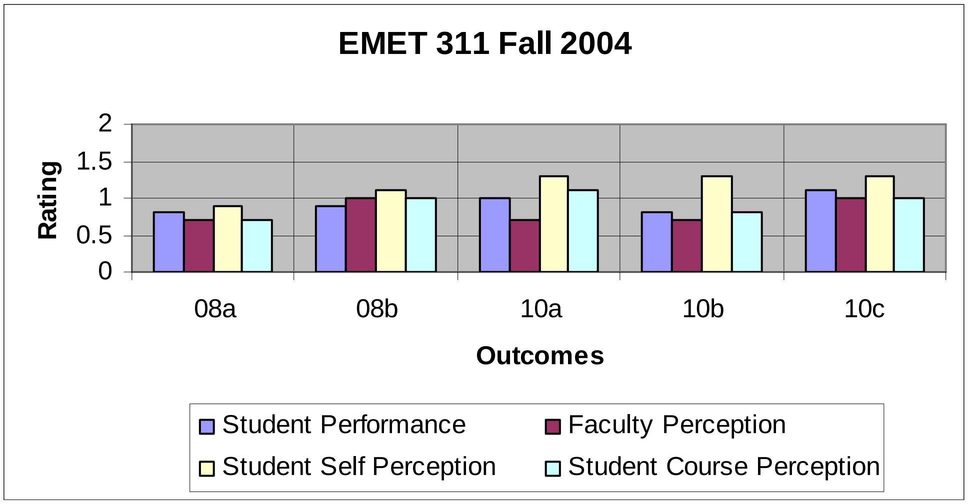
Digital Electronics – concern in communications (10)



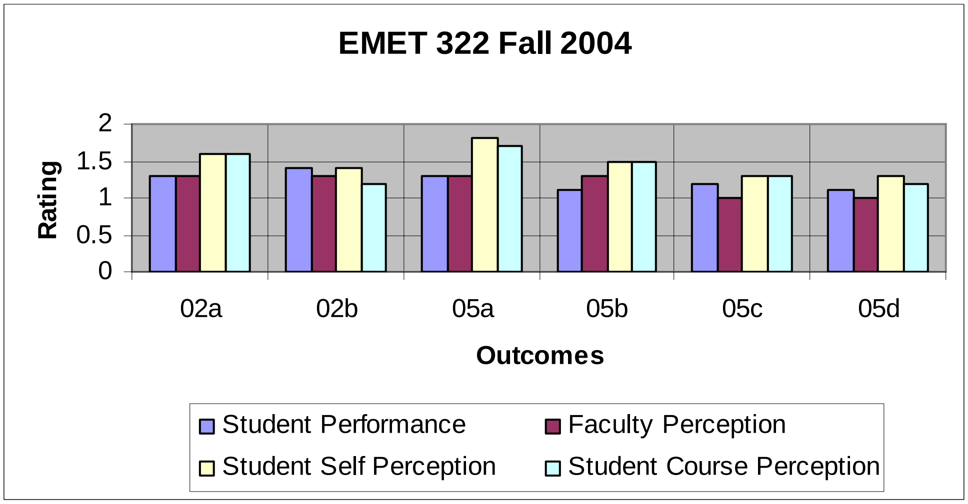
Analog Electronics – concern in communications (10)



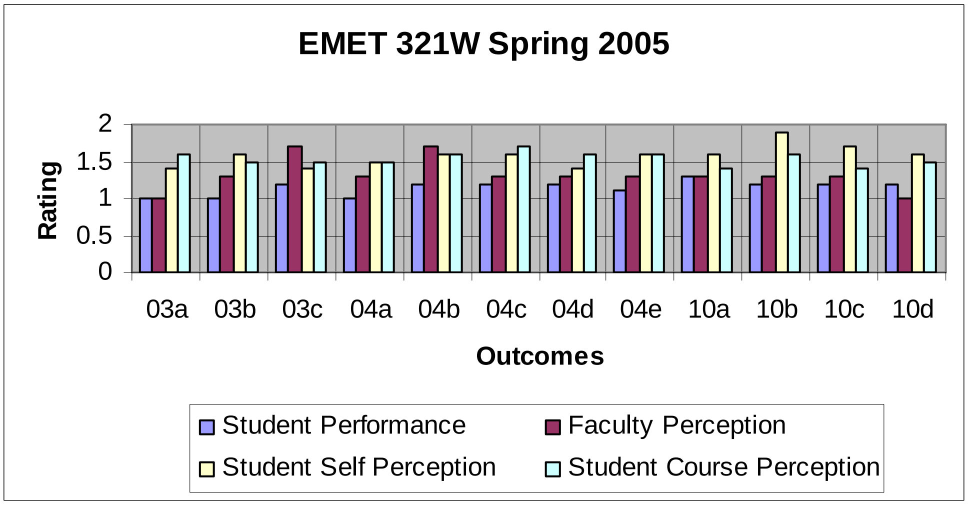
Spatial Analysis and Advanced CAD – deficiency in design (8) and communications (10)



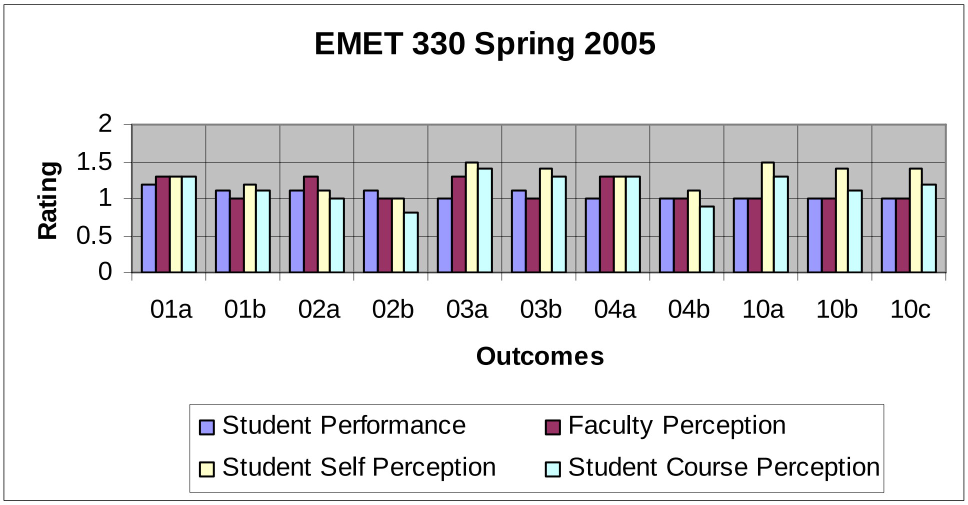
Mechanics for Technology - satisfactory



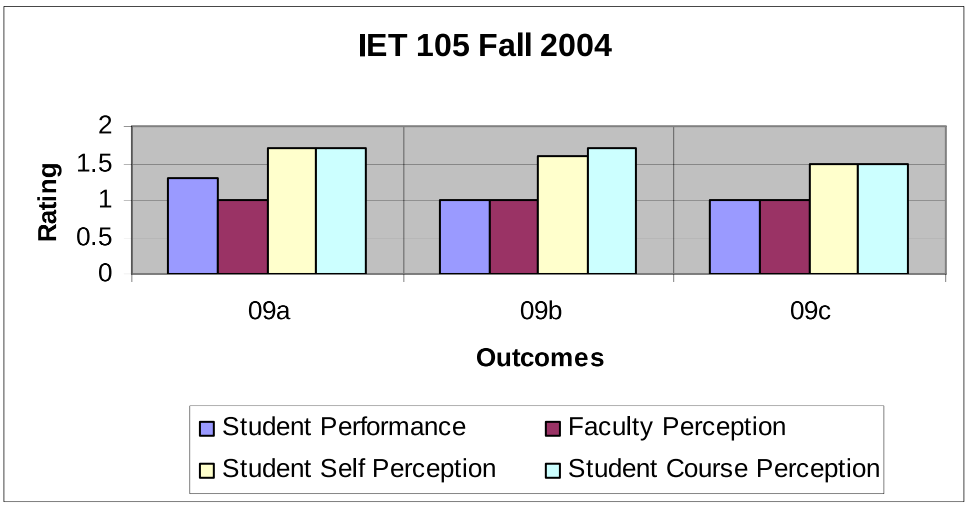
Electrical Machines – delinquency in technology (7)



