

Program Review Executive Summary

Institution Name: Rose State College Program Name and State Regents Code: Engineering (039) List Any Options: General, Mechanical/Aerospace, Electrical/Computer Date of Review: October 2019 Recommended Date of Next Review: 2029																					
Centrality to Institutional Mission: The Engineering Program (EP) serves the Mission and several Functions of Rose State College (RSC) by providing a diverse group of students with University Transfer Education, Continuing Education, and Career and Technical Education.																					
Program Objectives and Goals: Upon completion, graduates will be prepared to: <ol style="list-style-type: none"> 1. Apply knowledge of mathematics, science, and engineering 2. Apply critical thinking methodologies (scientific method, design process, etc.) to various situations 3. Communicate effectively 4. Successfully pursue study in a scientific, mathematic, engineering, or technological area at a baccalaureate institution 5. Identify, formulate, and solve: <ol style="list-style-type: none"> a. engineering problems (general option) b. problems in elementary mechanics and introductory thermal sciences (MAE option). c. problems involving fundamental electrical science techniques and introductory signal processing (ECE option) 																					
Quality Indicators Such As: <ul style="list-style-type: none"> – Student Learning Outcomes – Effective Teaching – Effective Learning Environments – External Curricular Evaluation – Capacity to Meet Needs and Expectations of Constituencies 				<ul style="list-style-type: none"> • Students are consistently evaluated in effective communication, quantitative reasoning, and critical thinking. • Average enrollment of 276 majors • Students have access to tutoring and help sessions • Course content is routinely evaluated by transfer institutions • More than 30% of transferring students earned a higher degree. 																	
Productivity for Most Recent 5 Years				<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">Number of Degrees:</td> <td style="text-align: center;">2019</td> <td style="text-align: center;">2018</td> <td style="text-align: center;">2017</td> <td style="text-align: center;">2016</td> <td style="text-align: center;">2015</td> </tr> <tr> <td></td> <td style="text-align: center;">22</td> <td style="text-align: center;">19</td> <td style="text-align: center;">12</td> <td style="text-align: center;">24</td> <td style="text-align: center;">16</td> </tr> </table>						Number of Degrees:	2019	2018	2017	2016	2015		22	19	12	24	16
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Other Quantitative Measures Such As:				<ul style="list-style-type: none"> • During the current evaluation period: <ul style="list-style-type: none"> ○ Eleven different engineering courses were taught 																	
Number of Courses for Major																					

<ul style="list-style-type: none"> – Student Credit Hour in Major – Direct Instructional Costs – Supporting Credit Hour Production – Roster of faculty members including the number of FTE faculty in the specialized courses within the curriculum – If available, information about employment or advanced studies of graduates of the program over the past five years – If available, information about the success of students from this program who have transferred to another institution 	<ul style="list-style-type: none"> ○ An average of 992.4 credit hours were generated per year <ul style="list-style-type: none"> ▪ An increase of over 78% from last review period ○ An average of 25.4 sections per year were offered <ul style="list-style-type: none"> ▪ An increase of only 65% from last review period • Faculty Roster: <ul style="list-style-type: none"> ○ Wayne Jones PhD, Dean, FTE = 0.1 ○ Steven L. Fowler MS, Coordinator, FTE = 0.6 ○ Jiyoon Lee PhD, Professor, FTE = 1.0* <ul style="list-style-type: none"> *Fully grant funded at no cost to RSC or the State ○ Adjunct Faculty as needed
Duplication and Demand	<ul style="list-style-type: none"> • No other programs in the Midwest City/ Del City area offer college level engineering courses
Effective Use of Resources	<ul style="list-style-type: none"> • Increased enrollment, number of credit hours, number of graduates, and credit hour production without significant increase in expenditures or FTE's
Strengths and Weaknesses	<p>Strengths: Transfer agreements and working relationships with multiple Universities. Additive and Advanced Manufacturing capabilities available for rapid implementation into curriculum. Excellent faculty in the program and supporting programs (Math, Physics, etc.)</p> <p>Weaknesses: Lack of Junior, Senior, and Graduate students to employ as teaching assistants and tutors. Industry demand for bachelor's degree as minimum requirement for most engineering jobs.</p>
Recommendations	<ul style="list-style-type: none"> • Integrate new Additive Manufacturing Capabilities into Curriculum • Develop deeper relationships with industrial partners • Increase Faculty and Support Personnel for the EP

Rose State College Engineering Program Review - 2019
Regents Program Code: 039

Description of the program's connection to the institutional mission and goals:

The Engineering Program (EP) at Rose State College (RSC) provides access to a high quality engineering curriculum for a diverse group of students while meeting the needs of the community. The open door admission policy of RSC provides students who might not be admitted to other institutions an opportunity to study in the exciting and in-demand field of engineering. The EP also serves students with degrees in other fields wishing to continue, expand, and further their education by taking engineering courses. Additionally the EP serves the community by providing curriculum that is applicable to the diverse set of industries operating in the area (including aerospace, electronics, petroleum, and manufacturing).

