WICHITA STATE UNIVERSITY

Program Review Self-Study Template

Academic unit: Electrical Engineering and Computer Science

College: Engineering

Date of last review 2012

Date of last accreditation report (if relevant) 2013

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

Degree: BS Electrical Engineering CIP* code:14.1099

Degree: BS Computer Engineering CIP code:14.0901

Degree: BS Computer Science CIP code:11.0701

Degree: MS Electrical Engineering CIP code: 14.1099

Degree: MS Computer Networking CIP code: 11.0901

Degree: MS Computer Science CIP code: 11.0701

Degree: PhD Electrical Engineering and Computer Science CIP code: 14.1099

*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

Visvakumar Aravinthan, Assistant Professor

Abu Asaduzzaman, Assistant Professor

Rajiv Bagai, Associate Professor and PhD Graduate Coordinator

Animesh Chakravarthy, Assistant Professor

Zheng Cheng, Assistant Professor

Yanwu Ding, Associate Professor and Graduate Coordinator (Electrical Engineering)

Ali Eslami, Assistant Professor

Kiyun Han, Engineering Educator

Murtuza Jadliwala, Assistant Professor

Ward Jewell, Professor _____

Huzefa Kagdi, Assistant Professor _____

Preethika Kumar, Associate Professor and Undergraduate Coordinator (Senior Checks) _____

Hyuck Kwon, Professor _____

Karen Milberger, Engineering Educator _____

Vinod Namboodiri, Associate Professor and Graduate Coordinator (Computer Science and Computer Networking) _____

Chengzong Pang, Assistant Professor _____

Prakash Ramanan, Professor _____

Sergio Salinas, Assistant Professor _____

Kaushik Sinha, Assistant Professor _____

Steven Skinner, Professor and Associate Dean _____

Yi Song, Assistant Professor _____

Perlekar Tamtam, Engineering Educator _____

Pu Wang, Assistant Professor _____

John Watkins, Professor and Chair _____

Submitted by: John Watkins, Professor and Chair _____ Date _____
(name and title)

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:

The mission of Wichita State University is to be an essential educational, cultural, and economic driver for Kansas and the greater public good.

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

The mission of the BS in Electrical Engineering program is to provide students with a strong foundation in the traditional and contemporary areas of electrical engineering so that they can conceive and solve technological problems in society. Social and humanistic issues are also emphasized in the general education component of the program to provide breadth in education. The program provides graduates with the knowledge, aptitudes, and attitudes which prepare them for corporate and governmental entry level jobs or to pursue further education at the graduate level.

The mission of the BS in Computer Engineering program is to provide students with a strong foundation in the traditional and contemporary areas of computer engineering so that they can conceive and solve technological problems in society. Social and humanistic issues are also emphasized in the general education component of the program to provide breadth in education. The program provides graduates with the knowledge, aptitudes, and attitudes which prepare them for corporate and governmental entry level jobs or to pursue further education at the graduate level.

The mission of the BS in Computer Science program is to provide students with a strong foundation in the traditional and contemporary areas of computer science so that they can conceive and solve technological problems in society. Social and humanistic issues are also emphasized in the general education component of the program to provide breadth in education. The program provides graduates with the knowledge, aptitudes, and attitudes which prepare them for corporate and governmental entry level jobs or to pursue further education at the graduate level.

The mission of the MS in Computer Science program is to provide students with a strong foundation in the traditional and contemporary areas of Computer Science, and to enable students to synthesize, interpret, and apply research and other forms of knowledge for the advancement of the discipline.

The mission of the MS in Computer Networking program is to provide students with a strong foundation in the traditional and contemporary areas of Computer Networking, and to enable students to

synthesize, interpret, and apply research and other forms of knowledge for the advancement of the discipline.

The mission of the MS in Electrical Engineering program is to provide students with a strong foundation in the traditional and contemporary areas of Electrical Engineering, and to enable students to synthesize, interpret, and apply research and other forms of knowledge for the advancement of the discipline.

The mission of the PhD in Electrical Engineering and Computer Science program is to provide students with a strong foundation in the traditional and contemporary areas of Electrical Engineering, Computer Engineering and Computer Science, and to enable students to synthesize, interpret, and apply research and other forms of knowledge for the advancement of the discipline.

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

The roles of the BS in Electrical Engineering program are as follows:

Role 1

The alumni, in the first several years after receiving their baccalaureate degree, will be productive and successful in the professional practice of electrical engineering, as evidenced by:

a. Job satisfaction and contributions towards the success of one's employers
b. Effective participation and leadership on engineering teams
c. Identifying and solving real-world problems
d. Managing increased and varied responsibilities
e. Job-related awards, promotions/raises, and professional accomplishments (e.g., patents, inventions)

Role 2

The alumni, in the first several years after receiving their baccalaureate degree, will be successful in pursuing continuing education, as evidenced by:

a. Effective progression towards an advanced post-undergraduate degree or professional licensure/certification
b. Participation in professional societies, professional conferences, and meetings
c. Participation in lifelong learning by adapting to new technologies, tools and methodologies in electrical engineering, and responding to the challenges of a changing environment
d. Scholarly accomplishments (e.g., publications, presentations)
e. Professional self-study

The roles of the BS in Computer Engineering program are as follows:

Role 1

The alumni, in the first several years after receiving their baccalaureate degree, will be productive and successful in the professional practice of computer engineering, as evidenced by:

a. Job satisfaction and contributions towards the success of one's employers
b. Effective participation and leadership on engineering teams
c. Identifying and solving real-world problems
d. Managing increased and varied responsibilities
e. Job-related awards, promotions/raises, and professional accomplishments (e.g., patents, inventions)

