Program Review Self-Study Template

Academic unit: Engineering Technology

College: Engineering

Date of last review ?

Date of last accreditation report (if relevant) August 31, 2016

List all degrees described in this report (add lines as necessary)

Degree: BS Engineering Technology CIP* code: 15.00

Degree: CIP code:

Degree: CIP code:

*To look up, go to: Classification of Instructional Programs Website, http://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55

Faculty of the academic unit (add lines as necessary)

Name	Signature
Gary Brooking	
Kara McCluskey	
Konstantinos Mykoniatis	
Perlekar Tamtam	
Lincoln Schroeder	

Submitted by: Gary Brooking (Director) Date
(name and title)

In yellow highlighted areas, data will be provided

1. Departmental purpose and relationship to the University mission (refer to instructions in the WSU Program Review document for more information on completing this section).

a. University Mission:

b. Program Mission (if more than one program, list each mission):

The Wichita State University Engineering Technology program will provide students with the highest quality education needed to succeed in the global marketplace.

c. The role of the program (s) and relationship to the University mission: Explain in 1-2 concise paragraphs.

The role of the BS in Engineering Technology (ET) program is to provide an undergraduate education to its students that will prepare the graduates to:

1. Identify, analyze, and solve broadly defined engineering technology problems in mechatronics, technology management, or environmental sustainability.

Provide a brief assessment of the quality of the faculty/staff using the data from the table above and tables 1-7 from the Office of Planning Analysis as well as any additional relevant data. Programs should comment on details in regard to productivity of the faculty (i.e., some departments may have a few faculty producing the majority of the scholarship), efforts to recruit/retain faculty, departmental succession plans, course evaluation data, etc.

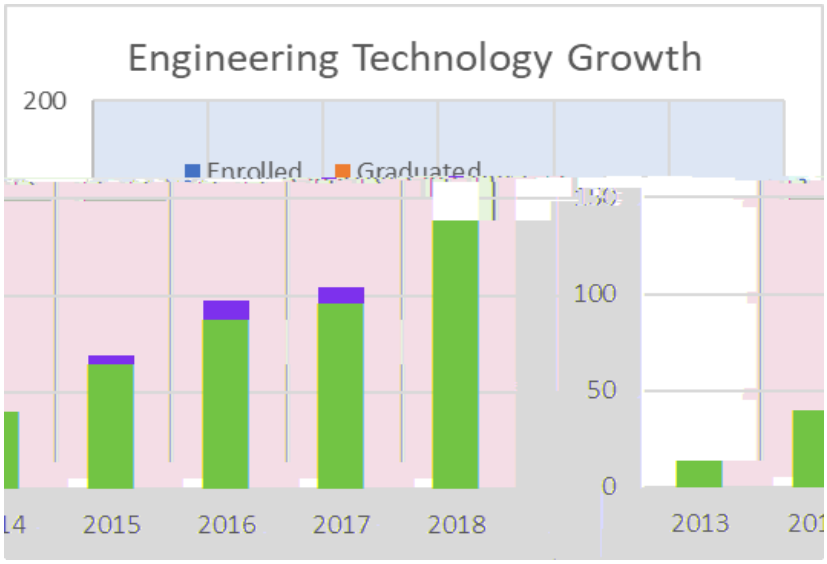


Figure 2.1: Number of Engineering Technology students and graduates

As shown in Figure 2.1 below, the Engineering Technology program undergraduate enrollment has grown steadily. From the start (2013) there were 14 students enrolled in the program, whereas it has grown to 138 students by Fall 2017. Additionally, the Engineering Technology program has realized its first graduates, 7 in 2015, 14 in 2016 and 11 in 2017.

The Engineering Technology program consists of six permanent non-tenure faculty members, three dedicated full time to Engineering Technology, one 50% shared with the Electrical Engineering and Computer Science Department, one 50% shared with the College of Engineering (COE) Department and one 50% shared with the Mechanical Engineering Department which is currently vacant. Due to the growth in the student enrollment and addition of new tracks, two of these faculty have been hired in the past year. We have had one faculty retire at the end of 2017 and this position is in the process of being filled.

