SEMINOLE STATE COLLEGE
ASSOCIATE IN SCIENCE FOR PRE-ENGINEERING (214)

Program Review Summary

October 1, 2012

Introduction

The mission of Seminole State College is to empower people for academic success, personal development, and lifelong learning. To that end, the College offers twenty-three degree/ certificate programs, including the Associate in Science for Pre-engineering. In accordance with requirements set forth by the Oklahoma State Regents for Higher Education, the College conducts a thorough review of this degree program every five years. The Math, Science, and Engineering Division presents here the results of its self-review of the Associate in Science for Pre-engineering.
Assessment of this transfer degree program employed a number of direct and indirect indicators. The focus of this process was to evaluate degree program productivity and the achievement of specific degree program and general education outcomes by students. Additionally, this review relates these findings to a number of relevant Higher Learning Commission Criteria and Components, the Seminole State 2012-13 Academic Plan and the educational mission of the College. Based on the information presented here, the academic division makes recommendations regarding the degree program.

3.7.5 Process (Internal/External Review): Self-review by academic division
Previous Reviews and Actions from those reviews:In the previous review, recommendations focused on tracking students through a variety of methods including web based surveys email communications.

Analysis and Assessment (including quantitative and qualitative measures) noting key findings from internal or external reviews and including developments since the last review:

Analysis of degree program productivity revealed that the degree program averaged 27 declared majors per year with 6 graduates and 1,061 total credit hours generated per year over the period under review. Other direct indicators used were course-embedded assessment and ACT Collegiate Assessment of Academic Proficiency (CAAP) Test. Principal indirect indicators used were the Community College Survey of Student Engagement (CCSSE), the ACT Faces of the Future Survey (biennial survey), and the SSC Graduate Opinion Survey. Students increased knowledge by a 4.8 to 1 ratio in a comparison of the pre-test and post-test scores. The CAAP test scores reflect learning in line with the national averages. The data reported on the CCSSE reflected the commuter campus atmosphere of Seminole State College. The ACT Faces of the Future Survey revealed that at least 50% of students reported a major life event such as losing or changing jobs.

Key findings from the most current evaluation of the Associate in Science for Pre-Engineering

First, analysts found that instructors and counselors should be more active in recruiting students to declare Pre-Engineering as a major. Second, faculty in the MSE Division discovered a need to create a plan to increase student awareness of the advantage of receiving an associate degree before transferring to a four-year institution. Third, analysis of data revealed the excessive number of students allowed to enroll in General Studies, leading to the conclusion that a plan should exist to encourage students in selecting a specific major.

A. Centrality of the Program to the Institution's Mission:

SSC Mission Statement

Seminole State College empowers people for academic success, personal development, and lifelong learning.

The Associate in Science for Pre-Engineering Degree Program:
Empowers people for academic success by preparing students for a range of careers involving Engineering and at the same time improve their critical thinking skills necessary for success in all studies.
Empowers people for personal development by training students to set and achieve educational goals by developing responsibility, organizational skills, and academic skills. The program places students in appropriate developmental or college level courses, allowing students the opportunity to progress through the curriculum to achieve success.
Empowers people for life-long learning by providing a variety of courses that vary in content and have the purpose of broadening a student's appreciation of and creating a desire for continued learning once they have completed their education.

Seminole State College prepares students to continue their education beyond the two-year level, trains students for careers and other educational opportunities, and makes available resources and services designed to benefit students and the community at large. Seminole State College also enhances the capabilities of individuals to achieve their goals for personal development by providing quality learning experiences and services that respond to diverse individual and community needs in a changing global society.

B. Vitality of the Program:

B.1. Program Objectives and Goals:

Associate in Science for Pre-Engineering Degree Program Outcomes
Outcomes for Transfer Degree Programs

Outcome 1: Demonstrate successful articulation of Seminole State College transfer degree programs to state and professional institutions of higher learning granting professional and baccalaureate degrees in Oklahoma.