Role 2
The alumni, in the first several years after receiving their baccalaureate degree, will be successful in pursuing continuing education, as evidenced by:
a. Effective progression towards an advanced post-undergraduate degree or professional licensure/certification
b. Participation in professional societies, professional conferences, and meetings
c. Participation in lifelong learning by adapting to new technologies, tools and methodologies in computer engineering, and responding to the challenges of a changing environment
d. Scholarly accomplishments (e.g., publications, presentations)
e. Professional self-study

The roles of the BS in Computer Science program are as follows:

Role 1
The alumni, in the first several years after receiving their baccalaureate degree, will be productive and successful in the professional practice of computing, as evidenced by:
a. Job satisfaction and contributions towards the success of one's employers
b. Effective participation and leadership on computing/engineering teams
c. Identifying and solving real-world problems
d. Managing increased and varied responsibilities
e. Job-related awards, promotions/raises, and professional accomplishments (e.g., patents, inventions)

Role 2
The alumni, in the first several years after receiving their baccalaureate degree, will be successful in pursuing continuing education, as evidenced by:
a. Effective progression towards an advanced post-undergraduate degree or professional certification
b. Participation in professional societies, professional conferences, and meetings
c. Participation in lifelong learning by adapting to new technologies, tools and methodologies in computing, and responding to the challenges of a changing environment
d. Scholarly accomplishments (e.g., publications, presentations)
e. Professional self-study

The role of the MS in Computer Science program is to prepare students for advanced careers in computer science and related fields, as well as further graduate study.

The role of the MS in Computer Networking program is to prepare students for advanced careers in computer networking and related fields, as well as further graduate study.

The role of the MS in Electrical Engineering program is to prepare students for advanced careers in electrical engineering and related fields, as well as further graduate study.

The role of the PhD in Electrical Engineering and Computer Science program is to prepare students for the highest-level careers in electrical engineering, computer engineering or computer science in academia, research and industry.

All the programs directly support Wichita State University's mission to be an essential education and economic driver for Kansas and the greater public good. Our programs do this by requiring students to apply their skill sets in practical or real world contexts.

d. Has the mission of the Program(s) changed since last review? ☒ Yes ☐ No
   i. If yes, describe in 1-2 concise paragraphs. If no, is there a need to change?

   While the missions of most of the programs has remained essentially the same, the mission of our PhD program was expanding from a PhD in Electrical Engineering to a PhD in Electrical Engineering and Computer Science. The original PhD program was developed many years ago when the department only offered degrees in electrical engineering. The expanded degree program much better serves the students and faculty of our current Electrical Engineering and Computer Science department.

e. Provide an overall description of your program (s) including a list of the measurable goals and objectives of the program (s) (both programmatic and learner centered). Have they changed since the last review? ☒ Yes ☐ No

   If yes, describe the changes in a concise manner.

   The BS in Electrical Engineering program offers electives in communications and signal processing, control systems, digital systems, electric power systems, and electronics. Students in their senior year work in teams on a two-semester real world project under the supervision of a faculty member. These projects are conducted in such a manner as to prepare students for a professional career with an emphasis on those skills required of engineering professionals. The demand for electrical engineering graduates continues to increase. The electrical engineering graduate is qualified for entry positions in a large number of industries and governmental organizations as a result of the graduate’s broad technical background. An electrical engineering degree opens the door to a satisfying and rewarding career.

Electrical engineering graduates have the potential to shape the future of society through creative problem solving, design, innovation, and discovery.

The Program Educational Objectives (PEO) of the BS in Electrical Engineering program are as follows:

PEO 1

The alumni, in the first several years after receiving their baccalaureate degree, will be productive and successful in the professional practice of electrical engineering, as evidenced by:

a. Job satisfaction and contributions towards the success of one's employers
b. Effective participation and leadership on engineering teams
c. Identifying and solving real-world problems
d. Managing increased and varied responsibilities
e. Job-related awards, promotions/raises, and professional accomplishments (e.g., patents, inventions)

PEO 2

The alumni, in the first several years after receiving their baccalaureate degree, will be successful in pursuing continuing education, as evidenced by:

a. Effective progression towards an advanced post-undergraduate degree or professional licensure/certification
b. Participation in professional societies, professional conferences, and meetings
c. Participation in lifelong learning by adapting to new technologies, tools and methodologies in electrical engineering, and responding to the challenges of a changing environment
d. Scholarly accomplishments (e.g., publications, presentations)
e. Professional self-study

The BS in Computer Engineering program allows students to take a broad array of electives or concentrate their electives in hardware related courses, software related courses, computer networking courses or courses from the electrical engineering area. In their senior year, they will work in teams on a two-semester real world project under the supervision of a faculty member. These projects are conducted in such a manner as to prepare students for a professional career with an emphasis on those skills required of engineering professionals. The demand for computer engineering graduates continues to increase. The computer engineering graduate is qualified for entry positions in a large number of industries and governmental organizations as a result of the graduate's broad technical background. A computer engineering degree opens the door to a satisfying and rewarding career. Computer engineering graduates have the potential to shape the future of society through creative problem solving, design, innovation, and discovery.

