College: College of Engineering and Computer Science

Department: Electrical Engineering

Academic Programs Reviewed

Program 1. B.S. in Electrical Engineering

Program 2. M.S. in Electrical Engineering

Program Review Committee

Committee member 1. Dr. John M. Emmert, Professor

Committee member 2. Dr. Arnab Shaw, Professor

Committee member 3. Dr. Saiyu Ren, Associate Professor

Committee member 4. Dr. Fred Garber, Associate Professor

Submitted 14 January 2015

Department Chair, __Dr. Brian Rigling_____

Dean, __Dr. Nathan Klingbeil_____

Program 1. B.S. in Electrical Engineering

Enrollment and Graduate History

	Fall 09	Fall 2010	Fall 2011	Fall 2012	Fall 2013
Enrollment	199	246	239	280	304
Graduates	34	32	33	50	46

Program description

The Department of Electrical Engineering has been in existence since 1984, and we offer a four-year Bachelor of Science in Electrical Engineering (BSEE) degree. The Department's BSEE degree was first accredited by ABET (Accreditation Board of Engineering and Technology) in 1988. The last ABET general review was conducted in AY2011-2012. Electrical Engineering is the core problem-solving foundation of our technological society. Electrical engineers create, design, build and improve everyday necessities we now take for granted, from wireless, Internet ready cellular phones to digital control systems in modern automobiles from space-based communications and control systems, to advanced manufacturing robots and hybrid electric cars. Electrical engineers also design and fabricate the integrated circuit chips that make virtually all these devices possible. According to the May, 2013 US Bureau of Labor and Statistics Occupational Employment and Wage Estimates report, there are 381,120 U.S. EE technical jobs (electrical and electronics engineering positions) that are directly supported by our program (it should be noted that this does not include the over 1.9 million engineering and operational management jobs that are not tied directly to specific engineering fields). To support these areas we offer six tracks: control systems; electronics systems; microwave engineering; signal processing and wireless; VLSI and computer engineering; and software. All students are required to complete general education requirements, an EE core, track courses, and a senior design sequence.

Alignment with university mission, strategic plan

In the EE Department, we transform the lives of our students and the communities we serve by offering a solid, ABET accredited foundation in the electrical engineering discipline. Our program offers state-of-the-art electrical engineering laboratory facilities, and students in our program have the option of six concentration areas that are very lucrative in today's complex, technological market: control systems, electronics systems, microwave engineering, signal processing & wireless, VLSI & computer engineering, and software. In addition we work closely with our local, state and national industrial partners to make sure our programs stay current and our students are prepared for today's and tomorrow's challenges. We have a corporate board made of local employers that annually review our program. These community members suggest changes and modifications that are incorporated into our program. At future meetings, we close the loop to validate the changes. We also have several funded research programs that make use of not only graduate students, but also undergraduate students. One such example is an automatic target recognition program where students are challenged year round to develop new, innovative techniques in automatic target recognition. These types of research projects challenge students to take theory from the classroom and apply it to real problems. Another advantage of these type projects is they foster life long learning. Students see the value of theory taught in the classroom, but they realize that they often have to delve deeper, outside the classroom to solve relevant problems. These and other initiatives to increase our enrollment align us well with the university's

mission and goals.

Program distinctiveness

1. The most distinctive aspect of our program relative to the others at WSU is that we offer an Accreditation Board for Engineering and Technology (ABET) approved BS in Electrical Engineering Degree.
2. In contrast to many other BSEE degree granting institutions, almost all of our undergraduate classes consist of not only a lecture section, but also a laboratory section. We combine classroom theory with hands on state-of-the-art laboratories.
3. To accommodate our highly technical local industry, we offer not only daytime classes, but also night classes.
4. Relative to other engineering disciplines, electrical engineering is the "type O" universal donor. Due to the rigorous math requirements for electrical engineers, they often fill in for other types of engineers.
5. The BSEE also offers tracks for pre-med and pre-law students to prepare students for the MCAT and LSAT, respectively.

Recognitions of quality of the program

To measure the quality of our program, we use our program educational outcomes (PEOs). These PEOs are based on inputs from our constituents, were last modified by our academic affairs committee in December of 2011, and were unanimously ratified by our faculty. The PEOs for the EE program, in support of the missions of the university and college, are to produce engineers who

1. Will be professionally employed in a technical position or pursuing an advanced degree.
2. Will be communicating their work to others through technical articles, reports, design documents, or presentations.
3. Will be leading or participating as a member of project teams.
4. Will be developing expertise in a specialized area or broadening their base of knowledge.

