Weber State University
Biennial Report on Assessment of Student Learning

Cover Page

Department/Program: Electrical and Computer Engineering/Computer Engineering
Academic Year of Report: 2018/19 (covering Summer 2017 through Spring 2019)
Date Submitted: 10/11/19
Report author: Justin Jackson

Contact Information:
Phone: 6078
Email: justinjackson@weber.edu

A. **Brief Introductory Statement:**
Please review the Introductory Statement and contact information for your department or academic program displayed on the assessment site: **http://www.weber.edu/portfolio/departments.html** - if this information is current, please place an 'X' below. No further information is needed.

___ Information is current; no changes required.

Update if not current:

Electrical Engineering

The WSU Computer Engineering (CE) program is completing its fifth year (2019-2020) of operation. As of November 20, the program has 126 declared majors and has produced 5 graduates.
The program received its initial accreditation August 2019 by the Engineering Accreditation Commission (EAC) of ABET. ABET accredits engineering programs on a six-year cycle, so the WSU Electrical Engineering program is accredited to August 2025. A self- study report will be submitted to ABET by the July 1, 2024 deadline followed by an on-site accreditation visit sometime fall semester 2024.
Per the agreement between EAST and the Office of Institutional Effectiveness, the ABET self-study report and the ABET on-site evaluation will constitute the Computer Engineering program review.

Electrical & Computer Engineering Department Website

Contact Information:
Dr. Justin B. Jackson
justinjackson@weber.edu
Weber State University
1703 University Circle
Ogden, UT 84408-1703
(801) 626-6078

B. Mission Statement
Please review the Mission Statement for your department or academic program displayed on the assessment site: **http://www.weber.edu/portfolio/departments.html** - if the mission statement is current, please place an 'X' below.; If the information is not current, please provide an update:

__ Information is current; no changes required.

Update if not current:

The mission of the Computer Engineering Program, by adherence to the core themes of the mission of Weber State University, is to provide students a high quality undergraduate education in Computer Engineering. This education, which emphasizes engineering fundamentals bolstered by industrial applications, prepares students for professional engineering practice, advanced education and life-long learning. The program emphasizes basic computer engineering theory and practice, testing and experimentation, the use of modern engineering tools for solving problems, effective communication of technical information and participation in a team environment. The program enables students to deepen their awareness and understanding of the impact of engineering solutions in a global context and to make significant contributions to society as professional and ethical individuals.

C. Student Learning Outcomes

Please review the Student Learning Outcomes for your academic program displayed on the assessment site: **http://www.weber.edu/portfolio/departments.html**. In particular, review in light of recent strategic reporting and indicate any needed updates. If the outcomes are current, mark below.

___ Information is current; no changes required.

Update if not current:

Program Educational Objectives

The Objectives of the ECE undergraduate programs in Electrical and Computer Engineering are to educate graduates to become productive, accountable, and responsible professionals in engineering who will:

1. Apply their engineering skills, through theory and application, in industry, government, society, or in graduate school;

2. Practice high technical and ethical standards and communicate their work to colleagues, industry, and professional organizations;

3. Work effectively and contribute in interdisciplinary fields while encouraging expression and valuing diversity;

4. Understand the importance of lifelong learning and continuous professional growth in a changing world as shown through self-directed learning, specialized trainings, certifications, licensing, and graduate programs.

Student Outcomes

Student outcomes describe what students are expected to know and be able to do by the time of graduation. Graduates of the WSU Electrical and Computer Engineering Programs will have:

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 multi-disciplinary 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 context.
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.

D-1. Curriculum
"A collection of courses is not a program. A curriculum has coherence, depth, and synthesis."
(Linda Suskie; presentation at NWCCU Assessment Fellowship, June 19, 2019)

Please review the Curriculum Grid for your department or academic program displayed on the assessment site: **http://www.weber.edu/portfolio/departments.html**.

Indicate in the curriculum grid where graduating student performance is assessed for each program outcome. In the 'additional information' section, please provide information about these assessments (e.g., portfolios, presentations, projects, etc.) This information will be summarized at the college and institutional level for inclusion in our NWCCU reporting on student achievement.

Curriculum Map Format

Matrix of ECE courses and student outcomes.