The Engineering Technology program is undergraduate with non-tenure faculty, and thus the program is teaching focused with no expectation on research. The five faculty members in the program have adequate expertise and experience in delivering the required curriculum. All faculty have attended the KEEN Integrating Curriculum with Entrepreneurial-Mindset (ICE) workshop and are using material developed through this workshop in their classes. Through their service and professional development activities, the faculty bring many practical examples to their classrooms, which benefit the eal]TJheir classes. Through their serwith

The department supports the faculty by providing travel support for faculty who bring recognition to the department. Faculty are encouraged to attend KEEN and other workshop that will enhance their teaching skills. Based on the faculty evaluations for the last two years, the faculty have consistently met the teaching requirements.

3. Academic Program/Certificate: Analyze the quality of the program as assessed by its curriculum and impact on students for each program (if more than one). Attach updated program assessment plan (s) as an appendix (refer to instructions in the WSU Program Review document for more information).

a. For undergraduate programs, compare ACT scores of the majors with the University as a whole.
The university has maintained an average ACT score of approximately 23 since 2012. The program started with an average ACT score of 19 as reported by 3 of 9 individuals in the program. The ACT average increased to 21.3 the very next year and then has a steady increase to 23.2 as reported in 2016, which is slightly higher than WSU average ACT score. The sample size has also increased to 26 of 75 individuals as of 2016.

b.

Table 3.1: Learning Outcomes Overview

Learning Outcomes (most programs will have multiple outcomes)	Assessment Tool (e.g., portfolios, rubrics, exams)	Target/ Criteria (desired program level achievement)	Results	Analysis
a) An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities	Project assignment rubrics from ENGT 302, 303, 308, 440, 510.	Mean of 70% across all students in courses assessed	2015-83% 2016-88% 2017-76%	Satisfactory. Slight drop should be addressed with changes of new courses ENGT201, 312, 313
b) An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies	Project assignment rubrics from ENGT 302, 320, 441, 497	Mean of 70% across all students in courses assessed	2015-78% 2016	