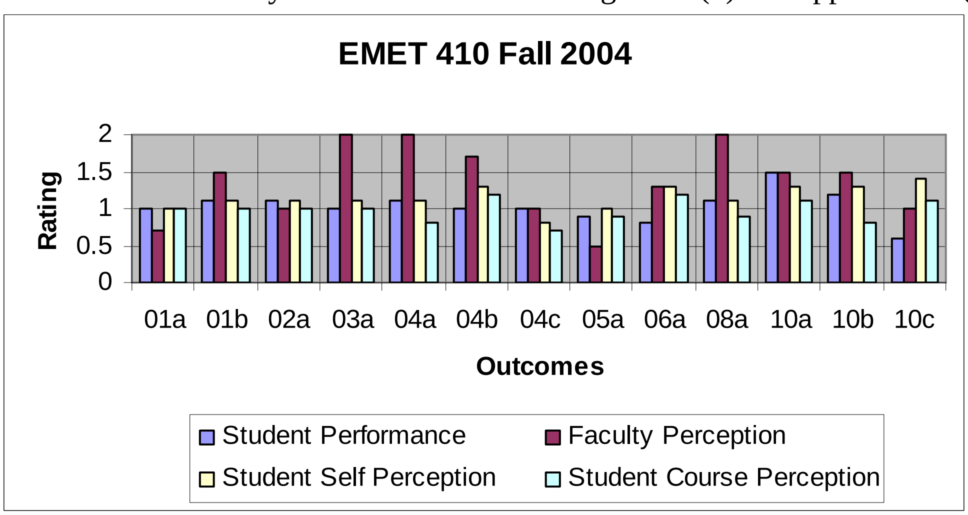
Measurement Theory and Instrumentation – weakness in mathematics (2) and applications (4)



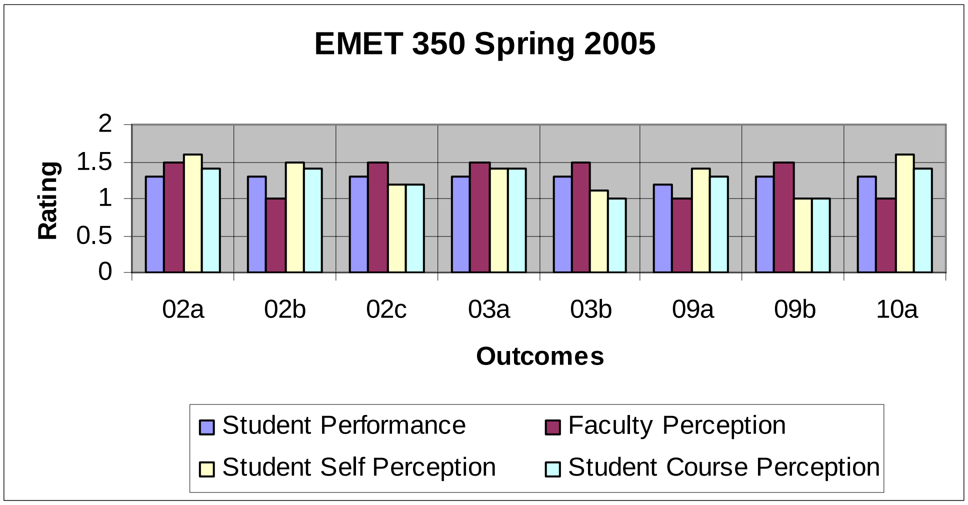
Economics of Industry - satisfactory



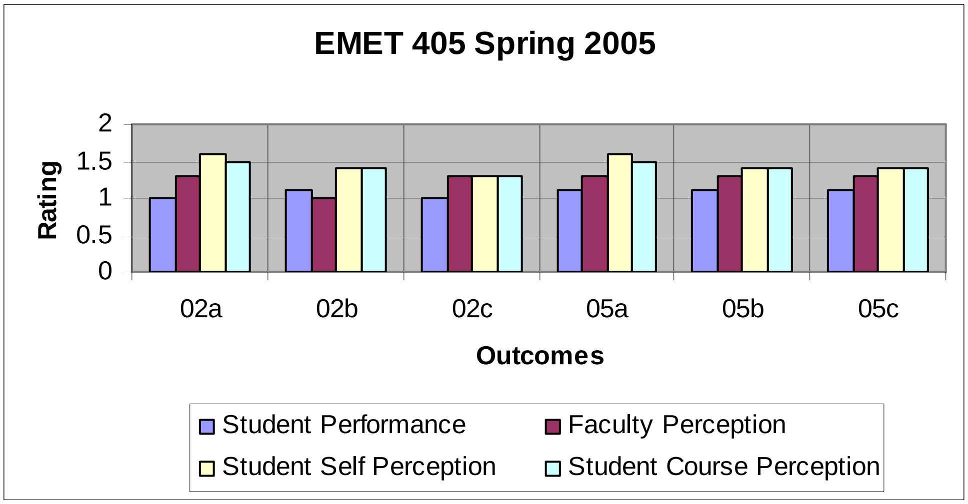
Automated Control Systems – weakness in integration (1) and applications (4)



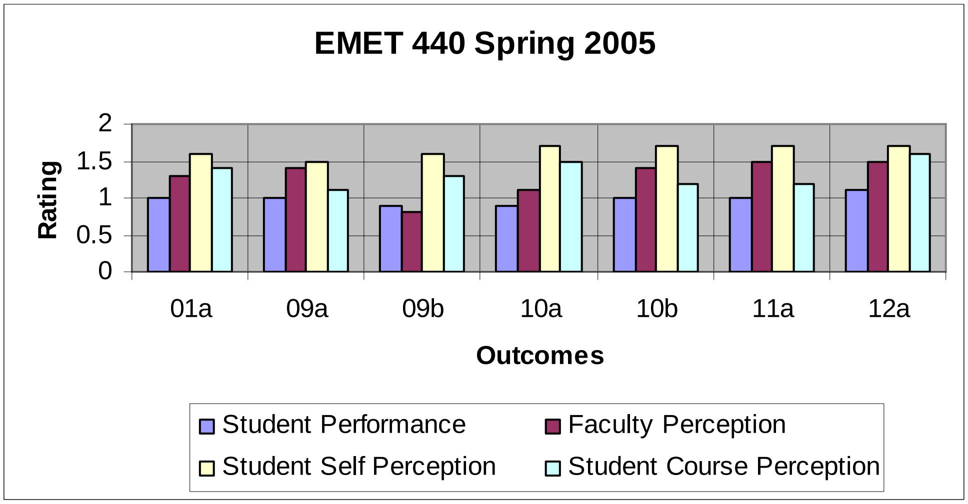
Quality Control, Inspection, and Design - satisfactory



Fluid Mechanics and Thermodynamics - satisfactory



Electro-Mechanical Project Design – weakness in safety (9)



Evaluation

The EMET Course Chairs were charged to consult with fellow instructors at each campus to evaluate the MEET assessment data for their course and to recommend improvements to the Standard Course Outline. The EMET Curricular Committee reviewed and approved the outline revisions.

EMET 310 Digital Electronics – concern in communications

Low performance was attributed to the quality of the students, so no change was recommended.

EMET 320 Analog Electronics – concern in communication

Low performance in applications (4) was attributed to some campuses not using circuit simulation software, so all faculty agreed to implement this topic for the next course offering. Low performance in communications (10) was attributed to poorly worded outcomes, so the course outcomes were clarified to explicitly require written reports and oral presentations.

EMET 311 Spatial Analysis and Advanced CAD – delinquency in design and communications

Low performance in design (8) was attributed to philosophical differences in approaching CAD as either computer-aided drafting (tool) or computer-aided design (process) on various campuses, so the outcome was rewritten to provide flexibility for the instructor to address the needs of the students on that campus, and the issue was referred to the MET Curricular Committee for resolution. Low performance in communications (10) was attributed to trying to cover all three areas of communication (written, oral, and graphical), so the course outcomes were reduced from three to one to only address graphical communication.

EMET 321W Electric Machines – delinquency in technology

Course outcomes to support Program Outcome 7 were missing, so they were added. Other course outcomes were edited to allow instructors more flexibility in delivering their course.

EMET 330 Measurement Theory and Instrumentation – weakness in mathematics and applications

Course outcomes to support Program Outcome 10 were reduced in number from three to two. No changes were recommended to course outcomes for Program Outcomes 2 or 4.