	Student Outcomes										
ECE Course	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
ENGR 1000 Introduction to Engineering				M		M					
ECE 1270 Introdution to Electrical Circuits	H	M			H		M		M		H
ECE 2260 Fundamentals of Electrical Circuits	H	M			H		M		M		H
ECE 2700 Digital Circuits	H	M		M	H						H
ECE 3000 Seminar						H	H	H	H	H	
ECE 3110 Microelectronics I	H	M			H		M		M		H
ECE 3120 Microelectronics II	H	M			H		M		M		H
ECE 3210 Signals and Systems	H	M			H		M		M		H
ECE 3310 Electromagnetics I	H	M			H						H
ECE 3610 Digital Systems	H	M	M	M	H						H
ECE 3710 Embedded Systems	H	H	H	M	H		H				H
ECE 3890 Internship				H		H	H	H	H	H	H
ECE 4010 Senior Project I			H	H		H	H		H	H	
ECE 4020 Senior Project II		H	H	H		H	H		H	H	
ECE 4100 Control Systems	H	H	M		H						H
ECE 4210 Digital Signal Processing	H	M			H						H
ECE 4310 Electromagnetics II	H	M			H		M		M		H
ECE 4410 Communication Circuits and Systems	H	M	M		H		M		M		H
Blank = low applicability											
M = medium applicability											
H = high applicability											

For each course in the curriculum, a level of applicability for each student outcome was assigned. The levels of applicability are *low*, *medium* and *high*, designated by a blank, M and H, respectively, in the matrix.

At the conclusion of each semester, faculty prepare a rubric for each ECE course they taught by assigning a level of achievement to each PI for the student outcomes in the rubric. The levels of achievement are (1) unsatisfactory, (2) developing, (3) satisfactory and (4) exemplary. A recent example of a course rubric is shown below.

ELECTRONICS ENGINEERING COURSE RUBRIC								
COURSE	ECE 3710 Embedded Systems (4), 2 Sections							
SEMESTER	Spring							
YEAR	2018						S = 1 or 2: action initiated by instructor	
INSTRUCTOR	Nair						S = 3 or 4: no action initiated by instructor	
Performance Indicator (PI)	Student Outcomes	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Exemplary	Score (S)	Initiate action by instructor ?	Action to be initiated
Write a computer program in assembly language.	a, e, k	Cannot write a program that assembles.	Writes a program that assembles but does not work.	Writes a program that assembles and works but is poorly organized and documented.	Writes a program that assembles, works and is well organized and documented.	3.5	No	
Write code to handle interrupts.	a, e, k	Cannot write interrupt handlers, or interrupt handlers cause the system to crash.	Writes interrupt handlers that do not cause the system to crash.	Writes interrupt handlers that work.	Writes interrupt handlers that work and are well documented.	3	No	
Debug a computer program using both hardware and software tools.	a, e, k	Debugs computer programs using trial and error.	Debugs computer programs using an interactive debugger only.	Debugs computer programs using an interactive debugger and basic laboratory equipment.	Debugs computer programs using an interactive debugger and a logic analyzer.	2.5	Yes	Students were required to use an oscilloscope to verify their measurements in only 2 labs, and so they used it only then. Apart from that, they were relying only on the debugger. In future, lab equipments for debugging should be introduced in one of the earlier labs, and used more often to make it a habit.
Interface peripherals to a microcontroller or microprocessor using a bus.	a, e, k	Cannot interface peripherals to a microcontroller or microprocessor.	Interfaces peripherals using I/O ports only.	Interfaces one peripheral using a bus.	Interfaces multiple peripherals using a bus.	3	No	
Document the hardware and software of an embedded systems design.	c, g	Cannot document a design using an acceptable format.	Uses an acceptable format to document a design but leaves out important aspects.	Uses an acceptable format to document all the important aspects of a design.	Uses an acceptable format to document a design completely, clearly and concisely.	3.5	No	
Design a test plan and use it to verify that a system satisfies its requirements and constraints.	b	Can only perform tests on an ad hoc basis.	Designs a test plan but fails to verify the system satisfies the requirements or constraints.	Designs a suitable test plan and verifies that the requirements and constraints are satisfied.	Designs a suitable test plan and documents the requirements and constraints verified by each test.	2	Yes	Students do verify that their system works and requirements are met, but their test plan is mostly vague and not reproducible. Test plans were only briefly mentioned in this class. In future, they need to be emphasised and covered in detail in the class.
					Average Score for Course =	2.9		
					(Transfer this number to course continuous improvement record)			

Additional Information (details about graduating student assessment):

D-2. High Impact Educational Experiences in the Curriculum

In response to the recent USHE requirement that all students have at least 1 HIEE in the first 30 credit hours and 1 HIEE in the major or minor we are asking programs to map HIEEs to curriculum using a traditional curriculum grid. This helps demonstrate how and where these goals are accomplished.