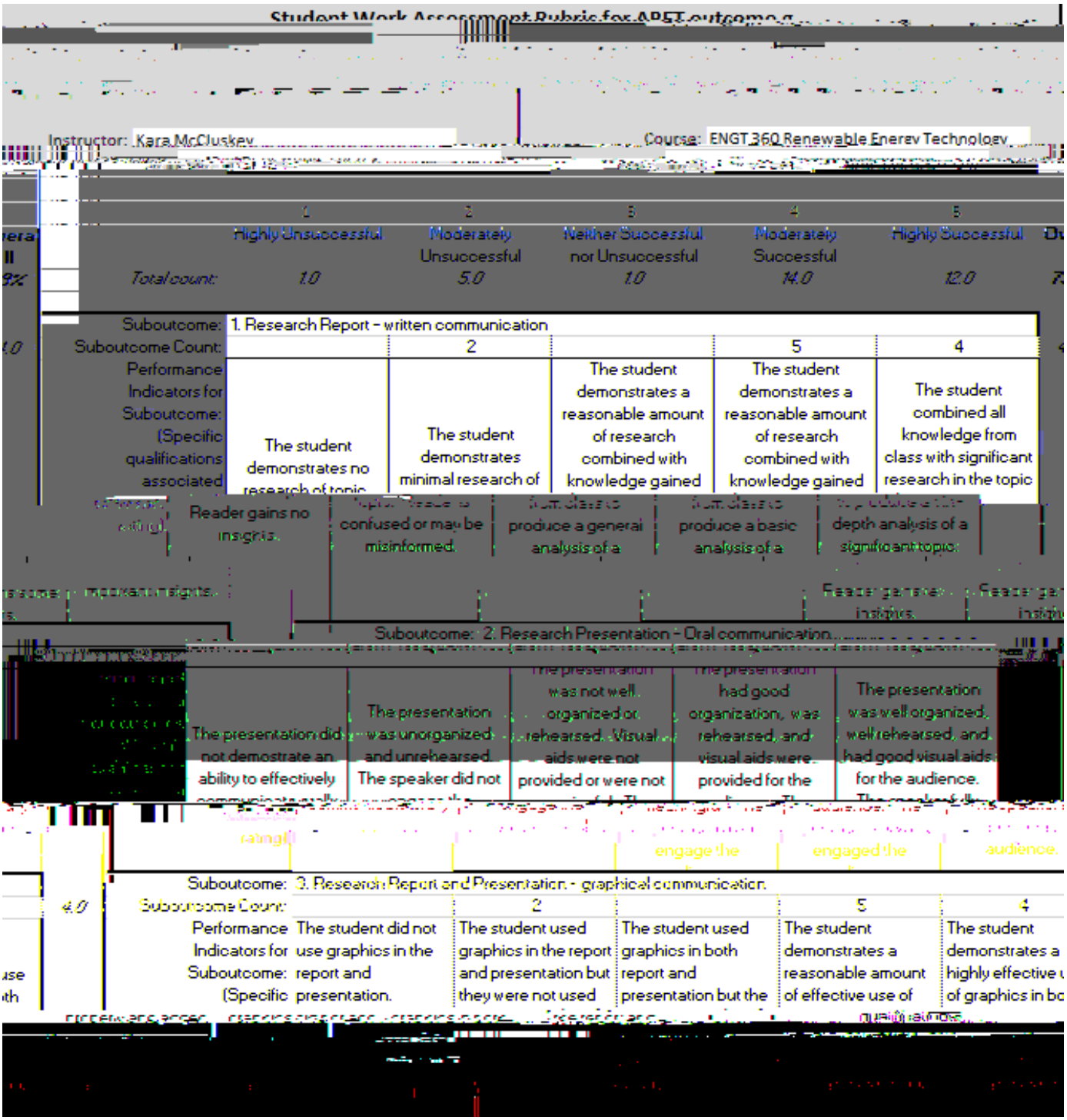
Results

Note: Not all programs evaluate every goal/skill. P

ENGT334		I	I				I			I	
ENGT492		R			R	R	R				
ENGT510	R					R					
ENGT600						R				R	
ENGT610		E			R	R	E			R	
ENGT620				I				R		R	
Concentration in Cybersecurity											
ENGT501	I	R									
ENGT601	R		R			R					
ENGT611				I			I		R	I	
ENGT612						R			R	R	
Concentration in Engineering Technology Management											
ENGT441	R					R				I	
ENGT664	E		R				I		R	R	
Concentration in Mechatronics											
ENGT320		I	I				I				
ENGT323		I				I					
ENGT313											
ENGT334		R	R				R			I	
ENGT497		R	R				R				
ENGT361	R	R		I		R					
ENGT348	R	R		R	R	R		R			
ENGT410	R	R		R				R			R
ENGT411	R			R							

Each course reported the assessment of specific learning outcomes using a standard format, Table 3.2. Table 3.2 shows that each learning outcome was assessed multiple times in multiple forms in this program. The performance is the ratio of points earned to total point available for the specific measure.

Table 3.3 An example of learning outcome assessment assigned to a specific course (ENGT 360). Similar assessments are available for each course each semester.



Student Work Assessment Rubric for ABET outcome a

Instructor: Kara McCluskey Course: ENGT 360 Renewable Energy Technology

	1	2	3	4	5
	Highly Unsuccessful	Moderately Unsuccessful	Neither Successful nor Unsuccessful	Moderately Successful	Highly Successful
Total count:	1.0	5.0	1.0	14.0	12.0

Suboutcome:	1. Research Report – written communication				
Suboutcome Count:		2		5	4
Performance Indicators for Suboutcome: (Specific qualifications associated	The student demonstrates no research of topic. Reader gains no insights.	The student demonstrates minimal research of topic. Reader is confused or may be misinformed.	The student demonstrates a reasonable amount of research combined with knowledge gained from class to produce a general analysis of a	The student demonstrates a reasonable amount of research combined with knowledge gained from class to produce a basic analysis of a	The student combined all knowledge from class with significant research in the topic to produce a high depth analysis of a significant topic. Reader gains insights.

Suboutcome:	2. Research Presentation – Oral communication				
	The presentation did not demostrate an ability to effectively	The presentation was unorganized and unrehearsed. The speaker did not	The presentation was not well organized or rehearsed. Visual aids were not provided or were not	The presentation had good organization, was rehearsed, and visual aids were provided for the	The presentation was well organized, well rehearsed, and had good visual aids for the audience.