EMET 410 Automated Control Systems – weakness in integration and applications

Course outcomes to support Program Outcomes 3, 4, 5 & 10 were dropped because other courses assess these areas.

EMET 440 Electro-Mechanical Project Design – weakness in safety

Course outcomes to support Program Outcomes 1, 4, 5, 6, 9 & 10 were dropped because other courses assess these areas.

Improvements

From the evaluations by the Course Chairs, the thirteen EMET Program Outcomes are now addressed by the following Course Outcomes:

Electro-Mechanical Engineering Technology Program Outcomes (at graduation):

1. Students should be able to identify, analyze, and solve technical problems related to integration of electrical, mechanical, instrumentation, computers, and control components to perform industrial and manufacturing functions.
    a. EMET 330--Students will be able to correctly predict the key performance characteristics of commonly used sensors such as resistive devices, RTDs, thermistors, thermocouples, variable inductance/reluctance devices, semiconductor based sensors, and piezoelectric devices using standard component models and assumptions.
    b. EMET 330--Students will be able to correctly predict the key performance characteristics of signal conditioning equipment such as ballast circuits, voltage divider circuits, and voltage and current sensitive bridge circuits using standard component models and assumptions.
    c. EMET 410-- Students will readily recognize the availability of electrical, fluid and mechanical analogues for use in system models.
    d. EMET 410--In laboratory exercises, students will correctly design and test control systems as applied to integrated electrical and mechanical systems.
2. Students should be able to apply concepts of calculus, differential equations, and probability and statistics to the design and analysis of electromechanical systems.
    a. EMET 322--Students will use the laws of beam diagrams to relate the load, shearing force, and bending moment diagrams to each other and to draw complete shear and bending moment diagrams for beams carrying a variety of loading patterns and with a variety of support conditions.
    b. EMET 322--Students will be able to apply the differential calculus relationships between displacement, velocity, and acceleration to calculate kinematic and kinetic quantities for rectilinear and curvilinear motion.
    c. EMET 330--Students will be able to correctly calculate the quality of their measurements including concepts of data error, propagation of uncertainty, data samples and data populations using standard statistical methods including Gaussian, ?2 , ,Student's-t distributions, confidence intervals, standard deviations, and uncertainty analysis.
    d. EMET 330--Students will be able to correctly calculate a system’s amplitude, frequency, and phase response using standard methods of frequency spectrum and harmonic Fourier analysis.
    e. EMET 350--Students will able to use calculators and/or computers to correctly determine standard statistical parameters (counts, mean, median, range, standard deviation) used to characterize variability in measured data.
    f. EMET 350--Students will able to use statistical parameters to construct standard statistical quality control charts (Pareto, histograms, frequency, X-bar/R, X-bar/s, Median/R, moving average, etc.) to correctly represent variability of statistical processes.
    g. EMET 350--Students will be able to use standard probability distributions (normal, Poisson, binomial, hypergeometric) to correctly predict the variability of random processes and to develop appropriate quality acceptance standards.
    h. EMET 405--Students will use mathematical integration to determine the amount

of work which is done by a compressed gas during expansion (or work done to compress a gas). They will do this using typical pressure versus volume information and their results to assigned exercises will be within a few percent of the exact answer.

   i. EMET 405--Students will understand and be able to use the equations which involve the time derivatives of functions which occur in the Thermodynamics, Fluid Flow, and Heat Transfer disciplines. They will be able to do this to produce results to assigned exercises to within a few percent of the exact results.
   j. EMET 405--Students will use concepts of mathematical integration in applying the equations of fluid statics to determine the magnitude and direction of the resultant force on a submerged surface. They will be able to do this to produce results to assigned exercises to within a few percent of the exact results.
   k. EMET 410-- Students will develop linear, constant coefficient, ordinary differential equations from electromechanical system models, and solve them using Laplace transform techniques.

3. Students should be able to plan and conduct experimental measurements, use modern test and data acquisition equipment, and be able to analyze and interpret the results.
   a. EMET 320--Students will able to assemble standard-design op-amp circuits and test their DC and frequency-dependent performance using standard laboratory test equipment.
   b. EMET 320--Students will be able to use standard lab test equipment and classroom theories to debug and troubleshoot malfunctioning op-amp circuits.
   c. EMET 320--Students will be able to synthesize laboratory data to characterize op-amp circuit performance in accepted graphical and written report forms.
   d. EMET 321W--Students will be able to correctly connect DC, single-phase AC, and 3-phase AC sources to various electrical machines and transformers to operate the apparatus.
   e. EMET 321W--Students will be able to use standard measuring equipment (viz., voltmeters, ammeters, wattmeters, tachometers, and dynamometers) to measure the mechanical and electrical operating characteristics of typical electromechanical power conversion devices, i.e., single- and three-phase transformers, AC induction and synchronous motors, DC series and shunt motors, and AC synchronous generators.
   f. EMET 321W--Students will be able to synthesize laboratory data to characterize correctly the performance of various machine using accepted standard formats
   g. EMET 330--Students will be able correctly set up and test/analyze the performance of commonly used sensors and signal conditioning equipment using standard laboratory test equipment.
   h. EMET 330--Students will be able to correctly acquire, interpret, and synthesize laboratory data to characterize sensor/signal conditioning circuit performance in accepted standard forms.
   i. EMET 350--Students will be able to use standard statistical quality control tools (see above) to analyze product data to determine whether or not processes are “in control.”
   j. EMET 350--Using calculators and/or computers, students will be able to use standard quality control techniques (sampling procedures, operating characteristic curves, average outgoing quality, outgoing quality limits, stipulated producer/consumer risk, etc.) and appropriate probability theorems to design effective sampling procedures to ensure statistical control of product quality to within specified limits.

4. Students should be able to apply electrical, electronic, and mechanical devices;

computers; and instrumentation systems to the development, operation, troubleshooting, and maintenance of electromechanical systems.

a. EMET 310--Students will use Boolean algebra and Karnaugh maps to design and analyze properly functioning combinational logic digital systems.
b. EMET 310--Students will use state diagrams and state tables to design and analyze properly functioning sequential logic digital systems.
c. EMET 310--Students will produce accurate simulations of the performance of digital circuits using standard simulation software.
d. EMET 310--Students will successfully construct, test, and troubleshoot digital circuits using standard laboratory tools and equipment.
e. EMET 320--Students will be able to analyze basic DC and AC operating characteristics of diodes and junction transistors and characterize this operation in accepted forms.
f. EMET 320--Students will be able to analyze and design practical op-amp circuits such as inverting and non-inverting amplifiers, filters, oscillators and comparators.
g. EMET 320--Students will be able to read specification sheets for op-amps and correctly interpret the effects of these specifications on the operation and design practical, functioning op-amp circuits.
h. EMET 320--Students will be able to use electronic simulation software to create and correctly analyze the performance of practical op-amp circuits.
i. EMET 321W-- Students will be able to use standard methods to determine accurate modeling/simulation parameters for various general-purpose electrical machines and transformers.
j. EMET 321W-- Students will be able to use modeling/simulation parameters with standard equivalent circuit models to predict correctly the expected performance of various general-purpose electrical machines and transformers.
k. EMET 321W-- Students will be able to use accepted national and international standards (such as NEMA) to select appropriate electrical machines to meet specified performance requirements.
l. EMET 321W-- Students will understand the fundamental control practices associated with AC and DC machines (starting, reversing, braking, plugging, etc.).
m. EMET 330--Students will be able to correctly apply temperature, displacement, pressure and flow sensors to the design and operation of electromechanical systems using standard electrical and electromechanical models.
n. EMET 330--Students will be able to correctly apply signal conditioning circuits, including ballast circuits, voltage divider circuits, and voltage and current sensitive bridge circuits, to the design and operation of electromechanical systems using standard circuit models.