Outcome 2: Demonstrate successful academic achievement by Seminole State College transfer degree students at primary receiving state baccalaureate institutions of higher learning in Oklahoma. Successful academic achievement is defined as the maintenance of satisfactory academic progress toward degree completion as determined by the receiving institution.

Outcomes Specific to Associate of Science for Pre-Engineering

Outcome 3: Define and explain fundamental concepts, principles, and theories of engineering.

Outcome 4: Gather scientific information through experiments and interpret and express the results of experiments.

Outcome 5: Demonstrate problem-solving skills foundational to understanding of engineering concepts.

Outcome 6: Demonstrate preparation for continued pursuit of engineering education leading to a baccalaureate degree in an engineering area.

B.2 Quality Indicators (including Higher Learning Commission issues):

The SSC Pre-engineering Degree Program fulfills Higher Learning Commission Criteria by providing evidence of student learning, faculty engagement that encourages quality teaching, and effective assessment of the student learning process. Instructors in the Mathematics and Science areas consistently review assessment tools and methods and revise those tools and methods, when necessary, to provide the most accurate assessment data possible. To measure the two outcomes specific to the Pre-Engineering Degree Program course embedded assessment is the foremost method. In the Mathematics and Science areas, instructors used pre-tests and post-tests as the tools to obtain assessment data. Faculty members regularly review and change pre-test and post-test questions when necessary. For example, in the past year mathematics and science faculty members have reviewed the pre-tests and post-tests in College Algebra, General Biology, Zoology, Anatomy, Physiology, Astronomy, Microbiology, Principles of Biology, Earth Science, and Introduction to Engineering. As a result, instructors have rewritten, replaced, or deleted some of the existing questions. This process illustrates that the Pre-engineering Degree Program fulfills academic priorities such as improving the assessment of student learning and striving for instructional quality as emphasized in the SSC Institutional Degree Completion and Academic Plans, 2012-2013 Outline.

Instructors calculate student score improvements from pre-test to post-test for every class every semester. While pre-tests and post-tests only assess improvements in a sampling of course objectives, the fact that all courses in the Mathematics and Science areas show improvement verifies that student learning takes place and that outcomes specific to the Pre-Engineering Degree Program are met.

As an example, key personnel gathered the course embedded assessment data from the spring 2010 and fall 2010 semesters as shown in the following table. The percent of increase reflects the difference between the average of the post-test scores and the pre-test scores. For all fourteen of the Major Field Recommendation courses, the average growth rate was 51.4%. The overall ratio of post-test scores to pre-test scores was 3.1 to 1 (76.0% to 24.7%).

Table 1

Combined Course Embedded Assessment Results For Spring and Fall, 2010	
General Education Outcomes	**Percent of Increase**
General Education Outcome 1	64%
General Education Outcome 2	38%

General Education Outcome 3	71%
General Education Outcome 4	46%
Specific Outcomes for Pre-Engineering	**Percent of Increase**
Degree Program Outcome 3	40%
Degree Program Outcome 4	39%
Degree Program Outcome 5	49%
Degree Program Outcome 6	64%

B.3. Minimum Productivity Indicators:

The following table provides data for the Pre-engineering Degree Program. Report Date May, 2012

Table 2

Pre-engineering Declared Majors and Graduates			
Academic Year	**Semester**	**Declared Majors**	**Graduates Total Per Year**
2007 - 2008	Fall 2007	27	
	Spring 2008	19	9
	OSRHE Non-duplicated Headcount	22	
2008 - 2009	Fall 2008	29	
	Spring 2009	26	8
	OSRHE Non-duplicated Headcount	30	
2009 - 2010	Fall 2009	31	
	Spring 2010	23	4
	OSRHE Non-duplicated Headcount	29	
2010 – 2011	Fall 2010	33	
	Spring 2011	26	5
	OSRHE Non-duplicated Headcount	Not Available	
2011 - 2012	Fall 2011	26	
	Spring 2012	26	5
	OSRHE Non-duplicated Headcount	Not Available	

In Table 2, the results show approximately 27 students selecting the program each year and about 6 successfully completing the program annually. This degree program has a low to moderate demand level. However, relative to the number of students declaring Pre-Engineering as a major, the graduation rate is low. Analysts partially attributed the low graduation rate to the concept that many of the students who declare Pre-Engineering as their major succumb to the rigor of the courses and do not complete their degree or decide to change majors. Additionally, some students transfer to other institutions before completing an associate degree at Seminole State College. Nationally, the Pre-Engineering degree is a low demand and a low productivity degree.