The Program Educational Objectives of the BS in Computer Engineering program are as follows:

PEO 1

The alumni, in the first several years after receiving their baccalaureate degree, will be productive and successful in the professional practice of computer engineering, as evidenced by:

a. Job satisfaction and contributions towards the success of one's employers
b. Effective participation and leadership on engineering teams
c. Identifying and solving real-world problems
d. Managing increased and varied responsibilities
e. Job-related awards, promotions/raises, and professional accomplishments (e.g., patents, inventions)

PEO 2
The alumni, in the first several years after receiving their baccalaureate degree, will be successful in pursuing continuing education, as evidenced by:
a. Effective progression towards an advanced post-undergraduate degree or professional licensure/certification
b. Participation in professional societies, professional conferences, and meetings
c. Participation in lifelong learning by adapting to new technologies, tools and methodologies in computer engineering, and responding to the challenges of a changing environment
d. Scholarly accomplishments (e.g., publications, presentations)
e. Professional self-study

The professional organization of computer scientists defines computer science as "the systematic study of algorithmic processes that describe and transform information – their theory, analysis, design, efficiency implementation, and application." Underlying all computing is discovering what can be automated and how the automation is best accomplished. The BS in Computer Science program allows students to take a broad array of technical electives in computer science, computer engineering, and computer networking. In their senior year, they will work in teams on a two-semester real world project under the supervision of a faculty member. These projects are conducted in such a manner as to prepare the student for a professional career with an emphasis on those skills required of computer science professionals. Opportunities for computer science graduates are abundant in our modern, technologically based society. The computer science graduate is qualified for many entry positions in business, industry, education, and government as a result of the graduate's broad technical background. A computer science degree opens the door to a satisfying and rewarding career. Computer science graduates have the potential to shape the future of society through creative problem solving, design, innovation, and discovery

The Program Educational Objectives of the BS in Computer Science program are as follows:
PEO 1
The alumni, in the first several years after receiving their baccalaureate degree, will be productive and successful in the professional practice of computing, as evidenced by:
a. Job satisfaction and contributions towards the success of one's employers
b. Effective participation and leadership on computing/engineering teams
c. Identifying and solving real-world problems
d. Managing increased and varied responsibilities

e. Job-related awards, promotions/raises, and professional accomplishments (e.g., patents, inventions)

PEO 2

The alumni, in the first several years after receiving their baccalaureate degree, will be successful in pursuing continuing education, as evidenced by:

a. Effective progression towards an advanced post-undergraduate degree or professional certification

b. Participation in professional societies, professional conferences, and meetings

c. Participation in lifelong learning by adapting to new technologies, tools and methodologies in computing, and responding to the challenges of a changing environment

d. Scholarly accomplishments (e.g., publications, presentations)

e. Professional self-study

The MS in Computer Science (MSCS) program prepares graduate students for career-oriented jobs or gaining admission into PhD programs around the world. Its curriculum is designed to ensure that students can study traditional areas of computer science as well as modern research trends in courses taught by active researchers having national and international recognition. The department has state-of-the-art laboratories for use by its students, who are also actively sought after by local companies through the university's Cooperative Education opportunity. This provides students with invaluable job experience, financial assistance, and contacts for potential full-time jobs after graduation.

The MSCS degree requires the satisfactory completion of a Plan of Study, which must be filed within the first 12 credit hours of graduate course work. The plan of study must be approved by the student's advisor and the MSCS graduate coordinator. Three options are available: (1) the thesis option requires a minimum of 24 hours of course work plus a minimum of 6 hours of thesis, (2) the directed project option requires a minimum of 30 hours of course work plus a minimum of 3 hours of directed project, and (3) the course work option requires a minimum of 36 hours of course work. Each plan of study must contain CS721 Algorithms, at least 12 credit hours of major courses numbered 800 or higher, and at least 3 credit hours of major courses with a research writing and presentation component. Up to 12 credit hours of elective courses, i.e. courses other than the major courses, may be taken by an MSCS student. Of these 12 hours of electives, at most 6 hours may be from outside the EECS department. At least 60% of all credit hours on this plan that are from WSU need to be courses numbered 700 or higher.

The objectives of the MS in Computer Science program are to prepare students for

1. advanced careers in computer science and related fields
2. further graduate study.

The MS in Computer Networking (MSCN) program prepares graduate students for career-oriented jobs in the rapidly-growing computer networking industry, or gaining admission into PhD programs around the world. Its curriculum is designed to ensure that students can study theoretical foundations of

computer networking as well as modern research trends in courses taught by active researchers having national and international recognition. The department has state-of-the-art laboratories for use by its students, who are also actively sought after by local companies through the university's Cooperative Education opportunity. This provides students with invaluable job experience, financial assistance, and contacts for potential full-time jobs after graduation.

The MSCS degree requires the satisfactory completion of a Plan of Study, which must be filed within the first 12 credit hours of graduate course work. The plan of study must be approved by the student's advisor and the MSCN graduate coordinator. Three options are available: (1) the thesis option requires a minimum of 24 hours of course work plus a minimum of 6 hours of thesis, (2) the directed project option requires a minimum of 30 hours of course work plus a minimum of 3 hours of directed project, and (3) the course work option requires a minimum of 36 hours of course work. Each plan of study must contain CS736, at least one of CS721 Algorithms and CS797G Mathematical Foundations of Computer Networking, at least 12 credit hours of major courses numbered 800 or higher, and at least 3 credit hours of major courses with a research writing and presentation component. Up to 12 credit hours of elective courses, i.e. courses other than the major courses, may be taken by an MSCN student. Of these 12 hours of electives, at most 6 hours may be from outside the EECS department. At least 60% of all credit hours on this plan that are from WSU need to be courses numbered 700 or higher.

The objectives of the MS in Computer Networking program are to prepare students for

1. advanced careers in computer networking and related fields
2. further graduate study.