	Department/Program use of High Impact Educational Experiences							
Courses	HIEE 1	HIEE 2	HIEE 3	HIEE 4	Etc…			
ECE 2700	Team Based Learning	Project Based Learning						
ECE 3890	Internship							
ECE 3000	Undergraduate Research	Pre-professional/Career Development Experiences						

Courses	Department/Program use of High Impact Educational Experiences							
	HIEE 1	HIEE 2	HIEE 3	HIEE 4	Etc…			
ECE 4010	Capstone Course	Team Based Learning	Undergraduate Research					
ECE 4020	Capstone Course	Team Based Learning	Undergraduate Research					

HIEEs include capstone courses or experiences, community-engaged learning, evidence-based teaching practices, internships, project-based learning, study abroad/away, supplemental instruction, team-based learning, undergraduate research, pre-professional/career development experiences.

E. Assessment Plan

Please update the Assessment Plan for your department displayed on the assessment site: http://www.weber.edu/portfolio/departments.html. Keep in mind that reporting will be done biennially instead of annually; that should be reflected in your assessment plan. Please ensure that Gen Ed courses are assessed/reported at least twice during a standard program review cycle.

A complete plan will include a list of courses from which data will be gathered and the schedule, as well as an overview of the assessment strategy the department is using (for example, portfolios, or a combination of Chi assessment data and student survey information, or industry certification exams, etc.), and plans for continuous improvement.

Assessment plan:

Course Rubrics

When the EE program was first established in 2010, the faculty spent a great deal of effort defining a matrix of courses and student outcomes. For each course in the curriculum, a level of applicability for each student outcome was assigned. The levels of applicability are *low*, *medium* and *high*, designated by a blank, M and H, respectively, in the matrix. The table below is the matrix of courses and student outcomes. Only the student outcomes that ranked *high* in the matrix were assigned a performance indicator (PI) in the course rubric. Levels of applicability were assigned to courses outside the CE program as well, but none of them ranked higher than *medium*, so they were not connected to a PI and are therefore not shown in the table.

Matrix of ECE courses and student outcomes.

	Student Outcomes										
ECE Course	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
ENGR 1000 Introduction to Engineering				M		M					
ECE 1270 Introdution to Electrical Circuits	H	M			H		M		M		H
ECE 2260 Fundamentals of Electrical Circuits	H	M			H		M		M		H
ECE 2700 Digital Circuits	H	M		M	H						H
ECE 3000 Seminar						H	H	H	H	H	
ECE 3110 Microelectronics I	H	M			H		M		M		H
ECE 3120 Microelectronics II	H	M			H		M		M		H
ECE 3210 Signals and Systems	H	M			H		M		M		H
ECE 3310 Electromagnetics I	H	M			H						H
ECE 3610 Digital Systems	H	M	M	M	H						H
ECE 3710 Embedded Systems	H	H	H	M	H		H				H
ECE 3890 Internship				H		H	H	H	H	H	H
ECE 4010 Senior Project I			H	H		H	H		H	H	
ECE 4020 Senior Project II		H	H	H		H	H		H	H	
ECE 4100 Control Systems	H	H	M		H						H
ECE 4210 Digital Signal Processing	H	M			H						H
ECE 4310 Electromagnetics II	H	M			H		M		M		H
ECE 4410 Communication Circuits and Systems	H	M	M		H		M		M		H
Blank = low applicability											
M = medium applicability											
H = high applicability											

At the conclusion of each semester, faculty prepare a rubric for each ECE course they taught by assigning a level of achievement to each PI for the student outcomes in the rubric. The levels of achievement are (1) unsatisfactory, (2) developing, (3) satisfactory and (4) exemplary. A recent example of a course rubric is shown below.

Course rubric example for ECE 3710 Embedded Systems.