Program learning outcomes

Each of the PEOs (described above) is impacted by a subset of the following program learning outcomes.

a) an ability to apply knowledge of mathematics, science, and engineering
b) an ability to design and conduct experiments, as well as to analyze and interpret data
c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d) an ability to function on multidisciplinary teams
e) an ability to identify, formulate, and solve engineering problems
f) an understanding of professional and ethical responsibility
g) an ability to communicate effectively
h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal con- text
i) a recognition of the need for, and an ability to engage in life-long learning
j) a knowledge of contemporary issues

k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Description of learning outcomes assessment program

We use several required EE (prefix) courses to assess our learning outcomes. The learning outcome assessed by each course is shown in the matrix below. The columns of the table are labeled with the EE course number, and the rows of the table are labeled with the student learning outcome described in the previous (program learning outcomes) section. Note that the selected courses are evaluated on a repeating, three-year cycle according to the schedule A (year 1), B (year 2), and C (year 3).

Course: Outcome	3210	3260	3310	3450	3810	4000	4130	4210	4620	Senior Design
a)	A	A		A					A	
b)		B	B					B	B	
c)			C			C	C			C
d)					ABC					A
e)	B			B			B			B
f)					ABC					
g)					ABC					C
h)					ABC					B
i)					ABC					A
j)					ABC					A
k)				B		B			B	

Summary of assessment findings for past five years

The major challenge for students in EE is mathematics preparation. Students that are not calculus-ready when they enter college can have a difficult time completing the degree in 4 years. Moreover, even if a student is calculus-ready, failure to pass calculus in the first semester is at times an automatic delay to their entire program. Students can make up for these deficiencies by increasing their course load later or by taking summer classes, but these are suboptimal solutions.

During the ABET accreditation evaluation process, a more thorough assessment of student professional skills was performed. We discovered notable shortcomings in student outcomes for lifelong learning, contemporary issues, ethical understanding, oral/written communications, and understanding of the impact of engineering solutions. The consensus view was that the general education requirements while serving their described purpose were not providing enough content directly applicable to the engineering profession. Curriculum changes to address these shortcomings, specifically the addition of EE 3810, have already been made.

Major curricular changes since last review (or past five years)

1. All WSU programs were converted from quarters to semesters in fall 2012.
2. The prerequisites for the core EE courses were changed to integrate required math to encourage students to progress through math requirements more quickly.
3. Expanded emphasis on culminating professional skills: senior design converted to a full-year

experience and introduced EE 3810 Professional Skills for Electrical Engineers

Graduate placement data, employer satisfaction

To gauge placement and employer satisfaction, we submitted surveys to a cohort of our alumni. Of the 79 member alumni cohort, 39 were successfully contacted. Of those 39, 26 completed the survey. The results of the survey are presented in table below.

Program Educational Objective	Survey Question	Positive Response Rate
1. Will be professionally employed in a technical position or pursuing an advanced degree	Employed as an engineer or related professional	62%
	Pursuing a graduate degree	92%
2. Will be communicating their work to others through technical articles, reports, design documents, or presentations.		
(full-time employed)	Present work in workshops, professional training, or conferences?	74%
	Publish papers, patents, training manuals, technical reports, and product documents?	70%
(graduate student)	Present work in seminars, workshops, or conferences?	83%
	Publish papers, patents, or technical reports?	75%
3. Will be leading or participating as a member of project teams.		
(full-time employed)	Play an active or leadership role in multidisciplinary teams (engineers in other disciplines, business managers, programmers, etc.)?	91%
(graduate student)	Participate in collaborative research projects?	83%
4. Will be developing expertise in a specialized area or broadening their base of knowledge.		
(full-time employed)	Attend workshops, professional training, conferences, or other continuing education?	87%
	Enroll in graduate-level courses?	78%

In a separate survey, we also received responses from 8 employer supervisors. Those results are summarized in the table below.