Suboutcome:	3. Research Report and Presentation - graphical communication				
Suboutcome Count:		2		5	4
Performance Indicators for Suboutcome: (Specific	The student did not use graphics in the report and presentation.	The student used graphics in the report and presentation but they were not used	The student used graphics in both report and presentation but the	The student demonstrates a reasonable amount of effective use of	The student demonstrates a highly effective

Feedback Loop:

Results of evaluation processes for the student outcomes and other available information are systematically used as input in the continuous improvement of the program. The results of course assessments are summarized by respective assessment leads for the three concentrations and submitted to the program director at the end of each semester. The survey of graduating seniors and employers are submitted directly to the program director. After analysis of the results, the documents are submitted to the assessment coordinator for the college. Trend analysis are performed at the end of each academic year and maintained by the program director and assessment coordinator for the college.

Criterion /Target for assessment

The target level for achievement is set at 70% for individual ABET outcomes as well as for the learning outcomes identified for the program. The target level is reviewed by the department curriculum committee periodically. The 70% value was chosen based upon the nature of the individual items used in courses as the basis for assessment. These are typically items that are very discriminating in terms of competency and thus do not include the easier elements that may makeup some elements of homework assignments or some test questions.

Tables 3.4a – 3.4k summarize the assessment of program learning objectives.

Table 3.4a. Summary results for Outcome a

Ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities

			Fa14	Sp15	Fa15	Sp16	Fa16	Sp17
ENGT 302	Rubric measure of one assignment on application of Newtonian Laws	Every year	-	91% (11)	-	86% (22)	-	75% (20)
ENGT 303	Rubric measure of two design problems: hydraulic sizing and energy saving	Every year	69% (9)	-	94% (8)	-	79% (14)	-
ENGT 308	Rubric measure of one assignment on stresses and deformation	Every year	-	-	-	-	83% (6)	-
ENGT 440	Rubric measure of application of Microsoft Project and other knowledge	Every year	100% (2)	-	88% (8)	-	-	-
ENGT 510	Rubric measure of one project of solar							

Table 3.4b. Summary results for Outcome b

Ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies

Three Year Evaluation Cycle				**Assessment Results**					
Course	**Assessment Method**	**Frequency**	**Performance Target**	**Percent achieving ≥4 (sample size)**					
				Fa14	**Sp15**	**Fa15**	**Sp16**	**Fa16**	**Sp17**
ENGT 302	Rubric measure of one homework and one test question on calculation of force components	Every year	At least 70% of students will achieve a score of 4 or higher on a scale of 1-5	-	82% (11)	-	78% (20)	-	58% (19)
ENGT 320	Rubric measure of one homework question on charge transfer and one test question on average current flow	Every year		-	79% (14)	-	81% (13)	-	77% (30)
ENGT 441	Rubric measure of project report on learning from three case studies	Every year		-	71% (7)	-	80% (5)	-	-
ENGT 497	Rubric measure of assignment on application of electrical machines	Every year		78% (9)	-	77% (13)	-	75% (16)	-
Evaluation and Actions									
Three Year Cycle: In fall 2017, the ET faculty computed the **extent of attainment of *Outcome a* as 75%**, the weighted average of all assessment results during the 3-year evaluation period. Extents of attainment of at least 70% indicate achievement of the outcome. Therefore, no required action was deemed necessary.									