3.7.5 Process (Internal/External Review):

Previous Reviews and Actions from those reviews:

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

Three goals were identified in the 2014 EP Program Review:

1. Add "hands on" projects to Thermodynamics, Fluid Mechanics, and Dynamics courses.
2. Explore incorporation of the newly developed FabLab at RSC into curriculum of select courses
3. Increase size of EP faculty

The EP program has made excellent progress in the achievement of all three goals:

1. Since the last program review "hands on" projects have been regularly incorporated into multiple Engineering courses including: Thermodynamics, Fluid Mechanics, Dynamics, Strengths of Materials, Materials Design and Manufacturing Processes, Graphics and Design, and Introduction to Engineering.
2. The FabLab has been moved out of Academic Affairs at RSC, but the EP has been granted use of the old FabLab location. In this space, the EP has built a state of the art Digital Prototyping Center (DPC). The DPC is equipped with five different 3-D printers of various capabilities. This provides support for prototype development to support the aforementioned "hands on" projects.
3. Dire budget cuts in Higher Education prevented RSC from accomplishing this goal on its own. The EP hired a new faculty member in Fall of 2017 using funding from a National Science Foundation grant. This position is only funded through Spring 2020.

A. Centrality of the Program to the Institution's Mission: *(Institution's response/rationale should follow each criteria of this policy; (Size of box provided is NOT an indicator of the length of response expected; please include as much information as needed to thoroughly address each standard.)*

The EP serves the Mission and several Functions of RSC by providing a diverse group of students with University Transfer Education, Continuing Education, and Career and Technical Education. The EP offers ten different engineering courses every year, and the majority of these

courses are designed specifically for university transfer credit. Life long learning and continuing education are also achieved by the EP since students with degrees in other fields can (and often do) take engineering courses at RSC to further their educational and career goals. Finally, the function of Career and Technical Education is served by the EP since some of the engineering courses include training in Computer Aided Design (CAD) or mathematical analysis software needed by engineers and technicians in the modern workforce.

B. Vitality of the Program:

B.1. Program Objectives and Goals:

The Associate in Science Degree Program provides students with the analytical skills and scientific knowledge to expand and apply critical thinking to all facets of learning. The expected Program outcome is to provide a comprehensive lower-division education for students who plan to transfer to a baccalaureate degree program.

Upon completion, graduates will be prepared to:

1. Apply knowledge of mathematics, science, and engineering
2. Apply critical thinking methodologies (scientific method, design process, etc.) to various situations
3. Communicate effectively
4. Successfully pursue study in a scientific, mathematic, engineering, or technological area at a baccalaureate institution
5. Identify, formulate, and solve:
 - a. engineering problems (general option)
 - b. problems in elementary mechanics and introductory thermal sciences (MAE option).
 - c. problems involving fundamental electrical science techniques and introductory signal processing (ECE option)

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

Quality Indictors used will be Student Outcomes, Effective Teaching, Effective Learning Environments, External Curricular Evaluation and the Capacity to Meet Needs and Expectations of Constituencies.

Student Outcomes:

The EP evaluates student outcomes in a number of ways. Students are required to present their findings and conclusions in both written and oral formats at various points in the curriculum. In these presentations, students must be able to identify and gather knowledge that is applicable to the situation, use an appropriate critical thinking methodology to formulate a solution, and communicate their findings in a professional manner. Additionally, RSC evaluates the quantitative reasoning and effective writing skills of the student body on a college wide basis by surveying randomly selected classes.

Effective Teaching

Both full time and adjunct faculty for the EP are consistently evaluated by students, peer faculty, and administration. The performance ratings for EP faculty from all three evaluating groups are consistently above satisfactory.