The MS in Electrical Engineering (MSEE) program is a flexible degree program for students who seek an advanced professional career in this field. It also gives critical knowledge to pursue a PhD in Electrical Engineering. Students of the program have the opportunity to build a strong foundation in physical science and mathematics, while exploring key sub-disciplines in Communication & Signal Processing, Computing Systems, Control Systems & Robotics, and Power & Energy Systems, to achieve a thorough command of their chosen sub-disciplines. The program's curriculum and the department's state-of-the-art laboratories prepare students to develop creative solutions to real-world engineering problems in a global economy. Students of this program are actively sought after by local companies through the university's Cooperative Education opportunity. This provides students with invaluable job experience, financial assistance, and contacts for potential full-time jobs after graduation.

The MSEE degree requires the satisfactory completion of a Plan of Study, which must be filed within the first 12 credit hours of graduate course work. The plan of study must be approved by the student's advisor and the MSEE graduate coordinator. Three options are available: (1) the thesis option requires a minimum of 24 hours of course work plus a minimum of 6 hours of thesis, (2) the directed project option requires a minimum of 30 hours of course work plus a minimum of 3 hours of directed project, and (3) the course work option requires a minimum of 36 hours of course work. Each MSEE student chooses a major and a minor specialization area. Current major areas in the department are Communication &

Signal Processing, Computing Systems, Control Systems & Robotics, and Power & Energy Systems. Any of these can also be chosen as a minor area. In addition, Networking can be a minor area. Each option requires a certain number of course in the major area and a certain number of course in the minor area. The plan of study must also have 60 percent of the hours at the 700 level or higher. The plan of study must also have nine of the hours at the 800 level or higher.

The objectives of the MS in Electrical Engineering program are to prepare students for

1. advanced careers in electrical engineering and related fields
2. further graduate study.

The PhD in Electrical Engineering and Computer Science (PhD EECS) is a degree designed mainly for students interested in pursuing an academic and/or industrial research and development career in a specialization offered by the department. The department offers research opportunities in several areas of specialization, such as Control Systems, Communications & Signal Processing, Energy & Power Systems, Computer Networking, Computer Systems & Architecture, and Algorithms & Software Systems.

The program normally contains at least 30 hours of post-master's graduate course work and a formal dissertation reporting on original research. A doctoral student must pass a comprehensive examination, a dissertation approval exam, and a final oral presentation and defense of the dissertation.

The objective of the PhD in Electrical Engineering and Computer Science program is to prepare students for the highest-level careers in electrical engineering, computer engineering and computer science in academia, research and industry.

The Program Educational Objectives for our BS degrees were updated based on input we received from our four key constituencies: students, alumni, faculty and employers. Our MS degree requirements were updated to achieve two goals. First, based on feedback we received from the graduate school, we wanted to make sure that each of our three MS programs were unique. Secondly, there was a desire, particularly for students who were choosing the course only option, to improve the rigor of our MS programs. The PhD program was expanded from Electrical Engineering to Electrical Engineering and Computer Science in order to provide a pathway for all our students to achieve the highest degree in their field.

2a. Describe the quality of the program as assessed by the strengths, productivity, and qualifications of the faculty in terms of SCH, majors, graduates and scholarly productivity (refer to instructions in the

WSU Program Review document for more information on completing this section).

Last 3 Years	Tenure/Tenure Track Faculty (Number)	Tenure/Tenure Track Faculty with Terminal Degree (Number)	Instructional FTE (#): TTF= Tenure/Tenure Track GTA=Grad teaching assist O=Other instructional FTE			Total SCH - Total SCH by FY from Su, Fl, Sp	Total Majors - From fall semester	Total Grads – by FY
			TTF	GTA	O			
Year 1→FY2012	14	14	13.8	2.1	2.4	10,686	851	205
Year 2→FY2013	13	13	12.5	1.7	2.7	11,054	834	196
Year 3→FY2014	18	18	17.6	2.4	2.2	14,853	1031	198
					Total Number Instructional (FTE) – TTF+GTA+O	SCH/ FTE	Majors/ FTE	Grads/ FTE
Year 1→FY2012					18.3	584	46.5	11.2
Year 2→FY2013					16.9	654	49.3	11.6
Year 3→FY2014					22.2	669	46.4	8.9

Scholarly Productivity	Number Journal Articles		Number Presentations		Number Conference Proceedings		Performances			Number of Exhibits		Creative Work		No. Books	No. Book Chaps.	No. Grants Awarded or Submitted	$ Research Expend.
	Ref	Non-Ref	Ref	Non-Ref	Ref	Non-Ref	*	**	***	Juried	****	Juried	Non-Juried				
Year 1 CY2012	25				37												1,237,068
Year 2 CY2013	25				46												927,170
Year 3 CY2014	24				61											27 awarded	1,695,555

* Winning by competitive audition. **Professional attainment (e.g., commercial recording). ***Principal role in a performance. ****Commissioned or included in a collection. KBOR data minima for UG programs: Majors=25; Graduates=10; Faculty=3; KBOR data minima for master programs: Majors=20; Graduates=5; Faculty=3 additional; KBOR data minima for doctoral programs: Majors=5; Graduates=2; Faculty=2 additional.

a. Provide a brief assessment of the quality of the faculty/staff using the data from the table above 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.