ELECTRONICS ENGINEERING COURSE RUBRIC

COURSE	ECE 3710 Embedded Systems (4), 2 Sections	
SEMESTER	Spring	
YEAR	2018	S = 1 or 2: action initiated by instructor
INSTRUCTOR	Nair	S = 3 or 4: no action initiated by instructor

Performance Indicator (PI)	Student Outcomes	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Exemplary	Score (S)	Initiate action by instructor ?	Action to be initiated
Write a computer program in assembly language.	a, e, k	Cannot write a program that assembles.	Writes a program that assembles but does not work.	Writes a program that assembles and works but is poorly organized and documented.	Writes a program that assembles, works and is well organized and documented.	**3.5**	No	
Write code to handle interrupts.	a, e, k	Cannot write interrupt handlers, or interrupt handlers cause the system to crash.	Writes interrupt handlers that do not cause the system to crash.	Writes interrupt handlers that work.	Writes interrupt handlers that work and are well documented.	**3**	No	
Debug a computer program using both hardware and software tools.	a, e, k	Debugs computer programs using trial and error.	Debugs computer programs using an interactive debugger only.	Debugs computer programs using an interactive debugger and basic laboratory equipment.	Debugs computer programs using an interactive debugger and a logic analyzer.	**2.5**	Yes	Students were required to use an oscilloscope to verify their measurements in only 2 labs, and so they used it only then. Apart from that, they were relying only on the debugger. In future, lab equipments for debugging should be introduced in one of the earlier labs, and used more often to make it a habit.
Interface peripherals to a microcontroller or microprocessor using a bus.	a, e, k	Cannot interface peripherals to a microcontroller or microprocessor.	Interfaces peripherals using I/O ports only.	Interfaces one peripheral using a bus.	Interfaces multiple peripherals using a bus.	**3**	No	
Document the hardware and software of an embedded systems design.	c, g	Cannot document a design using an acceptable format.	Uses an acceptable format to document a design but leaves out important aspects.	Uses an acceptable format to document all the important aspects of a design.	Uses an acceptable format to document a design completely, clearly and concisely.	**3.5**	No	
Design a test plan and use it to verify that a system satisfies its requirements and costraints.	b	Can only perform tests on an ad hoc basis.	Designs a test plan but fails to verify the system satisfies the requirements or constraints.	Designs a suitable test plan and verifies that the requirements and constraints are satisfied.	Designs a suitable test plan and documents the requirements and constraints verified by each test.	**2**	Yes	Students do verify that their system works and requirements are met, but their test plan is mostly vague and not reproducible. Test plans were only briefly mentioned in this class. In future, they need to be emphasised and covered in detail in the class.
					Average Score for Course =	**2.9**		
					(Transfer this number to course continuous improvement record)			

The continuous improvement process for courses occurs on two levels--the course level and the program level. At the course level, the instructor makes independent improvements to the course. When the score, S, for a given PI is 3 or greater, no action is taken by the instructor to improve the course. When S falls below 3, the instructor identifies corrective actions to implement the next time that he/she teaches the course.

At the program level, the instructor, with input from department faculty, makes improvements to the course. If the mean score for a given course is 2.67 or greater, no action is taken to improve the course, but a mean score of less than 2.67 suggests deficiencies in the course that require discussion and correction by the instructor and/or program faculty. For the rubric shown, action is to be initiated by the instructor for two PIs, but no program level action is required. Prior to fall semester 2014, the program-level triggered point was increased from 2.0 to 2.67 because the faculty felt that the threshold for triggering improvements at the program level as too low.

F. Report of assessment results for the most previous academic year:

There are varieties of ways in which departments can choose to show evidence of learning. This is one example. The critical pieces to include are 1) learning outcome being assessed, 2) method(s) of measurement used, 3) threshold for 'acceptable – that is, the target performance, 4) actual results of the assessment, 5) interpretation/reflection on findings 6) the course of action to be taken based upon the interpretation, and 7) how that action will be evaluated.