Effective Learning Environments

Many factors contribute to an excellent learning environment for students in the EP and at RSC as a whole. All RSC students have access to tutoring through the Learning Resource Center STEM Center. Additionally, Professor Fowler and Dr. Lee are available to answer questions from all engineering classes during office hours or via appointment. Finally, RSC provides many excellent workshops and student organizations for the entire student body.

External Curricular Evaluation

The content of courses in the EP are regularly evaluated by the engineering programs at The University of Oklahoma, The University of Central Oklahoma, and Oklahoma State University.

Capacity to Meet Needs and Expectations of Constituencies.

The Engineering and Science Division at RSC employs an academic advisor, Mr. Gholamreza (Nick) Bastani, to serve all of its students including those enrolled in the EP. Additionally, Professor Fowler provides advisement to students on an informal basis.

The satisfaction of the student body is surveyed by RSC on a regular basis, and allocation of financial support and resources is often based on the findings of those queries.

B.3. Minimum Productivity Indicators:

B.3. Minimum Productivity Indicators.

Academic Year	General	Mechanical/Aerospace	Electrical/Computer	Total Enrollment for EP	General	Mechanical/Aerospace	Electrical/Computer	Total Graduates for EP
	Enrollment for options				Graduates in each option			
2015	241	40	35	316	7	4	5	16
2016	245	29	34	308	10	10	4	24
2017	217	43	22	282	4	6	2	12
2018	162	51	29	242	3	11	5	19
2019	161	42	29	232	5	11	6	22

B.4. Other Quantitative Measures:

b.4.a. Number of courses taught exclusively for the major program for each of the last five years and the size of classes:

EP Course	2015		2016		2017		2018		2019	
	Enrolled	Sections	Enrolled	Sections	Enrolled	Sections	Enrolled	Sections	Enrolled	Sections
ENGR 1213	38	3	49	3	46	3	43	3	34	3
ENGR 2013	19	2	34	2	8	1	18	2	19	2
ENGR 2091	0	0	0	0	0	0	0	0	9	2
ENGR 2103	32	2	78	5	64	5	52	4	41	5
ENGR 2113	30	2	60	3	41	3	22	2	20	2
ENGR 2133	31	1	45	3	27	2	42	3	20	2
ENGR 2203	9	1	8	1	13	1	13	2	18	2
ENGR 2213	37	2	51	3	47	3	27	3	43	3
ENGR 2233	10	1	33	3	20	2	22	2	24	2
ENGR 2303	12	2	20	2	22	2	15	2	34	2
ENGR 2313	45	3	58	3	52	3	55	3	50	4
Total	263	19	436	28	340	25	309	26	312	29

b.4.b. Student credit hours by level generated in all major courses that make up the degree program for five years:

Course	Credit Hours generated by Course				
	2015	2016	2017	2018	2019
ENGR 1213	114	147	138	129	102
ENGR 2013	57	102	24	54	57
ENGR 2091	0	0	0	0	9
ENGR 2103	96	234	192	156	123
ENGR 2113	90	180	123	66	60
ENGR 2133	93	135	81	126	60
ENGR 2203	27	24	39	39	54
ENGR 2213	111	153	141	81	129
ENGR 2233	30	99	60	66	72
ENGR 2303	36	60	66	45	102
ENGR 2313	135	174	156	165	150
Total	789	1308	1020	927	918

- b.4.c.** Direct instructional costs for the program for the review period:

Figures are mean averages over the last 5 years.

Category	Estimated Annual Expense
Salary	\$59,340.00
Benefits	\$26,060.00
Supplies	\$1,900.00
Adjunct Faculty	\$30,090.00
Total	\$117,390.00

- b.4.d.** The number of credits and credit hours generated in the program that support the general education component and other major programs including certificates:

The EP is a specialized program and offers no courses that count towards general education requirements or certificates.

- b.4.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:

Faculty	Credential	Institution	Title	FTE
Wayne Jones	PhD.	University of Oklahoma	Division Dean	0.1
Steven L. Fowler	M.S.	Oklahoma State University	Professor and Coordinator	0.6
Jiyoan Lee	PhD.	University of Oklahoma	Professor (grant funded)	1
adjunct professors	M.S. or higher	(varies)	Professor	(varies)

- b.4.f.** If available, information about employment or advanced studies of graduates of the program over the past five years:

The EP has limited means to track this information, and since the application for a professional engineering license and almost all jobs in the field of engineering require at minimum a bachelor's degree, very little motivation outside of RSC will exist for the EP's students to complete their associate's degree.