The department currently has twenty full-time tenure/tenure track faculty members who teach in the department. This includes the chair John Watkins, who is 0.5 FTE administrator, and Animesh Chakravarthy, who is 0.5 FTE in the Aerospace Engineering department. While Steven Skinner is a tenured faculty member in the department, he is serving full time as Associate Dean for Undergraduate Studies, Finance, and Administration in the College of Engineering Dean's office. All tenure/tenure track faculty members have Ph.D. degrees and all teach courses at the graduate and undergraduate level. The department also has four full-time engineering educators who teach in the department. This includes Perlekar Tamtam, who is 0.6 FTE in the Engineering Technology program. Two of the engineering educators have Ph.D. degrees, and two have M.S. degrees. Faculty expertise is balanced into prominent areas of electrical and computer engineering and computer science including electrical power systems,

controls, communications, computer networking, computer architecture, information security, software engineering, and data management systems.

The strengths, productivity, and qualifications of the faculty can first be determined by their scholarly activity. The preceding table presents the scholarly activity of the faculty in regards to journal publications, conference proceedings, and grant activity. As seen in the table, the faculty is active in research. The publications have appeared in leading refereed journals and conferences. Many of the journal articles are co-authored by graduate students of the department. Recent external grants have come from a variety of government and industry sources including the Air Force Research Laboratory, Power Systems Engineering Research Center, National Science Foundation, Kansas NSF EPSCoR, NASA EPSCoR, and NetApp.

The faculty has also strived for excellence in teaching and research and, as a result, has won numerous awards. Recent awards include:

- National IEEE-HKN C. Holmes McDonald - Outstanding Teacher Award (2015)
- Air Force Office of Sponsored Research (AFOSR) Summer Faculty Fellow (2014, 15)
- ICPC 2013 Most Influential Paper Award (2013)
- WSU Excellence in Teaching Award (2012, 13, 15)
- WSU Excellence In Research Award (2015)
- WSU Leadership in the Advancement of Teaching Award (2015)
- WSU Academy of Effective Teaching Award (2013, 14)
- WSU President's Distinguished Service Award (2013)
- CoE Wallace Excellence in Research Award (2015)
- CoE Wallace Excellence in Teaching Award (2013, 14)
- CoE Wallace Excellence in Experience Based Learning (2014)

The faculty of the Electrical Engineering and Computer Science Department are very active in service to the profession. EECS faculty are members of professional societies, which covers their respective areas, and have been involved with reviewing articles for technical journals and serving as session chairs to various professional conferences. They are also serving on numerous committees for international societies and conferences.

The quality of the programs in the department is high as assessed by the strength, productivity and qualifications of the faculty. While the quantity of faculty members in the department is currently not sufficient to handle our student body, we plan to search for three tenure track faculty members during the 2015-2016 academic year. These new faculty members will have credentials placing them at the forefront in their area of expertise.

3.Academic Program: Analyze the quality of the program as assessed by its curriculum and impact on students. Complete this section 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.

Last 3 Years	Total Majors - From fall semester			ACT – Fall Semester (mean for those reporting)			
	CE	CS	EE	CE	CS	EE	All University Students - FT
Year 1→FY2012	86	104	149	25.3	25.4	24.5	22.8
Year 2→FY2013	82	111	137	25.5	25.7	24.3	23.0
Year 3→FY2014	79	130	160	23.9	25.9	24.3	23.0

KBOR data minima for UG programs: ACT≤20 will trigger program.

b. For graduate programs, compare graduate GPAs of the majors with University graduate GPAs.*

Last 3 Years	Total Admitted - By FY			Average GPA (Admitted) – Domestic Students Only (60 hr GPA for those with ≥54 hr reported) By FY			
	CE	CS	EE	CE	CS	EE	University
Year 1→FY2012	76	149	99	3.4	3.4	3.5	3.5
Year 2→FY2013	82	137	106	3.2	3.4	3.3	3.5
Year 3→FY2014	178	160	115	3.3	3.4	3.3	3.5

c. Identify the principal learning outcomes (i.e., what skills does your Program expect students to graduate with). Provide aggregate data on how students are meeting those outcomes. Data should relate to the goals and objectives of the program as listed in 1e. Provide an analysis and evaluation of the data by learner outcome with proposed actions based on the results.

Undergraduate Programs

The EECS department has three bachelor degree programs: BSEE, BSCE and BSCS. The BSEE and BSCE programs are ABET accredited by the Engineering Accreditation Commission (EAC). The BSCS program is ABET accredited by the Computing Accreditation Commission (CAC). Their six year accreditation is up for renewal during the 2019–2020 academic year. Each of these programs has two Program Educational Objectives (PEOs), as listed in section 1 (e), and eleven Student Outcomes.

Review of the BSEE Program

The Student Outcomes are adopted from ABET.

ABET Student Outcomes (EAC)

a). Ability to apply knowledge of mathematics/science/engineering
b). Ability to design/conduct experiments, and analyze/interpret data
c). Ability to design a system/component/process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

d). Ability to function on multidisciplinary teams
e). Ability to identify/formulate/solve engineering problems
f). Understanding of professional and ethical responsibility
g). Ability to communicate effectively
h). Understand the impact of engineering solutions in a global/economic/environmental/societal context
i). Recognition of the need for, and an ability to engage in life-long learning
j). Knowledge of contemporary issues
k). Ability to use the techniques/skills/modern engineering tools necessary for engineering practice.

Description:

Outcomes Assessment from Courses: Each required/elective EECS course for the BSEE program contributes to some Student Outcomes; this is indicated in the syllabi for each course. During Spring 2013, the following Outcomes were assessed:

Course (cr hrs)	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
EE 284: Circuits II (3)	x				x						
EE 383: Signals and Systems (3)					x						
EE 492: Electronic Circuits I (3)	x		x								x
EE 493: Electronic Circuits II (4)		x	x			x	x				x
EE 586: Intro to Communication Systems (4)	x	x									
EE 684: Intro Control Systems Concepts (3)			x				x				x

This assessment was based on specific questions in assignments/exams that pertained to each Outcome. The assessment reports consist of the following: individual assessment report from each course and "Big picture" recommendations for the entire program.