Program Educational Objective	Survey Question	Superior	Average	Deficient
2. Will be communicating their work to	Effectiveness in communicating ideas both	63%	25%	13%

others through technical articles, reports, design documents, or presentations.	verbally and in writing.			
3. Will be leading or participating as a member of project teams.	Effectiveness in exercising leadership. Participate in collaborative research projects?	38% 57%	38% 29%	25% 14%

If program has professional accreditation, attach most recent review findings and recommendations

Please see the attached ABET review findings and recommendations from 2012

Program 1. M.S. in Electrical Engineering

Enrollment and Graduate History Data in PED

	Fall 09	Fall 2010	Fall 2011	Fall 2012	Fall 2013
Enrollment	183	189	135	120	339
Graduates	57	93	90	50	88

Program description

Electrical Engineering is the core problem-solving foundation of our technological society. Electrical engineers create, design, build and improve everyday necessities we now take for granted, from wireless, sensor based surveillance systems, Internet ready cellular phones to digital control systems and sensors in modern automobiles from space-based communications and control systems, to advanced manufacturing robots and hybrid electric cars. Electrical engineers also design and fabricate the integrated circuit chips that make virtually all these devices possible. According to the May, 2013 US Bureau of Labor and Statistics Occupational Employment and Wage Estimates report, there are 381,120 U.S. EE technical jobs (electrical and electronics engineering positions) that are directly supported by our program (it should be noted that this does not include the over 1.9 million engineering and operational management jobs that are not tied directly to specific engineering fields). The Department of Electrical Engineering offers a program of graduate study leading to a Master of Science in Electrical Engineering. The M.S. in EE program is broad in scope and emphasizes concepts in the design and analysis of complex physical systems using modeling, synthesis, and optimization techniques, and bridges interdisciplinary engineering areas. To support these areas we offer four major areas in the M.S. in EE program: control systems; radio frequency (RF) and microwave engineering; signal processing and wireless communication; and VLSI & electronics.

Alignment with university mission, strategic plan

Wright State's M.S. in EE program builds a solid foundation for student success through a high-quality, innovative Master's curriculum. Our M.S. in EE program prepares graduates to conduct scholarly research and creative endeavors that impact quality of life. Many M.S. in EE graduates go on to pursue Ph.D. or fulfilling research career at local, state, national and international organizations. The M.S. in EE program prepares graduates to be a responsible citizens contributing to meaningful community service. Many of Wright State's M.S. in EE alumni contribute to the economic vitality of our region and state by engaging in professional and intellectual activities. We have a corporate board made of local employers that annually review our entire program. The community members recommend changes and modifications that are incorporated into our program. At future meetings, we close the loop to validate the changes.

Program distinctiveness

- We have several research programs that support the education of our M.S. in EE students with full stipend by the funding agency and tuition waiver by Wright State. Many of these funded MS students engage in research activities on location at the funding agency laboratory where they gain valuable hands-on work experience on cutting-edge research at working closely with renowned

researchers. Some of these students go on to work for the companies that supported their graduate education.

- In contrast to many other M.S. in EE degree granting institutions, many of our graduate classes consist of laboratory section as well as a lecture section. Many graduate courses integrate industry standard computer simulation projects. We combine classroom theory with hands on state-of-the-art laboratories and computer projects.
- To accommodate our highly technical local industry, most graduate level classes are offered after 4:00 p.m. to serve the educational needs of the practicing engineering professional as well as the full-time students.
- Relative to other engineering disciplines, electrical engineering is the "type O" universal donor. Due to the rigorous math requirements for electrical engineers, EE graduates often fill in for other types of engineers.

Recognitions of quality of the program

- There has been more than two-fold increase in the number M.S. in EE students and the number of M.S. in EE graduates in the last 5-7 years, attesting to the recognition of the quality of education we provide.
- There has been a 2-3 fold increase in the number applicants to our M.S. in EE program over the last 5-7 years, which has enabled us to be selective in accepting better quality students.
- The university has recognized the sustained enrollment increase in our M.S. in EE program by adding 3 full-time tenure-track faculty positions, and 2 Instructor positions. This has enabled the department to hire several high quality faculty in the department.
- There has been a two-fold increase in external funding, attesting to the recognition of the quality of research conducted by the department faculty and students.

Program learning outcomes

The M.S. in EE does not have specific learning outcomes beyond completion of the specified degree requirements, which includes completion of courses in one of four major areas of study: controls, signal processing & communications, RF & microwave, and VLSI & electronics.