This data shows that the Pre-Engineering Degree Program on average exceeds the minimum standards of productivity for Majors Enrolled (25) and Degrees Confirmed (5) with very few exceptions.

B.4. Other Quantitative Measures:

a. Number of courses taught exclusively for the major program for each of the last five years and the size of classes:

Faculty members teach four Major Field courses exclusively for the Associate in Science for Pre-Engineering Degree Program, Introduction to Engineering, Rigid Body Mechanics, Strength of Materials, and Electrical Science. During the review period, the instructor taught only one of the four courses, Introduction to Engineering. Table 4 shows the number of semesters taught and the number of students enrolled in Introduction to Engineering for the years 2006 to 2011.

Table 3
Introduction to Engineering

Semester	Enrollment	Semester	Enrollment
Spring 2006	17	Fall 2006	12
Spring 2007	7	Fall 2007	9
Spring 2008	N/A	Fall 2008	16
Spring 2009	6	Fall 2009	17
Spring 2010	N/A	Fall 2010	17
Spring 2011	6	Fall 2011	10

b. Student credit hours by level generated in all major courses that make up the degree program for five years:

Student Credit Hours Generated in the Major Courses (Five Year Period)

Table 4

Academic Year	Total Hours Generated
2006 – 2007	1118
2007 – 2008	1114
2008 – 2009	975
2009 – 2010	1152
2010 – 2011	945

Note: In Table 4, the "Total Hours Generated" column represents the student credit hours generated by all the Major Recommendation Courses of the degree program for the given academic year. The hours do not represent the number of student credit hours generated only by those students declaring Pre-Engineering as their major.

c. Direct instructional costs for the program for the review period:

Instructional Cost (Estimate):
No direct data was available that could be used to determine the exact amount of the instructional cost for any of the math and science degree programs. The annual SSC budget report provided the total expenditures for the science department as shown in Table 5. The annual science department budget contains the instructional costs for four of the MSE division degree programs.

Table 5

Academic Year	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Instructional Cost	$529,644	$563,202	508,325	$463,764	$496,559.51

d. The number of credits and credit hours generated in the program that support the general education component and other major programs including certificates:

Support of General Education Outcomes

All courses offered in the Mathematics and Science areas support the General Education Philosophy of Seminole State College. Mathematics and Science instructors make every effort to provide experiences that will equip students with the necessary skills to make informed decisions and encourage life-long learning. Instructors also attempt to provide experiences that will make students into citizens who will be thoughtful about their attitudes toward human life, cultural diversity and biological and physical environments. Please see Table 5 for a list of student credit hours generated in the major courses

All college level courses in the Mathematics and Science areas at Seminole State College support one or more of the General Education Outcomes. As students move through the course offerings of the Pre-Engineering Degree Program, they will eventually achieve all four General Education Outcomes. To illustrate this support of the General Education Outcomes the following table shows the Major Field Recommendation courses for the Associate in Science for Pre-Engineering Degree Program and the General Education Outcomes each course addresses.

Note: Three of the Major Field Recommendation courses address no identified General Education Outcomes. Upon investigation, faculty found that the courses exist in our course inventory, but no instructor has taught the courses in fourteen years. Faculty members revised the General Education Outcomes approximately ten years ago, and as a result, the association of these courses with the revised General Education Outcomes has never been established.

Table 6

All General Education Outcomes addressed by a specific course are marked with the letter "X."