Engineering Open House (EOH) Evaluation: Each senior BSEE student is required to complete a two-semester capstone Senior Design Project sequence EE 585/595. The EOH Evaluation is an evaluation of their project presentations during the Engineering Open House in April 2013; this evaluation was performed by two faculty judges who are not associated with EE 585/595. Since each project team consisted of students from multiple programs (BSEE, BSCE and BSCS), this evaluation is common to all the three programs. The scoring rubric and the average scores (average is over the various project presentations, separately for EE 585 and EE 595) follows. For each student outcome, the desired level of performance is 3.5

Criteria/ Outcome	Score 1	2	3	4	Avg Score EE 585	EE 595
Core Knowl. Base (a, j)	No EECS knowl. used	Some EECS knowl. used	Lower class EECS knowl. used	Full EECS undergrad knowl. used	3.3	3.9
Problem Identification (e)	Problem not clearly defined	Problem is somewhat clear, needs more definition	Problem is mostly clear, could be more tightly defined	Problem clearly defined	3.1	3.9
Solution Identification (c, e)	Solution not clearly stated	Solution is somewhat clear, needs more definition	Solution is mostly clear, could be more tightly defined	Solution is clearly stated	2.8	3.6
Application (c, e)	Solution not applied successfully	Project part addresses solution	Project realizes soln., not robust	Project robustly realizes soln.	2.3	3.3
Alternatives (c, e)	No alternative to solution and applicn. explored	One alternative to solution and applicn. explored	Few alternatv to solution and applicn. explored	Multiple alternatives to solution and applicn. explored	2.4	3.2
Teamwork (d)	Roles and functions of individuals not articulated	Some indivs. had some role and function	Each indiv. participated in some way, unclear how	Each indiv. had an articulatd role and function	3.0	3.6
Communicn (g)	Confusing presentation	Somewhat confusing presentation	Presentation mostly made sense	Presentation clear and professional	3.3	3.8

Co-op Survey: This survey is conducted by the WSU Office of Cooperative Education each academic year. It surveys all the BSEE students in the co-op program and their employers, on the students' performance with respect to Outcomes a–k. Students must complete 24 credit hours before enrolling in the co-op program; so, the respondents are mostly sophomores, juniors and seniors. According to the WSU Exit Survey of graduating seniors, about 30% of BSEE students have participated in co-op education. So, this survey covers a good number of BSEE students. In this survey, the student and the employer are asked whether the student had the ability corresponding to each of the 11 Outcomes. The allowed responses, on a scale of 1 to 4, are as follow: 1). Never, 2). Sometimes, 3). Usually, 4). Always.

Coop Assessment Data: BSEE Student has the ability

Year	Studt/Empl	a	b	c	d	e	f	g	h	i	j	k
2009-10	Studt Evaln	3.2	3.2	3.0	3.6	3.3	3.7	3.5	2.7	3.6	3.1	3.4
	Empl Evaln	3.6	3.7	3.6	3.5	3.4	3.6	3.8	3.5	3.4	3.5	3.5

2010-11	Studt Evaln	3.4	3.4	3.2	3.5	3.6	3.8	3.5	3.2	3.6	3.3	3.6
	Empl Evaln	3.7	3.6	3.5	3.6	3.6	3.8	3.7	3.5	3.5	3.5	3.7
2009-11	Studt Evaln	3.3	3.3	3.1	3.6	3.5	3.8	3.5	3.0	3.6	3.2	3.5
Average	Empl Evaln	3.7	3.7	3.6	3.6	3.5	3.7	3.8	3.5	3.5	3.5	3.6

We evaluate this data later, separately, for each Outcome. For comparison purposes, and to put the above data in perspective, we present below the average evaluation (over 2009-11) of all CoE students enrolled in the co-op program.

Coop Assessment Data: CoE Student has the ability

Year	**Studt/Empl**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
2009-11	Studt Evaln	3.1	2.9	2.5	3.1	3.1	3.5	3.5	2.8	3.5	2.9	3.3
Average	Empl Evaln	3.1	2.7	2.2	2.9	2.9	3.3	3.4	2.8	3.3	2.9	3.2

Desired Performance Level: For each Student Outcome, the desired level of performance for BSCE students' ability is the higher of 3.0 and the CoE average.

Exit Interview: This is an interview of seniors, conducted by the department chair or undergraduate coordinator, during the first semester of their senior year (during the senior check).

WSU Exit Survey: An online university survey of all graduating students. The students are required to take this survey when they submit their (online) Application for Degree during their second last semester.

Capstone Survey: Capstone Survey is an online, anonymous survey of the students enrolled in EE 595 (second semester Senior Design Project); students must complete this survey before passing the senior design project.

Mapping of Assessment Tools to Student Outcomes:

The following table shows the mapping of assessment tools to the Student Outcomes that they measure. The entries in the table mean the following: D - Direct measure, I - Indirect measure, and B - Includes both direct and indirect measures.