Description of learning outcomes assessment program

The M.S. in EE program is assessed based on the timely degree completion of admitted students and the incident rate of academic probation. Hence, our primary metric is student GPA, which must remain above 3.0 for a graduate student to remain in good standing. We currently examine student GPA as a function of admitted student GRE scores, undergraduate GPA, and English language proficiency scores (i.e., IELTS, TOEFL) if required. The primary goal is to identify students that are most likely to complete the program in a timely fashion without academic difficulties.

Summary of assessment findings for past five years

Current studies of student GPA in the M.S. in EE program as a function of GRE scores, undergraduate GPA, and English language proficiency scores have not been fruitful. To date, we have not identified a

strong correlation between any of these incoming student metrics and their ultimate performance in the program. Unfortunately, this limits our ability to adjust admission thresholds to identify students that will have academic difficulty without also eliminating students that could successfully complete the program. Moving forward, we will be expanding the range of data examined to potentially include undergraduate institution, country of origin, as well as longitudinal data to detect long term trends.

Major curricular changes since last review (or past five years)

1. Wright State went through quarters to semesters conversion in fall 2012. We have consolidated or weeded out several graduate courses during the conversion process.
2. The M.S. in EE program previously included 6 tracks instead of 4 major areas. With the growth in student enrollment, it was difficult to offer all of the required courses for all 6 tracks on an annual basis. By reducing to 4 major areas, the students have greater flexibility in the selection of the courses that will complete these requirements.
3. We have introduced two introductory spin-up graduate courses for incoming MS students who do not meet our highest quality requirement to enroll with Regular status: (1) Fundamentals of EE and (2) Mixed Signal Design. The learning objectives of the fundamentals course include, Matlab programming and review of linear systems and random process. The mixed signal course covers the basic concepts of mixed signal circuits, digital design, circuit design using hardware description language and MOSFET. We are offering Help Rooms for these courses where experienced tutors offer guidance to the students. We anticipate these preparatory courses will strengthen the students' understanding of the fundamental concepts enabling improved performance in the M.S. in EE program.

Graduate placement data, employer satisfaction

No such data is available for the M.S. in EE.

If program has professional accreditation, attach most recent review findings and recommendations

The M.S. in EE is not professionally accredited.

Departmental Summary

Faculty demographics

	2008	2009	2010	2011	2012
Full	**5**	**4.69**	**5.24**	**5.24**	**5.5**
Associate	**4.33**	**6.33**	**6.33**	**6.33**	**7**
Assistant	**5**	**4**	**4**	**3**	**2**
Inst/Lect	**0**	**0**	**0**	**0**	**0**
Total	**14.33**	**15.02**	**15.57**	**14.57**	**15.5**

Staffing Summary

	2008	2009	2010	2011	2012
Unclassified	**2**	**2**	**2**	**2**	**2**
Classified	**3**	**3**	**2.75**	**2.75**	**2.75**
Total	**5**	**5**	**4.75**	**4.75**	**4.75**

Student/faculty ratio

	2008	2009	2010	2011	2012
Student FTE/Fac FTE	**32.29**	**36.75**	**39.34**	**37.1**	**41.28**

Average class size

	2010	2011	2012
Lecture	**17.55**	**24.39**	**29.07**
Lab only	**8.6**	**12.63**	**16.33**
Lecture/Lab	**17.92**	**24.39**	**29.07**

Total of student data for all programs in unit

	Fall 09	Fall 2010	Fall 2011	Fall 2012	Fall 2013
Enrollment	199	246	239	280	304
Graduates	34	32	33	50	46

Total courses taught and credit hours generated for unit

	Fall 09	Fall 2010	Fall 2011	Fall 2012	Fall 2013
Undergraduate	**3172**	**3516**	**3853**	**4291**	**5224**
Graduate	**3046**	**3244**	**2706**	**2812**	**6719**
Total	**6218**	**6760**	**6559**	**7103**	**11943**

Course completions

	2008	2009	2010	2011	2012
Undergraduate	**88.7%**	**89.7%**	**87.8%**	**86.5%**	**82.3%**
Master's	**95.9%**	**97.0%**	**95.6%**	**95.6%**	**98.4%**

Expense per student and revenue to expense ratio

	2008	2009	2010	2011	2012
Expense per student	**$3247**	**$3216**	**$3390**	**$3638**	**$3655**
Rev/Expense	**1.907**	**1.918**	**1.829**	**1.642**	**1.796**

Research and External Funding

	2008	2009	2010	2011	2012
External funding	**$1.235M**	**$1.386M**	**$0.916M**	**$3.532M**	**$3.773M**

Future employment projections for discipline

Total nationwide employment for electrical engineers is projected to increase at an annual rate of 0.4% over the next three years.