- b.4.g.** If available, information about the success of students from this program who have transferred to another institution:

According to the National Student Clearinghouse, there were 792 students that transferred to another institution and 271 (34%) went on to earn a higher degree.

B.5. Duplication and Demand:

In cases where program titles imply duplication, programs should be carefully compared to determine the extent of the duplication and the extent to which that duplication is unnecessary. An assessment of the demand for a program takes into account the aspirations and expectations of students, faculty, administration, and the various publics served by the program. Demand reflects the desire of people for what the program has to offer and the needs of individuals and society to be served by the program.

Address Duplication: There are currently no other programs directly serving the needs for engineering higher education in the Midwest City, Del City, Eastern Oklahoma City, and Choctaw areas.

Address Demand: The EP serves its constituents by providing access to coursework taken in the first two years by students majoring in all fields of engineering (Mechanical, Civil, Industrial, Aerospace, Biological, Biomedical, Electrical, Computer, and many others). According to the Bureau of Labor Statistics (www.bls.gov), almost all fields of engineering are expected to experience growth at or above average rates in the foreseeable future.

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

The EP has experienced continued, stable enrollment and graduation rates during the evaluation period. While the number of declared majors has decreased, this decrease is in line or less than the enrollment trends in all areas of higher education in the state of Oklahoma.

- 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:

According to the Bureau of Labor Statistics (www.bls.gov), almost all fields of engineering are expected to experience growth at or above average rates in the foreseeable future.

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

The Engineering and Science Division at RSC was awarded a National Science Foundation grant (#1700647) to develop curriculum for Unmanned Aircraft Vehicle, or drones. The goal of this funding is to develop curriculum for students in the Technology Program and EP which exposes them to the theory behind design, applications, and maintenance of drones. Additionally, the EP has developed curriculum for a one hour special topics course on the basics of SolidWorks, a 3-D CAD program, specifically to offer to personnel at Tinker Air Force Base.

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

The EP has been able to provide expertise in the areas of drones and additive manufacturing to various civil and commercial entities during the evaluation period.

- 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:

The EP has been able to increase the number of hands on activities and laboratories for engineering courses. This allows students an opportunity to experience the theory associated with the topics covered in their coursework in a more tangible and applied format.

B.6. Effective Use of Resources:

Resources include financial support, (state funds, grants and contracts, private funds, student financial aid); library collections; facilities including laboratory and computer equipment; support services, appropriate use of technology in the instructional design and delivery processes, and the human resources of faculty and staff.

The EP has been able to develop a state of the art Additive and Advanced Manufacturing facility through the combined use of state funds, grants, and private donations. The EP has been able to utilize the space previously occupied by RSC's FabLab to create a Digital Prototyping Center, and the EP renovated some previously unused classroom space into a new Advanced Manufacturing Center. Some of the key equipment in these spaces include: an EOS M270 metal 3-D printer (private donation), a Statasys F170 soluble support plastic 3-D printer (NSF grant), and a Markforged Mark II composite plastic 3-D printer (NSF grant). These facilities have been built at minimal cost to RSC and the state of Oklahoma and will serve both the EP and RSC's Technology program well into the future.

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)

Recommendations	Implementation Plan	Target Date
Integrate newly developed Additive Manufacturing capabilities into curriculum	Continue to develop hands on projects, develop modules and assessment, integrated modules and assessment into curriculum	May - 15th - 2023
Develop deeper relationships with industrial partners	Explore internships and consulting or externships for EP students and faculty, explore specialized courses or workshops for industrial partner personnel	May - 15th - 2024

Increase Faculty and Support Personnel for EP	Lobby RSC administration for increased personnel to support academic and grant funded growth of EP program.	TBD
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Summary of Recommendations:

	Department	School/College	Institutional
Possible Recommendations:	EP	Engineering and Science Division	Click here to enter text.
Expand program (# of students)	Continue to increase number of majors	Continue to increase number of majors	
Maintain program at current level	Click here to enter text.	Click here to enter text.	Click here to enter text.
Reduce program in size or scope	Click here to enter text.	Click here to enter text.	Click here to enter text.
Reorganize program	Choose an item.	Choose an item.	Choose an item.
Suspend program	Choose an item.	Choose an item.	Choose an item.
Delete program	Choose an item.	Choose an item.	Choose an item.

Department/
Program Head Steve L. Pelt
(Signature)

Date 11-19-19

Dean W. J. Jones
(Signature)

Date 11/19/19