Assessment Tool	a	b	c	d	e	f	g	h	i	j	k
Outcomes Assessment from Courses	D	D	D		D	D	D				D
EOH Evaluation	D		D	D	D		D			D	
Capstone Survey						I	I			I	I
EECS Exit Interview						B	D	D	D	D	
WSU Exit Survey				I	I		I	I			
Co-Op Education Assessment	B	B	B	B	B	B	B	B	B	B	B

Outcome Evaluation:

a). The EOH evaluation shows significant improvement from EE 585 (3.3) to EE 595 (3.9). A high score in EE 595 exceeds the desired performance level (3.5). We will look at the average score of the coop data over the years 2009-11 (last two rows) in column a. Both the Student Evaluation (3.3 out of 4) and the Employer Evaluation (3.7 out of 4) indicate that the BSEE students have this ability; these two numbers also compare very favorably with the CoE data.

b). We will look at the average score of the coop data over the years 2009-11 in column b. Both the Student Evaluation (3.3 out of 4) and the Employer Evaluation (3.7 out of 4) indicate that the BSEE students have this ability; these two numbers also compare very favorably with the CoE data.

c). The EOH evaluation shows two things: Significant improvement from EE 585 to EE 595, in each aspect that contributes to this Outcome and Reasonable scores in EE 595 that are close to the desired performance level (3.5). Our students need improvement in two areas: Robustness (They are able to realize a solution, but their solution needs to be more robust.) and Alternatives (They need to consider multiple alternative solutions.) These areas are being stressed in EE 585/595. We will look at the coop data over the years 2009-11 in column c. Both the Student Evaluation (3.1 out of 4) and the Employer Evaluation (3.6 out of 4) indicate that the BSEE students have this ability; these two numbers also compare very favorably with the CoE data.

d). The EOH evaluation shows two things: Significant improvement from EE 585 (3.0) to EE 595 (3.6) and a good score (3.6) in EE 595 that meets the desired performance level (3.5). So, our students definitely have this ability. We will look at the average score of the Coop data over the years 2009-11 in column d. Both the Student Evaluation (3.6 out of 4) and the Employer Evaluation (3.6 out of 4) indicate that the BSEE students have this ability; these two numbers also compare very favorably with the CoE data. Based on the WSU Exit survey, however, students are not as confident in this skill as we would like.

e). The EOH evaluation shows three things: significant improvement from EE 585 to EE 595, in each aspect that contributes to this Outcome, students have very good ability to identify the problem (3.9), and for identifying a solution, reasonable scores in EE 595 that are close to the desired performance level (3.5). Our students need improvement in two areas: Robustness and Alternatives. These areas are being stressed in EE 585/595. Based on the WSU Exit Survey, students feel confident in this area. We will look at the average score over the years 2009-11 in column e. Both the Student Evaluation (3.5 out of 4) and the Employer Evaluation (3.5 out of 4) indicate that the BSEE students have this ability; these two numbers also compare very favorably with the CoE data.

f). From our capstone survey data, 95% of the students think that their education helped them to understand their ethical responsibility. This is very good. From our EECS Exit Interview Data, we see that the students definitely understand the importance of ethics in the workplace. But their ethical values, as measured by their peers, is not high. This indicates that students are observing unethical behavior in the program, which needs to be addressed. The department plans to finalize and publicize its own policy on academic dishonesty, and this document should be included with the syllabus of each EECS class. We will consider the average coop score over the years 2009-11 in column f. Both the Student Evaluation (3.8 out of 4) and the Employer Evaluation (3.7 out of 4) indicate that the BSEE students have this ability to a great extent; these two numbers also compare very favorably with the CoE data.

g). The EOH Evaluation shows two things: significant improvement from EE 585 (Score 3.3) to EE 595 (Score 3.8) and a high score (3.8) in EE 595 exceeds the desired performance level (3.5). So, our students definitely have this ability. From the capstone survey, we can see that about 90% of the BSEE students feel that their oral and written communication skills are either excellent or adequate. There is room for improvement. From the EECS exit interview data, we also see that the communications skills are acceptable, but there is room for improvement. The WSU Exit Survey shows similar results. Both the Student Evaluation (3.5 out of 4) and the Employer Evaluation (3.8 out of 4) from the coop data indicate that the BSEE students have this ability to a great extent; these two numbers also compare favorably with the CoE data.

h). Based on the EECS exit interview data, the student's understanding of global issues is low. On the WSU Exit Survey, BSEE results match the college, there is need for improvement. Both the Student Evaluation (3.0 out of 4) and the Employer Evaluation (3.5 out of 4) from the Coop data indicate that the BSEE students have this ability; these two numbers also compare very favorably with the CoE data. Overall, though, it is clear that students are not getting enough knowledge of global and societal issues from the General Education courses. Advisers should consider coverage of global and societal issues when helping students select these courses (for registration). Also, these issues should be discussed in EECS courses too.

i). Based on the EECS exit interview data, we see that the students have a reasonably good understanding of the need for life-long learning, but there is room for improvement. Both the Student Evaluation (3.6 out of 4) and the Employer Evaluation (3.5 out of 4) from the Coop data indicate that the BSEE students have this ability to a great extent; these two numbers also compare very favorably with the CoE data.

j) The EOH Evaluation shows two things: significant improvement from EE 585 (Score 3.3) to EE 595 (Score 3.9) and a high score (3.9) in EE 595 exceeds the desired performance level (3.5). Based on the EECS exit interview data, the student's understanding of contemporary issues is very low. They are not getting enough of this from Gen Ed courses. These issues should be discussed in EECS courses too. Both the Student Evaluation (3.2 out of 4) and the Employer Evaluation (3.5 out of 4) from the Coop data indicate that the BSEE students have this ability; these two numbers also compare very favorably with the CoE data.

k) From the capstone survey, we see that students are not confident of their ability to use MATLAB. We are considering requiring a 1 hour course that uses MATLAB to solve electrical and computer engineering problems. The students are more confident in their ability to use C/C++, but more work is required. Both the Student Evaluation (3.5 out of 4) and the Employer Evaluation (3.6 out of 4) from the Coop data indicate that the BSEE students have this ability; these two numbers also compare very favorably with the CoE data.