Description of how unit programs and curricula are "mission critical" to the core Wright State educational experience

Key to almost every engineering program is electrical engineering. Typically the EE program is one of the most heavily funded of the engineering disciplines. Our department is no exception, it is one of the highest funded and highest funded per faculty member in the university, and our publication rate per faculty is also near the top. In addition to our undergraduate program (described above), we also have the largest graduate program.

Faculty accomplishments and recognitions

Several department faculty have won prestigious awards at the international, national and university level. Dr. Marian Kazimierczuk, an IEEE Fellow, recently won the National Professor of Technical Sciences awarded by the President of Poland, one of the highest scientific awards given by the Polish Government.Dr. Kazimierczuk is acclaimed as the most awarded faculty member in Wright State University's history, having won all five institution-level faculty awards: The Frederick A. White Distinguished Professor of Professional Service Award, The Trustees' Award for Faculty Excellence, University Professor, and Distinguished Professor.

Programs and areas of recognized excellence with supporting evidence

The Department of Electrical Engineering is internationally recognized for research in sensors. Our impacts spans phenomenology, exploitation, simulation & modeling, device development, hardware & software design, and even hosting on unmanned systems. Sensors research within the department was funded at a level in excess of $2M in 2013 alone. This includes the operation of a summer research

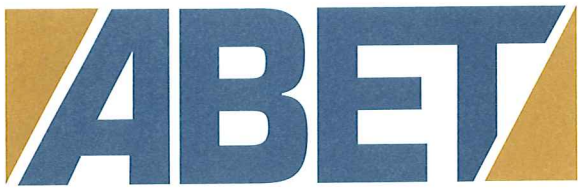
program in the area of sensors that draws students from across the country at all levels of education: high school to postdoctoral researcher. Faculty in the sensors area are also well-published and recognized within international professional societies such as the IEEE/IET.

Capacity for growth of programs

Our department is currently experiencing a growth spurt. Over the last two years our graduate program has experienced 160% growth. To accommodate this growth, we are currently hiring four new tenure track faculty. These new faculty bring a broad range of expertise to our department. The international students that comprise this growth have greatest interest in controls, VLSI, and electronics, which are hence being emphasized in our faculty search process.

New program opportunities

We are currently working on two proposals to grow our department. We are working to add a BS in Engineering Science and a BA in Electronics and Controls Engineering.



Engineering Accreditation Commission

Final Statement of Accreditation
to

Wright State University

Dayton, Ohio

2011-12 Accreditation Cycle

Leadership and Quality Assurance in Applied Science, Computing, Engineering, and Technology Education

ABET
ENGINEERING ACCREDITATION COMMISSION

WRIGHT STATE UNIVERSITY
Dayton, OH

FINAL STATEMENT
Visit Dates: November 6-8, 2011
Accreditation Cycle Criteria: 2011-12

Introduction & Discussion of Statement Construct

The Engineering Accreditation Commission (EAC) of ABET has evaluated the biomedical engineering, computer engineering, electrical engineering, engineering physics, industrial and systems engineering, materials science and engineering, and mechanical engineering programs of Wright State University.

This statement is the final summary of the EAC evaluation, at the institutional and engineering program levels. It includes information received during due process, including information submitted with the seven-day response. This statement consists of two parts: the first deals with the overall institution and its engineering operation, and the second deals with the individual engineering programs. It is constructed in a format that allows the reader to discern both the original visit findings and subsequent progress made during due process.

A program's accreditation action is based upon the findings summarized in this statement. Actions depend on the program's range of compliance or non-compliance with the criteria. This range can be construed from the following terminology:

- Deficiency: A deficiency indicates that a criterion, policy, or procedure is not satisfied. Therefore, the program is not in compliance with the criterion, policy, or procedure.

- Weakness: A weakness indicates that a program lacks the strength of compliance with a criterion, policy, or procedure to ensure that the quality of the program will not be

compromised. Therefore, remedial action is required to strengthen compliance with the criterion, policy, or procedure prior to the next evaluation.