5. Students should be able to apply engineering mechanics, engineering materials, machine design, and fluid mechanics to the development, operation, troubleshooting, and maintenance of electromechanical systems.
    a. EMET 322--Students will be able to calculate normal stresses, shear stresses, bearing stresses in axially loaded structural members.
    b. EMET 322--Students will be able to compute the maximum shear stress and angle of twist of members loaded in torsion.
    c. EMET 322--Students will be able to compute the stress at any point within the cross-section of a transversely loaded member and to describe the variation of stress with position in the beam.

   d. EMET 322--Students will be able to determine the required dimension of various key mechanical and structural components based upon the principles of static analysis of forces/moments and the determination of force induced tension/compression and shear stresses. The applicable material failure stresses will be used as a basis for determining the required safe dimensions.
   e. EMET 405--Students will be able to apply the laws of thermodynamics to determine the behavior of turbines, compressors, boilers, nozzles, etc. They will calculate the required results using the known operating data. The results to assigned exercises will be within a few percent of the exact results.
   f. EMET 405--Students will be to apply the laws of fluid statics to determine the resultant pressure on submerged surfaces, and the laws of fluid dynamics to analyze the pressures and fluid velocities in a fluid system containing turbines, pumps, valves, etc. all connected by various lengths of pipe. They will produce these results to assigned exercises to within a few percent of the exact answers.
   g. EMET 405--Students will use the laws of conduction, convection, and radiation to solve problems involving the transfer of heat through various types of walls, insulated pipes, etc. plus perform calculations based upon parallel flow, counter flow, and shell and tube heat exchangers. The results of these calculations to assigned exercises will be within a few percent of the exact results.
6. Students should demonstrate basic knowledge of control systems, including computer technologies and programming skills as applied to the design, operation, troubleshooting, and maintenance of electromechanical systems.
   a. EMET 410-- Students will analyze and design analog control systems to meet performance requirements by using computer tools to perform root locus, frequency and time domain analysis and design.
7. Students should be able to choose appropriate technology to solve problems.
   a. EMET 321W--Students will be able to correctly determine torque, speed, and power requirements of an electrical machine to perform in an electromechanical system.
   b. EMET 321W--Students will be able to select an appropriate electrical machine and drive technology for an application based on the required operating specifications and constraints.
   c. EMET 440-- Having a broad knowledge of technology related to electromechanical systems and having skills in critical thinking, students will be able to select appropriate technology to solve problems related to the completion of an electro-mechanical design project. The student will be able to satisfy all functional design specifications for this project.
8. Students should be able to apply the engineering design process to solve open-ended problems.
   a. EMET 311--Students will systematically determine the size and location of part features to satisfy the interface boundary conditions that optimize the function of a moving assembly of parts, such as a mechanism.
   b. EMET 410-- Students will correctly design and test analog control systems, including proportional, integral and derivative (PID) feedback control and other compensators in laboratory exercises.
   c. EMET 440-- Having a knowledge of at least one systematic approach to the engineering design process and having the tools and understanding for solving open-ended problems, the student will be able to *choose an electro-mechanical design project* from a variety of options with minimal constraints and submit a project proposal that satisfies all of the constraints.

   d. EMET 440--Having a knowledge of at least one systematic approach to the engineering design process and having the tools and understanding for solving open-ended problems, the student will be able to *solve at least one engineering design problem* related to a major component of the electro-mechanical design project. The student will be able to document all steps in the systematic design approach in a formal report.

9. Students should recognize the social, economic, safety, quality, reliability, and ethical issues in the work environment.
   a. IET 105--Students will be able to compute financial calculations including simple and compound interest, equivalence, present worth, and annuities. They will do so using the pertinent standard engineering economy equations assisted by a calculator and/or computer program. The monetary results will be calculated to within a *few* percent of the exact values.
   b. IET 105--Students will be able to judge the attractiveness of proposed investments by analyzing cash flow, present worth, annual worth, and return on investment. This will be done using the pertinent engineering economy equations and a calculator or software. The monetary results will be within a *few* percent of the exact values and the alternatives chosen will be the correct ones.
   c. IET 105--Students will be able to select among alternatives for depreciation accounting and computing economic risk. This will be done using the pertinent engineering economy equations and a calculator or software. The monetary values will be calculated to within a *few* percent of the exact values and the alternatives chosen will be the correct ones.
   d. EMET 350--Students will be able to correctly describe how statistical quality control methods result in improvements in product and service quality, reductions in production, manufacturing, and service costs, improvements in morale, and increases in company efficiency and competitiveness.
   e. EMET 350--Students will be able to correctly identify the accepted national and international standards for statistical quality control and management.

10. Students should be able to effectively communicate their ideas and solutions orally, in writing, and graphically.
   a. EMET 310--Students will convey their thoughts and ideas regarding laboratory exercises to both their lab partner(s) and the instructor via required oral presentation.
   b. EMET 310--Students will prepare high quality written reports documenting laboratory investigations of digital devices and circuits using word processing software.
   c. EMET 310--Students will prepare high quality graphical and tabular presentations of digital circuit performance as determined from electronic simulations and laboratory exercises using electronic simulation software and word processing software.
   d. EMET 311--Students will produce working drawings, consistent with ANSI Y14 standards, of their solutions to three-dimensional spatial problems using CAD software.
   e. EMET 320--Students will prepare professional quality graphical writer reports of laboratory data, including appropriate data analysis and synthesis.
   f. EMET 320--Students will be able to prepare professional quality graphical and tabular written reports of computational results obtained from electronic circuit simulations.
   g. EMET 320--Students will be able to use suitable visual and graphic aids to prepare and give professional quality oral presentations on technical subjects to

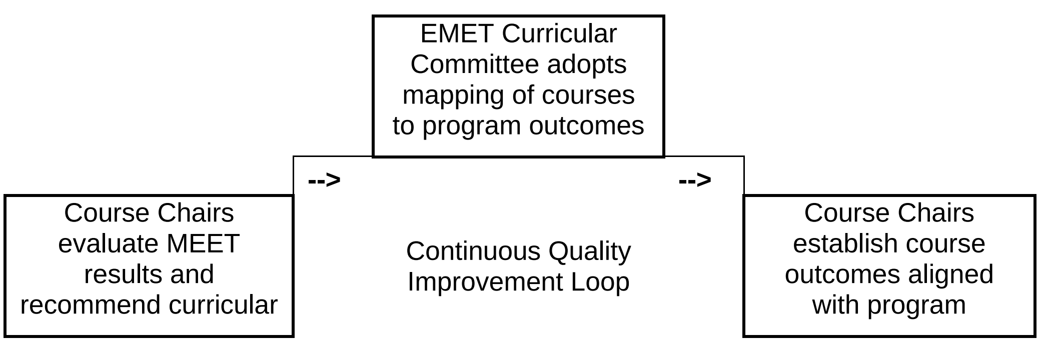
groups of faculty and peers.

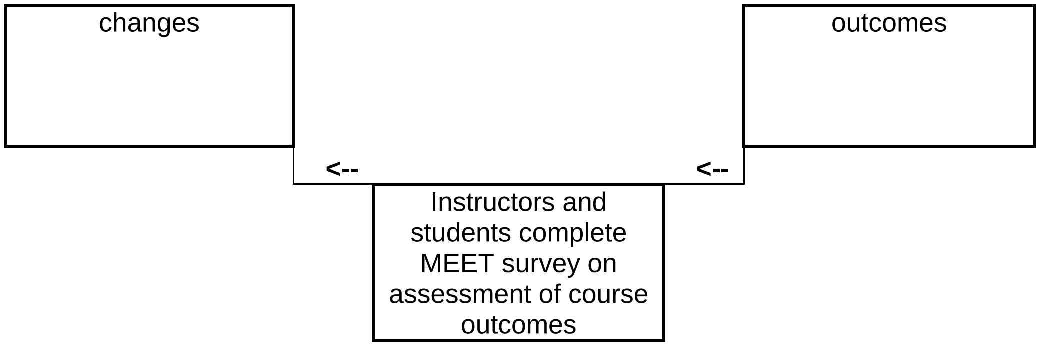
h. EMET 321W--Students will be able to use standard word-processing and mathematical analysis software to prepare professional quality written reports.
i. EMET 321W--Students will be able to prepare professional quality graphical presentations of laboratory data and computational results, incorporating appropriate data analysis and synthesis methods.
j. EMET 321W--Students will be able to use suitable visual and graphic aids to prepare and give professional quality presentations on technical subjects.
k. EMET 330--Students will be able to correctly prepare high quality written reports that document laboratory investigations of sensors, transmitters, and signal conditioning systems.
l. EMET 330--Students will be able to correctly prepare high quality graphical and tabular presentations based on appropriate data analysis and synthesis of data taken from laboratory experiments with sensors commonly encountered in industry.
m. EMET 350--Using computers, students will be able to prepare high quality graphical and tabular presentations of quality control data in standard quality control chart forms.