Major Field Recommendation Course Information			General Education Outcome			
Prefix	**Number**	**Title**	**1**	**2**	**3**	**4**
ENGR	1113	Introduction to Engineering	X	X	X	
ENGR	2113	Rigid Body Mechanics				
ENGR	2153	Strength of Materials				
ENGR	2613	Electrical Science				
MATH	1613	Plane Trigonometry	X		X	
MATH	2215	Calculus and Analytic Geometry I	X		X	
MATH	2424	Calculus and Analytic Geometry II	X		X	
MATH	2434	Calculus and Analytic Geometry III	X		X	
PHYS	2114	General Physics I	X	X		
PHYS	2224	General Physics II	X	X		
PHYS	2212	Calculus Based Physics	X	X		
CHEM	1114	Introduction to Chemistry		X		
CHEM	1315	General Chemistry I		X		
CHEM	1515	General Chemistry II		X		

e. A roster of faculty members, faculty credentials and faculty credential institution(s). Also include the number of full time equivalent faculty in the specialized courses within the curriculum:

Current Mathematics/Science/Engineering Division Faculty

Table 7

Current Full-Time Mathematics/Science/Engineering Faculty			
Name	**Teaching Area**	**Highest Degree**	**Institution**
Goeller, Linda	Mathematics	Ph.D.	Oklahoma State University
Laule, Gerhard	Science	M.S.	University of Arkansas
Tollett, Jarrod	Mathematics / Science	M.Ed.	East Central University
Troglin, Annette	Mathematics	M.Ed.	East Central University

f. If available, information about employment or advanced studies of graduates of the program over the past five years:

No data

g. If available, information about the success of students from this program who have transferred to another institution:

Transfer Reports from Four-Year Institutions:

Seminole State College routinely seeks transfer data from the primary transfer baccalaureate institutions but receipt of transfer data from those institutions has been sporadic. Transfer reports received from East Central University, the University of Central Oklahoma, and Oklahoma State University provided GPAs of students who had transferred from Seminole State College. Data in those reports, cited in the 2009 Seminole State College HLC Self-Study Report, indicated that "Students' GPAs typically only decrease 0.25 on the 4.0 scale upon transferring from SSC .... This decrease is considered not as a reflection of SSC's curriculum, but the fact that at the university, students take more advanced, junior, and senior level courses in their majors." The data in those reports confirmed our expectation that SSC students maintain similar GPAs upon transfer as those attained at SSC and verified the competence of SSC students in their academic preparation.

B.5. Duplication and Demand:

B.5. Duplication and Demand Issues:

Review of Duplicated Programs

Other institutions have similar programs to the Pre-Engineering Degree Program at Seminole State College. The only near duplications (in our five county area) are at a few private schools that are cost prohibitive for many students.

The Pre-Engineering Degree is a moderate demand program and the rates of declared majors and graduation generally exceed OSRHE productivity levels. Our function at Seminole State College is to provide local access to those students in our five county service area wishing to pursue the Pre-Engineering Degree.

B.5.a. Detail demand from students, taking into account the profiles of applicants, enrollment, completion data, and occupational data:

The Pre-Engineering Degree is a low to moderate demand program and the rates of declared majors and graduation exceed OSRHE productivity levels. Approximately 27 students selected the Associate in Science in Pre-Engineering degree program each year over the review period.

Nine students in 07-08, 8 students in 08-09, 6 in 09-10, and 5 in 10-11 successfully completed the program. This degree program possesses an average demand level. Relative to the number of students declaring Pre-Engineering as a major, the graduation rate is low at 14.1%. The students in the Pre-Engineering Degree Program are predominately under the age of 24 at 70%. The number of under-prepared learners following this program ranged from 2 to 7 as indicated by the Pre-Engineering ACT scores 19 and under. The number of under-prepared students is low compared to other math and science majors.

B.5.b. Detail demand for students produced by the program, taking into account employer demands, demands for skills of graduates, and job placement data:

Faculty members expect students with a Pre-Engineering Degree to matriculate to a four-year program. The options available to these students include any engineering field.

B.5.c. Detail demand for services or intellectual property of the program, including demands in the form of grants, contracts, or consulting:

Not applicable to SSC.