- Concern: A concern indicates that a program currently satisfies a criterion, policy, or procedure; however, the potential exists for the situation to change such that the criterion, policy, or procedure may not be satisfied.

- Observation: An observation is a comment or suggestion that does not relate directly to the accreditation action but is offered to assist the institution in its continuing efforts to improve its programs.

Wright State University, founded in 1964 and granted full university status in 1967, is a regional university in the state of Ohio higher education system. Enrollment in the university is approximately 19,600 undergraduate students and over 3,000 graduate students. Undergraduate programs are offered in six colleges: Business, Education and Human Services, Engineering and Computer Science, Liberal Arts, Science and Mathematics, and Nursing and Health.

The College of Engineering and Computer Science (CECS) consists of four departments that offer the seven engineering programs under review: the Department of Biomedical, Industrial & Human Factors Engineering, the Department of Computer Science and Engineering, the Department of Electrical Engineering, and the Department of Mechanical and Materials Engineering. The college also offers eight master's programs and has 11 PhD focus areas in engineering and computer science. Enrollment in the college at the time of the visit was approximately 1,650 undergraduate and 400 graduate students. There are approximately 76 full-time faculty members in the college. The dean is new to the college and university, as of July 2010.

The following supporting units of the CECS were reviewed: Office of the Registrar, biology, chemistry, humanities/social sciences, library, mathematics, and physics. All supporting areas appear to adequately support the undergraduate engineering programs.

Electrical Engineering
Program

Introduction

The electrical engineering program is administered by the Department of Electrical Engineering along with the engineering physics program. The electrical engineering program has about 200 students with 28 graduates in the most recent academic year. The department has 16 tenured or tenure-track faculty members and several adjunct faculty members.

Program Strengths

1. The program has several outstanding laboratories that are integrated with lecture classes. The laboratories are well-liked by the students, deemed of great value by employers, and considered an integral part of the Wright State University experience by the program's faculty members.

2. The program's freshman engineering class in math has national prominence as a model for motivating students and increasing retention of students of the program. Students and faculty members commented that the success of the program at Wright State University, and the adoption of the curriculum and materials by other universities is indicative of its impact on engineering education.

Program Deficiency

1. Criterion 4. Continuous Improvement This criterion requires the program to regularly use appropriate, documented processes for assessing and evaluating the extent to which both the program educational objectives and student outcomes are being attained. The results of these evaluations must be systematically utilized as input for continuous improvement of the program. Other available information may also be used to assist in the continuous improvement of the program. No evidence has been shown that the program has a process in place to improve the program using available data.

Attainment of the program educational objectives is assessed primarily through surveys of alumni, employers, and faculty advisors in graduate programs. The program indicated that data is collected continuously, but assessed and evaluated every three years. However, there is no evidence of assessing the attainment of program educational objectives prior to 2011. Data collected in 2011 includes survey responses from 22 of 39 graduates of the department, from five employers, and zero from graduate programs. The program demonstrated that expected levels of attainment have been achieved based on a previous set of program educational objectives from this single set of data, which included graduates of both the electrical engineering and engineering physics programs. The program has provided no evidence that the results of the assessment process have been used for continuous improvement. New program educational objectives were approved on November 1, 2011 and the extent to which they are attained has not yet been assessed. There is a plan in place for regularly assessing the attainment of these new objectives beginning in 2012.

Prior to 2009, all outcomes assessment data were derived from student self-reports, based on pre-course surveys, post-course surveys and exit surveys/interviews of graduating seniors. In 2009, the program revised the assessment process to include more direct measures of student outcomes. This process was used for five courses available to students in the program. However, only two of the five courses are required by the program. The program's Undergraduate Studies Committee is responsible for evaluation of the data, and the committee reports its findings and recommendations to the program's faculty members. There is little evidence that this is done regularly or systematically.

The program is not in compliance with this criterion for three reasons. There is no evidence that the degree to which program educational objectives are attained was assessed prior to 2011 and it was not possible to disaggregate the data collected for the electrical engineering program. There is little evidence that the process for assessment of student outcomes and evaluation of the data collected is being carried out regularly or systematically. No evidence has been shown that the program has a process in place to systematically use information gained from evaluation of assessment data for continuous improvement of the program.