11. Students should demonstrate the ability to work as professionals on a team and in a project environment.
    a. EMET 440-- Having a basic understanding of communication skills including those skills specifically related to technical communication, students will be able to work in multi-member teams during the course of a semester to complete successful electro-mechanical design projects.
12. Students should recognize the need for life-long learning, be prepared to continue their education through formal or informal study, and be able to adapt to a continuously changing work environment.
    a. EMET 440--Having access to all Penn State information technology and communication resources, students will be able to do professional technical research and adapt design concepts and change design strategies to overcome problems arising during project development.
13. Students should have respect for diversity, and knowledge of social and global issues.
    a. US, IL, and Language—Student will satisfy the University's degree requirements for three-credits of United States Cultures and three-credits of International Cultures competencies and for two-years of a high school global language.

Conclusion

Continuous Quality Improvement was implemented for the EMET Program and the loop was closed as illustrated in the figure.





The mapping of EMET courses to Program Outcomes was revised for the next academic year as illustrated in the table.

Mapping Program Outcomes to Courses 2006

	PROGRAM OUTCOMES Students should:	EMET 310	EMET320	EMET321W	EMET 311	EMET 322	EMET 330	EMET 350	EMET 405	EMET 410	EMET 440	IET 105	GI/US/IL	LANGUAGE
1	Identify, analyze, and solve technical problems related to integration of electrical, mechanical, instrumentation, computers, and control components to perform industrial and manufacturing functions.						X			X				
2	Apply concepts of calculus, differential equations, and probability and statistics to the design and analysis of electromechanical systems.					X	X	X	X	X				
3	Plan and conduct experimental measurements, use modern test and data acquisition equipment, and be able to analyze and interpret the results.		X	X			X	X						
4	Apply electrical, electronic, and mechanical devices; computers; and instrumentation systems to the development, operation, troubleshooting, and maintenance of electromechanical systems.	X	X	X			X							
5	Apply engineering mechanics, engineering materials, machine design, and fluid mechanics to the development, operation, troubleshooting, and maintenance of electromechanical systems.					X			X					
6	Demonstrate basic knowledge of control systems, including computer technologies and programming skills as applied to the design, operation, troubleshooting, and maintenance of electromechanical systems.									X				
7	Choose appropriate technology to solve problems.			X							X			
8	Apply the engineering design process to solve open-ended problems.				X					X	X			
9	Recognize the social, economic, safety, quality, reliability, and ethical issues in the work environment.							X				X		
10	Effectively communicate their ideas and solutions orally, in writing, and graphically.	X	X	X	X		X	X						
11	Demonstrate the ability to work as professionals on a team and in a project environment.										X			
12	Recognize the need for life-long learning, be prepared to continue their education through formal or informal study, and be able to adapt to a continuously changing work environment.										X			
13	Have respect for diversity, and knowledge of social and global issues.												X	X

Appendix

C.2. Course Assessment Report

Improvements

Six changes were incorporated into the revised outline for EMET 311 Spatial Analysis and Advanced CAD based on the evaluation of the assessment data:

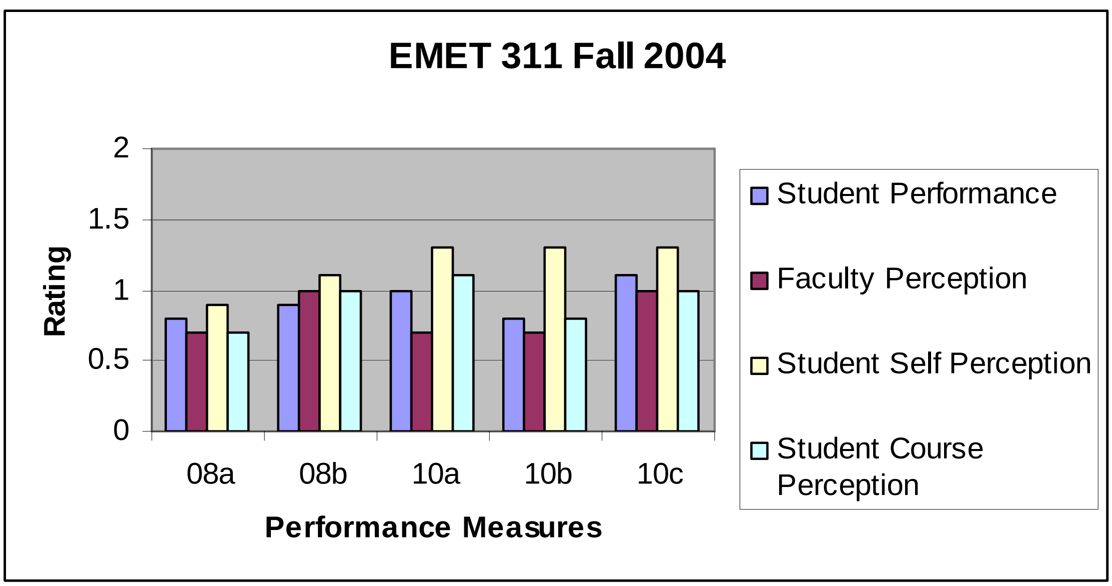
- Course performance measures were reduced from five to two, one for each program outcome.
- Course performance measures were revised to provide more flexibility in the approach that individual campus instructors take to satisfy the outcomes.
- Suggested texts specific to CAD applications were eliminated.
- References to auxiliary views were deleted.
- Coverage time suggestions were revised with ten hours moved from drafting topics to modeling topics.
- Appropriate CAD applications were listed in the computer use section.

The four course instructors where this course is taught concur with these modifications to the EMET 311 Standard Course Outline.

Assessment

EMET 311 is typically offered in the fall semester to junior-year students entering the program with an associate degree in Electrical Engineering Technology. The goal of the course is to match the material covered in EGT 114 Spatial Analysis and CAD and in EGT 201 Advanced CAD, which are required courses for the associate degree in Mechanical Engineering Technology.

This course was offered at Altoona, Berks, and New Kensington in Fall 2004 and at York in Spring 2005. The Measures & Evaluation in Engineering Technology (MEET) on-line survey system was used to collect faculty and student data at the end of those semesters. The data is compiled by semester and the results for Fall 2004 are illustrated in the figure below.



In addition to a rating of '0' corresponding to 'not met,' '1' corresponding to 'met,' and '2' corresponding to 'exceeded,' the survey also asked for student comments on each performance measure as listed below.

Course Performance Measure 08a: Students will select commercially available components from vendor catalogs to solve an open-ended design problem defined by a product specification.

- The course should provide more information about how to go about researching components from vendor catalogs.
- It is easy to tell that this course was recently amended, and that our class were the guinea pigs.
- The project that we had to work on through out the semester was a great steping stone to design a part and draw with all the other things to make it a efficient product.
- This class is a cad class. It is not a design class. We should not be expected to design a jack in this class.

Course Performance Measure 08b: Students will determine dimensions and tolerances from a trade-off analysis of manufacturing processes that solves an open-ended design problem while minimizing the fabrication cost of custom manufactured parts.

- Quotes are hard to get with just one little project with no money.
- This class is a cad class. It is not a design class. We should not be expected to design a jack in this class.

Course Performance Measure 10a: Students will produce working drawings to ANSI Y14 standards of their solution to a design problem using CAD software.

- This class is a cad class. It is not a design class. We should not be expected to design a jack in this class.

Course Performance Measure 10b: Students will write a reflective essay using work processing software that details what approach they used, how they implemented their process, and why they succeeded in solving a design problem.

- Not applicable
- This class is a cad class. It is not a design class. We should not be expected to design a jack in this class.

Course Performance Measure 10c: Students will describe their problem and verify their solution meets the design specification using visual aids to present in front of the class.

- This class is a cad class. It is not a design class. We should not be expected to design a jack in this class.

Evaluation

The course chair's analysis of the assessment data indicates that students are satisfied with the course outcomes at Berks but dissatisfied at Altoona and at New Kensington. The instructors are satisfied with the course outcomes at Berks and at New Kensington but dissatisfied at Altoona. The assessment data at York for Spring 2005 indicates that the students are satisfied with the course outcomes but the instructor is dissatisfied with the outcomes.