Table 3.4c. Summary results for Outcome c

Ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes

Three Year Evaluation Cycle				**Assessment Results**					
Course	**Assessment Method**	**Frequency**	**Performance Target**	**Percent achieving ≥4 (sample size)**					
				Fa14	**Sp15**	**Fa15**	**Sp16**	**Fa16**	**Sp17**
ENGT 302	Rubric measure of one assessment on lab report: statics of trusses	Every year	At least 70% of students will achieve a score of 4 or higher on a scale of 1-5	-	73% (11)	-	72% (20)	-	65% (34)
ENGT 303	Rubric measure of one assessment on P-1 pump selection	Every year		-	-	-	-	86% (14)	-
ENGT 308	Rubric measure of final test question on selection of bearings	Every year		-	-	-	-	83% (6)	-
ENGT 320	Rubric measure of two labs: finding the difference between EMF and Voltage; and measurement of active, reactive power, apparent power, and PF	Every year		-	71% (14)	-	88% (13)	-	83% (30)
ENGT 401	Rubric measure of 2 assessments on the final project: conduct, analyze, & interpret experiments; apply experimental results to improve processes	Every semester		83% (5)	50% (2)	78% (9)	79% (7)	75% (16)	73% (22)
ENGT 497	Rubric measure of lab report on working of electrical machines	Every year		78% (9)	-	85% (13)	-	81% (16)	-
Evaluation and Actions									
Three Year Cycle: In fall 2017, the ET faculty computed the **extent of attainment of *Outcome a* as 77%**, the weighted average of all assessment results during the 3-year evaluation period. Extents of attainment of at least 70% indicate achievement of the outcome. Therefore, no required action was deemed necessary.									

Table 3.4d. Summary results for Outcome d

Ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives.

			Fa14	Sp15	Fa15	Sp16	Fa16	Sp17
ENGT 401	Rubric measure of one assessment on the final project report: design systems, components, or processes	Every semester	80% (5)	100% (2)	78% (9)	100% (7)	88% (8)	91% (11)
ENGT 402	Rubric measure of one assessment on the final project report: design systems, components, or processes	Every semester	75% (4)	100% (4)	100% (3)	100%		

Table 3.4e. Summary results for Outcome e

Ability to function effectively as a member or leader on a technical team

	Fa14	Sp15	Fa15	Sp16	Fa16	Sp17
ENGT 302						

Table 3.4f. Summary results for Outcome f

Ability to identify, analyze, and solve broadly-

Table 3.4h. Summary results for Outcome h

Understanding of the need for and an ability to engage in self-directed continuing professional development

			Fa14	Sp15	Fa15	Sp16	Fa16	Sp17
ENGT 401	Rubric measure of assignment on continuing professional development plan	Every semester						

Table 3.4i. Summary results for Outcome i

Understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity

Course	Assessment Method	Frequency	Performance Target	Percent achieving ≥4 (sample size)					
				Fa14	Sp15	Fa15	Sp16	Fa16	Sp17
ENGT 401	Rubric measure of one assessment on demonstration of professional and ethical responsibilities	Every semester	At least 70% of students will achieve a score of 4 or higher on a scale of 1-5	80% (5)	50% (2)	100% (9)	86% (7)	75% (8)	82% (11)
ENGT 402	Rubric measure of one assessment on demonstration of professional and ethical responsibilities	Every semester		100% (4)	100% (4)	100% (3)	100% (7)	86% (7)	78% (9)
ENGT 441	Rubric measure of progress on and quality of the final project report	Every year		-	86% (7)	-	80% (5)	-	-
Evaluation and Actions									
Three Year Cycle: In fall 2017, the ET faculty computed the **extent of attainment of *Outcome a* as 86%**, the weighted average of all assessment results during the 3-year evaluation period. Extents of attainment of at least 70% indicate achievement of the outcome. Therefore, no required action was deemed necessary.									

Table 3.4j. Summary results for Outcome j

Knowledge of the impact of engineering technology solutions in a societal and global context

			Assessment Results Percent achieving ≥4 (sample size)					
			Fa14	**Sp15**	**Fa15**	**Sp16**	**Fa16**	**Sp17**
ENGT 360	Rubric measure of two assessments: global and societal contest in research paper 2; and societal context in final project report	Every year	67% (9)	-	80% (15)	-	82% (22)	-
ENGT 402	Rubric measure of global and societal context in final project	Every semester	75% (4)	75% (4)	100% (3)	100% (7)	100% (7)	78% (9)
ENGT 440	Rubric measure of final exam question on managers dependency on the culture	Every year	100% (2)	-	88% (8)	-	-	-
Evaluation and Actions								