- Due process response: The EAC acknowledges receipt of documentation concerning evidence of continuous improvement based on assessment and of a systematic process for assessment of attainment of educational objectives and student outcomes. The documentation demonstrates that several actions have been taken to ensure continuous program improvement. A faculty member having an interest in accreditation and accreditation training has been given release time to serve as an accreditation manager for the program. The program believes that this action will ensure that assessment will be periodic and that the results of the assessment will provide continuous improvement of the program. In addition the program has taken the actions of reviewing data from assessments of 2008-09 and demonstrating that improvements were made to the program during that time period. Further, additional assessments of the program educational objectives and student outcomes have occurred since the on-site visit during the fall of 2011. The additional assessments were solely for the electrical engineering program and did not include any data related to the engineering physics program. At this time the new assessment process has provided a single set of results, and it will be important to demonstrate continued compliance with this criterion.

- The deficiency is now cited as a concern.

Program Weakness

1. Criterion 2. Program Educational Objectives This criterion requires a program to have published program educational objectives that are consistent with the mission of the institution, the needs of the program's constituencies, and these criteria. There must also be a documented and effective process involving program constituencies for periodic review and revision of the program educational objectives. The program's educational objectives were changed in 2007-08 in response to a prior accreditation review, and the objectives were again changed in May 2011 to better conform to the definition of program educational objectives found in the engineering criteria. The program educational objectives of 2011 were approved by the faculty without direct involvement of all of the program's defined constituencies. Although two of the four new objectives are consistent with the definition of program educational objectives, the other two appear to represent student outcomes. The new

objectives were in the self-study report and were posted on the department's website. The program's Industrial Advisory Board members, a constituency, reviewed and approved the new objectives on November 1, 2011. However at least two of the constituencies (alumni and graduate programs) do not appear to be represented on the Industrial Advisory Board and no evidence was presented indicating their involvement in reviewing the new objectives. There is a process for periodic review and revision, but it has not been fully implemented. Because the program educational objectives are not fully consistent with the engineering criteria and the process for periodic review and revision of the program educational objectives does not appear to involve all of the identified constituencies of the program and has yet to be fully implemented, strength of compliance with this criterion is lacking.

- Due–process response: The EAC acknowledges receipt of documentation concerning program educational objectives. The program now has new program educational objectives that describe what graduates are expected to attain within a few years of graduation. All of the constituencies have participated in the review process that generated the new program educational objectives. A periodic review and revision process is in place to ensure that the program educational objectives meet the needs of the constituencies. In addition, a faculty member with release time serves as an accreditation manager for the program.

- The weakness is resolved.

Program Concerns

1. Criterion 1. Students This criterion requires that the institution have and enforce procedures to assure that all students meet all program requirements and to monitor students' progress to foster their success in achieving student outcomes. A review of transcripts of recent graduates did not demonstrate how transfer credits were being used to satisfy degree requirements. Several course substitutions were made, particularly in the required design sequences, without documentation or evidence of an approval process. However, in each case, after an explanation and guidance by the program, it was determined that all students did meet the program's graduation requirements. The lack of documentation and unclear process for review could lead to a student graduating without meeting the graduation

requirements. There is the potential that future compliance with this criterion could be jeopardized.

- Due–process response: The EAC acknowledges receipt of documentation related to verification that all students satisfy the degree requirements. The program now uses the university's Degree Audit Reporting System (DARS). The DARS system is used to monitor the progress of all students in the program. A program academic advisor, the student, and the program chair all have viewing access to the student's DARS report. Only the academic advisor of the program is authorized to enter data in DARS.

- The concern is resolved.

2. Criterion 5. Curriculum This criterion requires that the curriculum include a major design experience that incorporates appropriate engineering standards and multiple realistic constraints. The portfolios of student work provided little evidence that engineering standards and multiple realistic constraints were being incorporated in the projects in an organized fashion. In many cases, the use of standards and/or constraints could only be inferred from the student work product. Discussions with students currently enrolled in the senior design project class indicated that such standards and constraints were being considered, but failure to incorporate adequate attention to appropriate engineering standards and realistic constraints could jeopardize future compliance with this criterion.

   - Due–process response: The EAC acknowledges receipt of documentation related to a curriculum change for the senior design courses. Syllabi for the senior project courses syllabi now include engineering standards and multiple realistic constraints. The changes appear to insure that these elements will be incorporated in the projects in an organized fashion. However, at this time, student work is not available for review showing that the changes produce the desired result.

   - The concern remains unresolved.