The course chair contacted the instructors at both Altoona and at York for their impression of the course. Both campuses use EMET 311 to teach the EET students most of the same material taught to the MET students in EGT 114 and EGT 201. Whereas at Berks and New Kensington, the course introduces EMET students to the design process using the context of engineering graphics.

Instructors teaching EGT courses identified inconsistencies in the course outcomes for the two courses suggesting that both courses should be consolidated into a single advanced computer-aided design course. The chair of the 2MET Curricular Committee has agreed to put this issue on the agenda for a future meeting. That future discussion should address:

- The instructor's philosophy on the graphical content of the course;
- The regional needs of industries that the campus serves; and
- The numerous software applications in use across the university.

The standard course outline is revised to provide greater flexibility for the individual instructors to satisfy the student needs on their campus. Since the program outcomes 8 and 10 are mapped to numerous courses, the performance measures in EMET 311 are reduced to one for each outcome.

- <u>Program Outcome 8:</u> Students should be able to apply the engineering design process to solve open-ended problems.
    - <u>Course Performance Measure 08a:</u> Students will systematically determine the size and location of part features to satisfy the interface boundary conditions that optimize the function of a moving assembly of parts, such as a mechanism.
- <u>Program Outcome 10:</u> Students should be able to effectively communicate their ideas and solutions orally, in writing, and graphically.
    - <u>Course Performance Measure 10a:</u> Students will produce working drawings, consistent with ANSI Y14 standards, of solutions to three-dimensional spatial problems using CAD software.

A few minor changes were also incorporated to emphasize three-dimensional modeling over two-dimensional drafting skills and to acknowledge that each campus uses a different CAD package for engineering graphics instruction.

Consultation

Irene Ferrara at Altoona provided comments on 15 June 2005:

"I really appreciate all of the work you put into analyzing the MEET data for EMET 311, and your revisions to the outline. I absolutely agree that each of the six changes incorporated into the outline are improvements. In terms of Performance Measures, we currently cover Working Drawings in the course, and would continue to do so. However, the other Performance Measure listed is outside the bounds of what has been taught in the past.

"I am wondering if you could provide more information regarding the information you would provide to students, and the time you would devote in class, to set up a project such as this. I am not adverse to including a project of this nature in the course; in fact, the feeling in Altoona is that the more design we incorporate into courses, the better students are prepared for the senior design work. However, since it isn't similar to the material we have included in the course to date, I'm hoping you will let me (and my students) benefit from your experience with more design oriented projects. With a better understanding of the necessary information and time constraints, I can evaluate where revisions to our current offering could be made.

“Any information you could provide would be greatly appreciated. Thanks!”

Terry Speicher at Berks replied on 17 June with:

”Thanks for your support. I don't know how familiar you are with ANGEL, but I use it extensively in my courses. I gave you access to the EMET 311 course site that I used last fall. Take a look at it and let me know what you think.

”The course was developed around four projects as stated in the syllabus. The students worked in two-person teams to design a desk mount for a computer screen. The four projects progressed in distinct phases: first sketching ideas, next orthographic drawings of parts, then dimensioning & tolerancing the parts while creating an assembly drawing, and finally modeling the final design with opportunities to improve the design along the way. The student's individual work was submitted in the team folders of the In Touch Section for you to view.

”We can discuss how you might adapt any of this by phone. I'm at 610-396-6331 and usually on campus each morning.”

Don Coho at York provided comments on 27 June 2005:

“In my opinion, you did a great job with your assessment, and I concur with the revised outcomes, even though EMET 311 will not be offered at York until Spring 2006.

“Actually, I hope to emulate your write-up for the EG T 201 Course Outline (as I begin to better understand the workings of our new process).”

Frank Kadi at New Kensington provided comments on 11 July 2005:

“Sorry for my delay in getting back to you on this issue. I have reviewed your proposed changes to the EMET 311 standard course outline and I am in agreement with the outlined revisions. I think your simplification of the specific course performance measures still effectively maintain the core content of EMET program outcomes 8 and 10. Also, I welcome the shifting of an additional 10 hours to 3D modeling in view of the fact that I have been using 3D modeling software from the beginning of the course rather than starting out with AutoCad 2D software.

“As you may be aware from your review of the student course perception survey, I received a lot of student flak for adding some basic statics and elementary strength of materials analysis to the open ended design problem I assigned during my fall '04 EMET 311 course. While I realize this basic analysis is typically not part of the course requirement, I wonder if we are not missing an excellent opportunity to exercise and reinforce engineering design skills by not pulling a little of this analysis into the "open-ended design problem". For now I have learned my lesson, but I believe this might be a potential discussion topic for sometime in the future.”

Appendix

C.3. Graduates Assessment Report

Assessment

The Electro-Mechanical Engineering Technology System-Wide Graduate Exit Report (SP05_EMET_Exit_11-28-05.doc) identified one Program Outcomes for improvement.

> Program Outcome 2: *Apply concepts of calculus, differential equations, and probability and statistics to the design and analysis of electromechanical systems.*
>
> > Five students (27.8%) indicated being unprepared while the others indicated being either prepared (n=12, 66.7%) or very prepared (n=1, 5.6%) for this outcome. This was the only outcome in which more than two students noted a lack of preparation.

Evaluation

Program Outcome 2 was mapped into five courses with a total of eleven performance measures:

a. EMET 322--*Students will use the laws of beam diagrams to relate the load, shearing force, and bending moment diagrams to each other and to draw complete shear and bending moment diagrams for beams carrying a variety of loading patterns and with a variety of support conditions.*
b. EMET 322--*Students will be able to apply the differential calculus relationships between displacement, velocity, and acceleration to calculate kinematic and kinetic quantities for rectilinear and curvilinear motion.*
c. EMET 330--*Students will be able to correctly calculate the quality of their measurements including concepts of data error, propagation of uncertainty, data samples and data populations using standard statistical methods including Gaussian, ?2 , ,Student's-t distributions, confidence intervals, standard deviations, and uncertainty analysis.*
d. EMET 330--*Students will be able to correctly calculate a system''s amplitude, frequency, and phase response using standard methods of frequency spectrum and harmonic Fourier analysis*.
e. EMET 350--*Students will able to use calculators and/or computers to correctly determine standard statistical parameters (counts, mean, median, range, standard deviation) used to characterize variability in measured data.*
f. EMET 350--*Students will able to use statistical parameters to construct standard statistical quality control charts (Pareto, histograms, frequency, X-bar/R, X-bar/s, Median/R, moving average, etc.) to correctly represent variability of statistical processes.*
g. EMET 350--*Students will be able to use standard probability distributions (normal, Poisson, binomial, hypergeometric) to correctly predict the variability of random processes and to develop appropriate quality acceptance standards.*
h. EMET 405--*Students will use mathematical integration to determine the amount of work which is done by a compressed gas during expansion (or work done to compress a gas). They will do this using typical pressure versus volume*

information and their results to assigned exercises will be within a few percent of the exact answer.

i. EMET 405--*Students will understand and be able to use the equations which involve the time derivatives of functions which occur in the Thermodynamics, Fluid Flow, and Heat Transfer disciplines. They will be able to do this to produce results to assigned exercises to within a few percent of the exact results.*

j. EMET 405--*Students will use concepts of mathematical integration in applying the equations of fluid statics to determine the magnitude and direction of the resultant force on a submerged surface. They will be able to do this to produce results to assigned exercises to within a few percent of the exact results.*

k. EMET 410-- *Students will develop linear, constant coefficient, ordinary differential equations from electromechanical system models, and solve them using Laplace transform techniques.*

An examination of the Spring and Fall 2005 MEET data for these course outcomes shows that most courses meet their outcomes. Exceptions appear in the instrumentation course regarding frequency spectrum & harmonic Fourier analysis and in the quality course regarding probability distributions.