B.5.d. Detail indirect demands in the form of faculty and student contributions to the cultural life and well-being of the community:

Although many of the faculty members commute, they also participate in community activities such as blood drives, Lion's Club, churches, and the local chambers of commerce. Faculty members and students are active in the five county area served by SSC.

B.5.e. The process of program review should address meeting demands for the program through alternative forms of delivery. Detail how the program has met these demands:

With the advances in technology, faculty members have the opportunity to expand to several different forms of delivery. Although still experimenting with new methods, faculty members have found that hybrid or blended courses and IETV prove to be successful delivery methods. SSC also addresses the community need for a variety of course scheduling by offering night courses, weekend courses, 8-week courses, and courses at the prison.

B.6. Effective Use of Resources:

Staff Support

The MSE Division has a full-time secretary who primarily supports the Division Chair, and secondarily supports the other functions of the division including purchasing, maintaining budgets and various records, and facilitating the various needs of the MSE faculty members. There are currently two student wage students working for the MSE Division.

Educational Technology Support

The infusion of technology into academic programs and processes currently receives priority implementation and funding at Seminole State College. Through this focus, the College creates a technologically enhanced academic environment focused on student learning. As a result, technology has never been a limiting factor in classroom instruction. Primary funding sources are E&G funds, federal grants, dedicated student fees, and private donations.

Seminole State College installed a wireless network with two control centers providing Internet and Seminole State College Intranet connectivity to campus academic and residential buildings. In addition to wireless connectivity, all classrooms are hard-wired for Internet and Seminole State College Intranet access. Students have access to personal email accounts, online enrollment, student records, and can obtain copies of their transcripts online. Students may use one of the computers in 16 computer labs stationed across campus to access these sites. Technologically equipped classrooms have computer systems with current instructional and multimedia software, CD/DVD/VCR players, digital multimedia projectors and a Smart Board. Classrooms equipped for IETV have full-motion video/audio interactive television technology interfaced with fiber optic transmission equipment and a computerized multimedia projection system for OneNet course sharing. Faculty members use the internet for instructional activities and information research in courses throughout the curriculum.
Technological services provided by the Testing Center include computerized Advanced Placement testing, class placement testing, ACT residual testing, telecourse testing, and technologically-aided ADA appropriate testing for students with special needs.

Instructional Technology Support Services
Maintaining all forms of technology used in instruction requires a qualified support team. Seminole State College has just such a team made up of the MIS director and two tech persons. They are responsible for maintaining all campus technology such as computers, Smart Boards, IETV equipment, and keeping the campus Intranet and Internet operable in all offices and classrooms.

Web-based Support Services
Campus Cruiser is available to instructors for course management and not just for online course delivery. Through Campus Connect, instructors report student grades electronically, receive emergency response, and make announcements.

Institutional Program Recommendations: (describe detailed recommendations for the program as a result of this thorough review and how these recommendations will be implemented, as well as the timeline for key elements)

Table 8

Recommendation	Implementation Plan	Target Date
Instructors and counselors should encourage and recruit students to declare Pre-Engineering as their major	MSE faculty will increase efforts to recruit Pre-Engineering majors by encouraging SSC students to choose Pre-Engineering as a major and by recruiting area high school students to choose the major. Continue to use the PIE Academy as a recruiting tool.	On-going
Increase student awareness of the advantage of receiving an associate degree before	Faculty in the MSE Division will create a plan to increase student awareness of the	On-going

transferring to a four-year institution	advantage of receiving an associate degree before transferring.	
Encourage students to enroll in specific degree programs rather than choosing General Studies	Faculty, along with student support services, will continue the efforts to inform students of the advantages of enrolling in a specific degree program	On-going

Summary of Recommendations:

	Department	School/College	Institutional
Possible Recommendations:			
Expand program (# of students)	We recommend expanding the program by 20% or about 1 student per year.		
Maintain program at current level			
Reduce program in size or scope			
Reorganize program			
Suspend program			
Delete program			

Department/
Program Head Annette Troglin (Signature) Date 11/23/12

Dean E Mill (Signature) Date 12-18-12