A. Evidence of Learning: Courses within the Major

We have been using course rubrics as a student outcome assessment instrument since fall semester 2011. Since that time, the course-level threshold has been triggered 50 times. With the exception of ECE 3120 and ECE 4410, all ECE courses have been triggered at least once. When a course-level trigger occurs, it is the responsibility of the

faculty member to initiate action and implement improvement in that particular course. The table below summarizes the courses for which the rubrics have been triggered and improved at the course level.
ECE 3000 Seminar has been triggered seven times at the course level and one time at the program level. This course, unlike most of the other courses in the program, is devoted largely to the "soft" skills such as communication, professionalism, ethics, etc. Consequently, ECE 3000 is often the most challenging course to assess. The corrective actions for ECE 3000 summarized below are indicative of the improvements that faculty have made over the past several years in this course.

Course rubric triggers and resulting corrective actions at the course level.

Year/Sem	Course	Performance Indicator (PI)	Outcomes	
2017/Fall	ECE 3000	Explain the role of general education as it pertains to engineering.	h, i, j	There was no significant assignment or discussion on this topic. Need to include an assignment or discussion session in the seminar class to cover the importance of general education for engineers.
2017/Fall	ECE 3210	Program simple scripts and functions in MATLAB.	k	Emphasize independent MATLAB script writing earlier in the semester.
2018/Spring	ECE 3710	Debug a computer program using both hardware and software tools.	a, e, k	Students were required to use an oscilloscope to verify their measurements in only 2 labs, so they used it only then. Apart from that, they were relying only on the debugger. In future, lab equipment for debugging should be introduced in one of the earlier labs and used more often to make it a habit.
2018/Spring	ECE 3710	Design a test plan and use it to verify that a system satisfies its requirements and constraints.	b	Students do verify that their system works and requirements are met, but their test plan is mostly vague and not reproducible. Test plans were only briefly mentioned in this class. In future, they need to be emphasized and covered in detail in the class.
2018/Spring	ECE 4210	Demonstrate knowledge of Linear Prediction and Optimum Linear filters	a, e, k	Future course schedule will continue to reduce review material (LTI and Impulse response) and IIR filter implementation exercises.

The graduate survey is an eleven-question survey instrument administered to seniors at graduation. Each question asks graduates to indicate the degree to which the student learning outcome was achieved in their program. The responses are given on the following five-point Likert scale: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree. The trigger point was set by faculty at 3.5. This instrument has been administered to graduating seniors since fall semester 2014. The table below is a summary of the graduate survey results. Numbers in the table are mean values for the graduating cohort. The survey also asks the graduate to provide feedback on the strengths and weaknesses of the ECE programs. The survey in its entirety is given in the Optional Appendices section of this report.

Graduate survey results. Student Outcome

Year/Sem	a	b	c	d	e	f	g	h	i	j	k
2014/Fall	4.9	5.0	5.0	5.0	5.0	4.9	4.9	4.9	4.9	4.9	5.0
2015/Spring	4.8	4.8	4.4	4.4	4.6	4.4	4.3	4.2	4.6	3.8	4.3
2015/Fall	4.6	4.6	4.6	4.6	4.7	4.9	4.4	4.6	4.7	4.1	4.4
2016/Spring	4.8	5.0	4.3	4.8	5.0	5.0	4.3	4.3	5.0	4.3	4.8
2016/Fall	4.6	4.5	4.4	4.3	4.7	4.8	4.6	4.3	4.8	4.2	4.6
2017/Spring	4.8	4.8	4.5	4.2	4.7	4.8	4.2	4.5	4.5	4.4	4.7

2017/Fall	5.0	4.8	4.5	4.5	4.8	4.8	4.5	4.5	4.8	4.3	4.8
2018/Spring	4.9	5.0	4.6	4.4	4.9	4.3	4.3	4.1	4.3	4.0	4.6

The Traceable Progress System (TPS) is used to initiate and document course-level and program-level improvements initiated by the department faculty. The use of the course-level TPS may be triggered by a low PI in a course rubric or by a reason that lies outside the formal quantitative process. The use of the program-level TPS is for the addition of new courses, deletion of existing courses, and other curricular changes. The Traceable Progress System was added to our continuous improvement efforts to facilitate improvements that may lie outside the regular assessment process. Below is a summary of course-level and program-level improvements for which the TPS has been used.

Traceable Progress System course-level improvements.