Table 3.4k. Summary results for Outcome k

Commitment to quality, timeliness, and continuous improvement

Three Year Evaluation Cycle

Course	**Assessment Method**	**Frequency**	**Performance Target**	**Fa14**	**Sp15**	**Fa15**	**Sp16**	**Fa16**	**Sp17**
ENGT 303	Rubric measure of two assessments: project deadlines and quality of the final project report	Every year		-	-	-	-	79% (14)	-
ENGT 308	Rubric measure of homework question on combined stresses	Every year		-	-	-	-	83% (6)	-
ENGT 401	Rubric measure of two assessments: project deadlines and quality of the final project report	Every semester		90% (5)	60% (2)	83% (9)	86% (7)	75% (16)	77% (22)
ENGT 402	Rubric measure of two assessments: project deadlines and quality of the final project report	Every semester		75% (4)	75% (4)	100% (3)	86% (7)	86% (14)	78% (18)

Clearwater 4

entrepreneurial mindset and innovation in their curriculums. Through Dr. Brooking's initial interaction with Dr. Melton from KEEN and the College of Engineering's follow up efforts, our College of Engineering is now a member of KEEN. Dr. Brooking was also involved with the College of Engineering's involvement in VentureWell's Pathways to Innovation, where he has served as a faculty mentor to WSU students who have been selected to also participate in this innovation program. Dr. Brooking has mentored 4 of these student groups, known as University Innovation Fellows. Dr. Brooking also participated in a NSF funded I-Corp grant awarded to the BME Department, which involved Dr. Hakansson as the PI, Dr. Chris Broberg from the Center for Entrepreneurship and a BME student, Mr. Brandon Bartlett. This NSF grant allowed this team to vet and further develop a product that emanated from a Capstone Design class. Dr. Brooking's involvement in this NSF grant paved the way for him to mentor several student groups as they were awarded Shocker I-Corp funds from WSU Ventures to enhance their products, which also emanated from Capstone Design projects. As a result of Dr. Brookings vast involvement and service related to innovation within and outside WSU, he was selected as a Coleman Foundation Faculty Fellow, where he interacts with others across WSU involved in innovation as well as introducing entrepreneurship in curriculums. He also has a passion to engage students in innovation and develop the entrepreneurial mindset, as well as provide exposure to professional careers. He has committed significant effort and time to increase the number of health-related sponsors in the Capstone Design course who serve as sponsors and clinical sites for our Capstone Design students to perform their projects, as well as increase the diversity of the sponsors (e.g., dentistry, medical, veterinary, physical therapy, orthopedics, prosthetics, etc.). He has also expanded the experiences to be more real-world by now involving business and entrepreneurship students in the Capstone Design teams, as well as requiring the teams to submit their capstone projects and products to external competitions for innovation and funding, including the WSU Shocker New Venture Competition, and Shocker I-Corp. Several Capstone Design teams have won awards for their designs in these competitions.

Dr. Brooking also provides service to advising and mentoring students of all ages. He has mentored elementary and middle school students in robotics, serves as faculty advisor for the BMES student chapter, the UIF student groups, Shocker Startup, and was one of the faculty advisors for Engineers Without Borders. He also serves as a judge for many WSU activities, including the Wallace Scholarship competition, the Distinguished Scholar Invitational, the Koch Innovation Challenge, and Lego Mindstorms.

Finally, consistent with the goals of WSU, the Engineering Technology program offers a unique experiential, applied learning opportunity to its students. The faculty have also increased substantially the number of hands-on experiential learning activities in the specific Bioengineering coursework and all faculty have been through the KEEN faculty development workshop. These experiential learning activities have typically taken place in the various labs, but also occur in the classroom, may be research projects in the courses, presentations, and also include projects out in the community with community partners to address real community problems. To provide these experiential learning opportunities to the students, adequate resources are necessary to provide for equipment, supplies, teaching assistants, travel, and the cost of time to perform these valuable activities for the students.

6. Report on the Program's/certificate's goal (s) from the last review. List the goal (s), data that may have been collected to support the goal, and the outcome. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).

(For Last 3 FYs)	Goal (s)	Assessment Data Analyzed	Outcome

7. Summary and Recommendations

a.

2) Develop a new Applied Computing Program with will house the Cybersecurity track and certificates as well as develop four new applied computing certificates. The new program will be accredited by ABET CAC.
3) Bring both Engineering Technology and Applied Computing program together into one new Department
4) Increase enrollment through student focused options including transfer students