Course	Student Performance	Faculty Perception	Student Self Perception	Student Course Perception
EMET 322a	1.7	2.0	1.7	1.9
EMET 322b	1.9	2.0	1.3	1.4
EMET 330a	1.2	1.2	1.1	1.0
EMET 330b	0.5	0.6	1.0	0.8
EMET 350a	1.4	1.7	1.6	1.4
EMET 350b	1.2	1.3	1.5	1.4
EMET 350c	0.8	1.3	1.2	1.2
EMET 405a	1.0	1.3	1.6	1.5
EMET 405b	1.1	1.0	1.4	1.4
EMET 405c	1.0	1.3	1.3	1.3
EMET 410a	1.3	1.0	1.2	1.2

Improvement

While the detailed course outcomes indicate that students have mastered mathematics, their perception at graduation indicates a lack of confidence in their ability to apply mathematical concepts. The Curricular Committee should consider rewording Program Outcome 2 as:

> *Apply concepts of mathematics to the design and analysis of electromechanical systems by using calculus for mechanics problems, differential equations for control problems, and probability & statistics for measurement problems.*

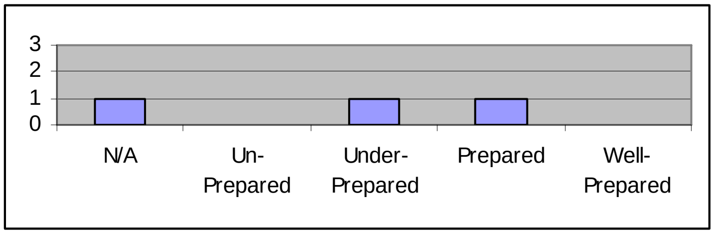
Appendix

C.4. Industry Assessment Report

Assessment

The Electro-Mechanical Engineering Technology System-Wide Industry Survey Report (ET_IndustrySurveys_Fall200506.doc) confirmed the four Program Objectives are satisfactory and identified one Program Outcome for improvement.

Program Outcome 9: *Students should recognize the social, economic, safety, quality, reliability, and ethical issues in the work environment.*



What are the new trends that you see in your field that will need to be addressed through education?

- Awareness of economics in engineering decision making process
- Understanding of cost accounting and the use of Value Analysis and Value Engineering tools

Evaluation

Program Outcome 9 was mapped into two courses with a total of five performance measures:

a. IET 105--*Students will be able to compute financial calculations including simple and compound interest, equivalence, present worth, and annuities. They will do so using the pertinent standard engineering economy equations assisted by a calculator and/or computer program. The monetary results will be calculated to within a few percent of the exact values.*
b. IET 105--*Students will be able to judge the attractiveness of proposed investments by analyzing cash flow, present worth, annual worth, and return on investment. This will be done using the pertinent engineering economy equations and a calculator or software. The monetary results will be within a few percent of the exact values and the alternatives chosen will be the correct ones.*
c. IET 105--*Students will be able to select among alternatives for depreciation accounting and computing economic risk. This will be done using the pertinent engineering economy equations and a calculator or software. The monetary values will be calculated to within a few percent of the exact values and the alternatives chosen will be the correct ones.*
d. EMET 350--*Students will be able to correctly describe how statistical quality control methods result in improvements in product and service quality, reductions in production, manufacturing, and service costs, improvements in morale, and increases in company efficiency and competitiveness.*

e. EMET 350--*Students will be able to correctly identify the accepted national and international standards for statistical quality control and management.*

An examination of the Spring and Fall 2005 MEET data for these course outcomes shows that the courses meet their outcomes.

Course	Student Performance	Faculty Perception	Student Self Perception	Student Course Perception
IET 105a	1.3	1.5	1.7	1.6
IET 105b	1.3	1.5	1.7	1.6
IET 105c	1.1	1.0	1.5	1.5
EMET 350a	1.2	1.0	1.4	1.3
EMET 350b	1.2	1.7	1.0	1.0

Improvement

While the detailed course outcomes indicate that students have mastered work environment issues, an employer indicates strengthening engineering economics in the curriculum. The Curricular Committee has tasked the Course Chair for IET 105 Economics of Industry to redefine the course as an EMET 300 level course and to review its content compared with IE 302 Engineering Economy.

Appendix

C.5. Industrial Advisory Committee Minutes

Penn State Berks College
Industrial Advisory Committee
For
Engineering and Engineering Technology

Minutes of Meeting-November 15, 2005

Attendees:

Henry Ansell	Penn State Berks Campus
Bob Buczynski	Penn State Berks Campus
Eric Byrne	Penn State Berks Campus
Joseph Deane	KTR Associates
Paul Esqueda	Penn State Berks Campus
Walter Fullham	Penn State Berks Campus
John Gavigan	Penn State Berks Campus
Thomas Gavigan	Penn State Berks Campus
Travis Getz	Reading Bakery Systems
Patricia Jepsen	Penn State Berks Campus
Dale Litwhiler	Penn State Berks Campus
Neil McCormick	Arrow International
William Meister	Meister Architects
Adam Raspanti	2MET Student
Brian Roth	Arrow International
Dan Schlege	Lutron Electronics
Terry Speicher	Penn State Berks Campus
Greg Stanek	Lutron Electronics
Greg Stanton	Penn State Berks Campus
Leonard Stump	Carpenter Technologies
Ronald Tomasello	Dana Corporation
Eric Turgeon	Turgeon Engineering
Jeff Wike	Penn State Berks Campus

I. **Minutes** of the Fall 04 IAC meeting were distributed and approved**.**

II. **Committee and Status Reports**

BS Electro-Mechanical Engineering Technology Program (BSEMET)

Professor Terry Speicher, Program Chair for EMET, reported that the Curricular Committee of EMET is considering approval of a full 4 year EMET B.S. degree, not requiring students to complete 2MET or 2EET Associate Degrees prior to entering the EMET degree Program. Students could declare there intent at FTCAP to pursue the EMET degree. There are minor changes to the curriculum.

Professor Speicher also reported that sixteen students graduated from the BSEMET program during the 2004-05 academic year. The 2005-06 EMET enrollment is between 45 and 50 full-time and part-time students. Approximately 15 to 20 students are expected to graduate this academic year.

Associate Electrical Engineering Technology Program (2EET)

Prof. Greg Stanton, Program Chair for EET, reported on the status of the 2EET freshman enrollment. The enrollment, although low in comparison to the other Engineering Programs, is holding steady. With assistance from the Industrial members of the IAC and funding from the State of PA the campus purchased additional PLC Controlled Servo Motion Control equipment. ABB Commander 360 Process Controllers were also purchased with the same funding. The EET Power Lab was outfitted with much needed digital strobes.

Associate Mechanical Engineering Technology Program (2MET)

Professor Barbara Mizdail, Program Chair for 2 MET, reported that in the 2004-05 academic year, there were 22 graduat**es** in Mechanical Engineering Technology. For Fall 2005, there are 44 students in the program. Barbara Mizdail and Tom Gavigan are Advisors for all 2MET students. The faculty leading the courses are: John Gavigan in the Mechanics area, Tom Gavigan in Mechanical Engineering Technology, Barbara Mizdail in Industrial Engineering Technology, and Terry Speicher in Engineering Graphics Technology. Using the same funding as stated above, the MET labs were outfitted with strain gage apparatus, a computer workstation, Solidworks and Inventor software, a Millermatic Mig Welder, and various tooling apparatus for laboratory machining, etc.

Baccalaureate Engineering Programs

Professor Tom Gavigan reported that first year and second year engineering enrollments at the Berks Campus was 160 students for the 2004-2005 academic year, which included some students in DUS. Gavigan also explained the process for which the Sophomore students are evaluated for entrance to their specific majors. Mechanical Engineering has become the most popular major for engineering students, and as a result, the required GPA to become accepted is just slightly below a 3.0. Popularity and demand for Computer Engineering and Computer Science has fallen drastically.

Career Services

Tish Jepsen gave an update on Career Services noting that jobs are being found for engineering and engineering technology graduates, although not necessary in the Berks County region. She thanked Company Representatives for contacting her regarding Co-op and Internship needs, as well as for job placement of graduates.

Continuing Education

Mr.Walt Fullam provided an update on Continuing Education Programs and offered brochures on future offerings. Walt also conducted an interest survey of the Industrial members present.

EBC Division

Paul Esqueda, the Division Head reported the overall status of the Engineering, Business and Computing Division and the strength of the Engineering and Engineering Technology programs. Paul is also serving on a committee consisting of members of the Penn State stand-alone colleges who offer engineering Techn ology programs. Their mission is to develop a report that identifies a body of knowledge for Engineering Technology.

III. SAE Student Chapter – Mini Baja Competition

Professor Barbara Mizdail, and Lab Supervisor Eric Byrne, and three of the SAE Student Club representatives reported on the success of the PSU Berks Mini Baja Team. In this, their Rookie year in this International event, the Team placed 37th Overall, and 12th in the Endurance Race. Projects for this event are being used as learning experiences in some of the Engineering and Engineering Technology classes. This interdisciplinary effect has potential for expansion into other disciplines, such as Business and Computing.