Yr/Sem	Course	Action Plan	Implementation
2017/Spring	ECE 3710	PI “debug a computer program” scored a 2 in rubric.	Students are now required to use an O-scope to collect a waveform to debug a program.
2017/Spring	ECE 3890	PI “stay abreast of contemporary issues” scored a 2 in rubric.	Students were assigned to observe how the company stays abreast of contemporary issues.
2017/Fall	ECE 3210	Signals and Systems is a very challenging topic. Students were struggling, so instructor wanted to make a major change to help students.	A set of lecture notes with incorporated exercises were disseminated to students in advance. Lecture time was devoted to working on problems.
2018/Spring	ECE 4210	Set up access to Linux lab to use MATLAB for creating Digital Signal Processing exercises.	Student comments suggested that change was useful. They can now use MATLAB to learn DSP concepts.

Traceable Progress System program-level improvements.

Yr/Sem	Action Plan	Implementation
2018/Fall	With the removal of computer literacy from the university requirements, additional credit hours will be available in the program.	The additional credit hours will be used to add two electives to the program, increasing the total credit hours for electives from six to twelve. Will take affect fall 2018.
2018/Fall	Students do not understand how to manage a project in their ECE 4010 and 4020 courses. A one credit hour course in project management will be added to the program.	ECE 3090 Project Management will be taught starting fall 2018. A resulting reduction in one credit hour to ECE 3890 Internship.
2018/Fall	ECE 5510 Power Systems is not taught at the appropriate senior/graduate level. Change the course number to ECE 3510.	ECE 5510 Power Systems was moved to ECE 3510 Power Systems because it is more appropriate as a junior level course. Require students to take either ECE 3510 or ECE 3610 Digital Systems, and make ECE 5510 an elective. Will take affect fall 2018.

Over a year ago, engineering faculty decided that we needed an instrument to directly and globally assess the technical knowledge of our senior students. We discussed using the Fundamentals of Engineering (FE) examination administered by the National Council of Examiners for Engineering and Surveying (NCEES). However, we did not want to be constrained by the lack of detailed score reporting, cost, and timing of the FE examination, so we designed an internal exam that resembles the FE exam. Questions similar or identical to those in old FE review manuals were chosen to build the exam.

The exam covers the following 15 topics:
Circuits
Electromagnetics
Power
Computers
Electronics
Probability
Controls
Ethics
Properties
Digital
Mathematics
Signals
Economics
Mechanics
Software

The exam consists of six questions for each topic for a total of 90 questions. To avoid giving a single long exam, we split the exam into two equal parts by giving students 45 questions in ECE 4010 Senior Project I and 45 questions in

ECE 4020 Senior Project II. The exam was administered to students for the first time during the 2017-2018 academic year. The table below is a summary of the mean scores.
Now that we have one year of exam data, the plan for fall 2018 is to devote a faculty meeting to a discussion of the efficacy of the exam and the interpretation of the results.

Senior assessment exam results (mean scores in percent)

	Fall 2017		Spring 2018	
Topic	ECE 4010	ECE 4020	ECE 4010	ECE 4020
1. Circuits	51.5	35.3	43.8	26.2
2. Computers	57.6	64.7	54.2	66.7
3. Controls	66.7	43.1	22.9	54.8
4. Digital	63.6	51.0	56.3	66.7
5. Economics	45.5	60.8	45.8	42.9
6. Electromagnetics	60.6	54.9	50.0	59.5
7. Electronics	39.4	45.1	54.2	52.4
8. Ethics	54.6	66.7	45.8	61.9
9. Mathematics	100.0	70.6	89.6	76.2
10. Mechanics	45.5	39.2	29.2	28.6
11. Power	39.4	35.3	37.5	26.2
12. Probability	60.6	39.2	56.3	28.6
13. Properties	57.6	31.4	58.3	38.1
14. Signals	27.3	23.5	37.5	16.7
15. Software	63.6	58.8	72.9	42.9

Appendix A

Most departments or programs receive a number of recommendations from their Five/Seven-Year Program Review processes. This page provides a means of updating progress towards the recommendations the department/program is acting upon.

Date of Program Review: ####	Recommendation	Progress Description
Recommendation 1	Text of recommendation	#### +1 progress
		#### +2 progress
		#### +3 progress
		#### +4 progress
Recommendation 2	Text of recommendation	#### +1 progress
		#### +2 progress
		#### +3 progress
		#### +4 progress
Recommendation 3	Text of recommendation	#### +1 progress
		#### +2 progress
		#### +3 progress
		#### +4 progress
(add as needed)		

Additional narrative:

Appendix B

Please provide the following information about the full-time and adjunct faculty contracted by your department during the last academic year (summer through spring). Gathering this information each year will help with the headcount reporting that must be done for the final Five Year Program Review document that is shared with the State Board of Regents.

Faculty Headcount	2017-18	2018-19
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)	7	6
Full-time Tenured	4	4
Full-time Non-Tenured (includes tenure-track)	3	2
Part-time and adjunct	3	3
With Master's Degrees		
Full-time Tenured		
Full-time Non-Tenured		
Part-time and adjunct		
With Bachelor's Degrees		
Full-time Tenured		
Full-time Non-tenured		
Part-time and adjunct		
Other		
Full-time Tenured		
Full-time Non-tenured		
Part-time		
Total Headcount Faculty		
Full-time Tenured		
Full-time Non-tenured		
Part-time		

Appendix C – alternative format for Evidence of Learning Reporting

Course:

Program Outcome 1	
Aligned Course Outcome(s):	
Method(s) of measurement:	
Target Performance:	
Actual Performance:	
Interpretation/Reflection on findings:	
Action Plan/Use of Results:	
Intended evaluation of plan (closing the loop):	

Please respond to the following questions.

1) First year student success is critical to WSU's retention and graduation efforts. We are interested in finding out how departments support their first-year students. Do you have mechanisms and processes in place to identify, meet with, and support first-year students? Please provide a brief narrative focusing on your program's support of new students:
    a. Any first-year students taking courses in your program(s).

    b. Students declared in your program(s), whether or not they are taking courses in your program(s)

2) A key component of sound assessment practice is the process of 'closing the loop' – that is, following up on changes implemented as a response to your assessment findings, to determine the impact of those changes/innovations. It is also an aspect of assessment on which we need to improve, as suggested in our NWCCU mid-cycle report. Please describe the processes your program has in place to 'close the loop'.

Glossary

Student Learning Outcomes/Measurable Learning Outcomes

The terms 'learning outcome', 'learning objective', 'learning competency', and 'learning goal' are often used interchangeably. Broadly, these terms reference what we want students to be able to do AFTER they pass a course or graduate from a program. For this document, we will use the word 'outcomes'. Good learning outcomes are specific (but not too specific), are observable, and are clear. Good learning outcomes focus on skills: knowledge and understanding; transferrable skills; habits of mind; career skills; attitudes and values.

- Should be developed using action words (if you can see it, you can assess it).
- Use compound statements judiciously.
- Use complex statements judiciously.

Curriculum Grid

A chart identifying the key learning outcomes addressed in each of the curriculum's key elements or learning experiences (Suskie, 2019). A good curriculum:

- Gives students ample, diverse opportunities to achieve core learning outcomes.
- Has appropriate, progressive rigor.
- Concludes with an integrative, synthesizing capstone experience.
- Is focused and simple.
- Uses research-informed strategies to help students learn and succeed.
- Is consistent across venues and modalities.
- Is greater than the sum of its parts.

Target Performance (previously referred to as 'Threshold')

The level of performance at which students are doing well enough to succeed in later studies (e.g., next course in sequence or next level of course) or career.

Actual Performance

How students performed on the specific assessment. An average score is less meaningful than a distribution of scores (for example, 72% of students met or exceeded the target performance, 5% of students failed the assessment).

Closing the Loop

The process of following up on changes made to curriculum, pedagogy, materials, etc., to determine if the changes had the desired impact.

<u>Continuous Improvement</u>
An idea with roots in manufacturing, that promotes the ongoing effort to improve. Continuous improvement uses data and evidence to improve student learning and drive student success.

<u>Direct evidence</u>
Evidence based upon actual student work; performance on a test, a presentation, or a research paper, for example. Direct evidence is tangible, visible, and measurable.

<u>Indirect evidence</u>
Evidence that serves as a proxy for student learning. May include student opinion/perception of learning, course grades, measures of satisfaction, participation. Works well as a complement to direct evidence.

<u>HIEE – High Impact Educational Experiences</u>
Promote student learning through curricular and co-curricular activities that are intentionally designed to foster active and integrative student engagement by utilizing multiple impact strategies.