IV. Request for New Members

As members retire or change jobs, Professor Tom Gavigan reminded the Committee that new members are needed to maintain a vital Industrial Advisor Committee for the Berks College. He called upon current members to help refer potential new members for the IAC to any engineering faculty member at Berks-Lehigh Valley College.

V. ABET Preparation for Engineering Technology Programs

Professor Terry Speicher, who attended an ABET Conference in Washington, DC over the summer of 2005, reported on our status in preparation for the fall 2006 ABET visit. He encouraged all members to fill out and return the electronic Employer Surveys which they will be receiving soon.

VI. Subcommittee Breakout Sessions

After the luncheon meeting, breakout sessions were held by each subcommittee to discuss details with regard to the new TAC of ABET accreditation criteria (TC2K) for the EMET, EET and MET programs, and to review Continuing Education activities to help meet the technical training needs of area industries.

Respectfully submitted by: Tom Gavigan, Co- Chair

Penn State Berks
Engineering and Engineering Technology Industrial Advisory Committee
EMET Subcommittee Minutes

Time: Tuesday, 15 November 2005, from 1:30 until 2:00
Location: Thun 145
Attendees: Hank Ansell (Penn State), Terry Speicher (Penn State), Brian Roth (Arrow International), and Greg Stanek (Lutron Electronics)
Attachments: EMET Assessment Metrics 2005, EMET Student Guide Rev H, and TAC EMET Proposed Program Criteria

Prof. Speicher provided a handout that listed the thirteen program outcomes with two corresponding assessment summary charts. Student performance in meeting specified course outcomes was assessed by the faculty teaching each EMET course. A course composite across the program outcomes demonstrated that students were meeting or exceeding each program outcome with the lowest ratings in social issues and control systems. Graduate performance in meeting program outcomes was assessed as an exit interview completed by seniors. A summary of responses demonstrated that graduates were prepared or very prepared in each program outcome with the lowest rating in mathematics. Evaluation of this data will be presented to ABET in the Self-Study Report.

Prof. Speicher provided a handout of the Student Guide for the four-year EMET Program. The guide lists the four Program Objectives, the thirteen Program Outcomes, the curriculum for the Electrical Track and for the Mechanical Track, the course prerequisites, and the course substitutions for the program. Comments were requested for this document.

Prof. Speicher provided a handout of ABET's Proposed Program Criteria for EMET Programs. Specific credit requirements in mathematics and in science no longer exist. A comparison between the Penn State's Quantification and Natural Science credit requirements and the number of courses in the program was made and questions were asked. The group agreed that statistics and probability are important in current manufacturing environments and that progressive options in math are desired. The group discussed using science courses as prerequisites for engineering science courses versus as breadth courses as part of general education. The concern is to retain rigor of depth with respect to increasing breadth in the life sciences. The group expressed the desire to allow seniors the choice of an internship or a capstone experience. The EMET Curricular Committee is planning to streamline the program in the next few years to allow for greater flexibility, and the Industrial Advisory Committee will be kept informed of its progress.

Penn State Berks-Lehigh Valley College
Industrial Advisory Committee
For
Engineering and Engineering Technology

Minutes of Meeting-October 26, 2004

Attendees:

Henry Ansell	Penn State Berks Campus
Richard Aulenbach	RPA Associates
Robert Bartkowiak	Penn State Lehigh Valley Campus
Elaine Berish	Penn State Berks Campus
Bob Buczynski	Penn State Berks Campus
Paul Esqueda	Penn State Berks Campus
John Gavigan	Penn State Berks Campus
Patricia Jepsen	Penn State Berks Campus
Charlie Kopicz	Performance Advocates
Dale Litwhiler	Penn State Berks Campus
Neil McCormick	Arrow International
Barbara Mizdail	Penn State Berks Campus
Brian Roth	Arrow International
Keith Sanford	Neapco, Inc.
Jerry Shoup	Penn State Harrisburg
Terry Speicher	Penn State Berks Campus
Leonard Stump	Carpenter Technologies
Ron Tomasello	Dana Corporation

VII. Introduction of New Members and Guests

Greg Stanton from Penn State Berks Campus engineering faculty was introduced as a new member of the committee. In addition, the following were introduced as guests:

Dave Booth	Alcon Manufacturing
Eric Byrne	Hintz Manufacturing Laboratory
Adam Raspanti	Berks Campus SAE Student Chapter
Shawn Verzinskie	Berks Campus SAE Student Chapter

VIII. Status Reports

BS Electro-Mechanical Engineering Technology Program (BSEMET)

Professor John Gavigan reported that nine students graduated from the BSEMET program during the 2003-2004 academic year. The 2004-05 BSEMET enrollment is between 45 and 50 full-time and part-time students in both degree and non-degree status Approximately 15 students are expected to graduate this academic year.

Dale Litwhiler, Assistant Professor of EET described how EET and EMET students will make use of some newly-purchased handheld computers (hp iPAQ PDA's). Each PDA is also equipped with a GPS receiver module. These units, together with LabVIEW software written by Dale and his undergraduate researchers, will be used for laboratory and remote data acquisition projects.

B. AS Electrical Engineering Technology Program (2EET)

Professor Bob Buczynski reported that thirteen students had graduated from the 2EET program during the 2003-2004 academic year. The 2004-2005 EET enrollment is between 25 and 30 students. Approximately 5 students are expected to graduate this academic year.

A. AS Mechanical Engineering Technology Program (2MET)

Professor Terry Speicher reported that twenty two students had graduated from the 2MET program during the 2003-2004 academic year. The 2004-2005 MET enrollment is approximately 45 students. Approximately 15 students are expected to graduate this academic year.

Barbara Mizdail thanked the industrial members of the IAC for their willingness to provide tours for the MET students and plans to continue bringing students on them. Industrial tours are integral parts of our Industrial Engineering Technology coursework.

The SAE student chapter presented their plans for entering the June 2005 Mini Baja competition in Troy Ohio. Industrial sponsorship of this activity has been tremendous.

B. Lehigh Valley Engineering

Bob Bartkowiak reported 68 students are enrolled in ENGR status at the Lehigh Valley campus and there has been an increase in student interest in Mechanical Engineering.

C. Berks Engineering

There are approximately 120 first year Engineering students and 50 second year students in ENGR status. The Engineering and Engineering Technology faculty were actively engaged during FTCAP in summer 04 to increase awareness among incoming ENGR students about our Engineering Technology programs.

D. Career Services

Tish Jepsen reported an increased student interest in Cooperative Education and Internship opportunities. Representatives from the Co-op office at UP have visited Berks and made presentations to interested students. The Career Services office on campus continues to offer workshops and activities to prepare students for successful job placement.

E. EBC Division

Paul Esqueda, Head of the EBC Division of the Berks-Lehigh Valley College reported activities of Penn State's Engineering Technology (ET) Council, whose membership includes heads of Technology programs at UP, Behrend, Capital, Berks, and Altoona. The ET Council is developing a strategic plan for ET programs.

III. Election of Officers and Solicitation of New Members

The present officers were elected for an additional term and a solicitation of new members of the committee were made.

IV. Assessment of Engineering Technology Programs

Terry Speicher presented a summary of the results of the Berks campus Spring 04 course assessment for certain technology courses in the Electrical, Mechanical, and Electro-Mechanical Engineering Technology programs. Courses were assessed by both students and faculty based upon outcomes established for each course. Results of these assessments are then used to make positive changes to the curricula.

V. Announcements and New Business

- Paul Esqueda updated the committee about the proposed new academic building.
- Bob Buczynski requested the industrial members to forward their ideas and requests for Engineering Technology.
- Eric Byrne, the MET Lab technician, who will be working with the students on the Mini Baja vehicle project, stressed the importance of campus club activities for students.
- Paul Esqueda has been involved in the development of new Engineering programs for the campus along with interdisciplinary programs with IST and Business, and M.S. programs in both Project and Engineering Management.

VI. Subcommittee Breakout Sessions

After the luncheon meeting, breakout sessions were held by each subcommittee to discuss details of assessment plans for the EMET, EET and MET programs and to review continuing education activities to help meet the technical training needs of area industries.