Review of the BSCE Program

The Student Outcomes are adopted from ABET.

ABET Student Outcomes (EAC)

a). Ability to apply knowledge of mathematics/science/engineering
b). Ability to design/conduct experiments, and analyze/interpret data
c). Ability to design a system/component/process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d). Ability to function on multidisciplinary teams
e). Ability to identify/formulate/solve engineering problems
f). Understanding of professional and ethical responsibility
g). Ability to communicate effectively
h). Understand the impact of engineering solutions in a global/economic/environmental/societal context
i). Recognition of the need for, and an ability to engage in life-long learning
j). Knowledge of contemporary issues
k). Ability to use the techniques/skills/modern engineering tools necessary for engineering practice.

Description:

Outcomes Assessment from Courses: Each required/elective EECS course for the BSCE program contributes to some Student Outcomes; this is indicated in the syllabi for each course. During spring 2013, the following Outcomes were assessed:

Course (cr hrs)	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
CS 394: Intro to Computer Arch (3)	x								x		
CS 411: Object-Oriented Programming (3)					x						
CS 540: Operating Systems (3)	x										
EE 284: Circuits II (3)	x				x						
EE 492: Electronic Circuits I (3)	x		x								x

This assessment was based on specific questions in assignments/exams that pertained to each Outcome. The assessment reports consist of the following: individual assessment report from each course and "Big picture" recommendations for the entire program.

Engineering Open House (EOH) Evaluation: Each senior BSCE student is required to complete a two-semester capstone Senior Design Project sequence EE 585/595. The EOH Evaluation is an evaluation of their project presentations during the Engineering Open House in April 2013; this evaluation was performed by two faculty judges who are not associated with EE 585/595. Since each project team consisted of students from multiple programs (BSEE, BSCE and BSCS), this evaluation is common to all the three programs. The scoring rubric and the average scores (average is over the various project presentations, separately for EE 585 and EE 595) is given in the BSEE section. For each student outcome, the desired level of performance is 3.5

Co-op Survey: This survey is conducted by the WSU Office of Cooperative Education each academic year. It surveys all the BSCE students in the co-op program and their employers, on the students' performance with respect to Outcomes a–k. Students must complete 24 credit hours before enrolling in the co-op program; so, the respondents are mostly sophomores, juniors and seniors. According to the WSU Exit Survey of graduating seniors, about 38% of BSCE students have participated in co-op education. So, this survey covers a good number of BSCE students. In this survey, the student and the employer are asked whether the student had the ability corresponding to each of the 11 Outcomes. The allowed responses, on a scale of 1 to 4, are as follow: 1). Never, 2). Sometimes, 3). Usually, 4). Always.

Coop Assessment Data: BSCE Student has the ability

Year	Studt/Empl	a	b	c	d	e	f	g	h	i	j	k
2009-10	Studt Evaln	3.0	3.2	3.0	3.0	3.3	3.5	3.5	3.3	3.2	3.2	3.3
	Empl Evaln	3.3	4.0	3.2	2.8	3.0	3.8	3.5	3.2	3.3	3.0	3.2
2010-11	Studt Evaln	3.8	3.2	2.8	3.8	3.6	3.8	3.8	3.2	3.8	3.4	3.8
	Empl Evaln	3.6	4.0	4.0	3.8	3.4	3.8	4.0	3.4	3.8	3.6	3.5
2009-11	Studt Evaln	3.4	3.2	2.9	3.4	3.5	3.7	3.7	3.3	3.5	3.3	3.6
Average	Empl Evaln	3.5	4.0	3.6	3.3	3.2	3.8	3.8	3.3	3.6	3.3	3.4

We evaluate this data later, separately, for each Outcome. For comparison purposes, and to put the above data in perspective, we present below the average evaluation (over 2009-11) of all CoE students enrolled in the co-op program.

Coop Assessment Data: CoE Student has the ability

Year	Studt/Empl	a	b	c	d	e	f	g	h	i	j	k
2009-11	Studt Evaln	3.1	2.9	2.5	3.1	3.1	3.5	3.5	2.8	3.5	2.9	3.3
Average	Empl Evaln	3.1	2.7	2.2	2.9	2.9	3.3	3.4	2.8	3.3	2.9	3.2

Desired Performance Level: For each Student Outcome, the desired level of performance for BSEE students' ability is the higher of 3.0 and the CoE average.

Exit Interview: This is an interview of seniors, conducted by the department chair or undergraduate coordinator, during the first semester of their senior year (during the senior check).

WSU Exit Survey: An online university survey of all graduating students. The students are required to take this survey when they submit their (online) Application for Degree during their second last semester.

Capstone Survey: Capstone Survey is an online, anonymous survey of the students enrolled in EE 595 (second semester Senior Design Project); students must complete this survey before passing the senior design project.

Mapping of Assessment Tools to Student Outcomes:
The following table shows the mapping of assessment tools to the Student Outcomes that they measure. The entries in the table mean the following: D - Direct measure, I - Indirect measure, and B - Includes both direct and indirect measures.

Assessment Tool	a	b	c	d	e	f	g	h	i	j	k
Outcomes Assessment from Courses	D	D	D		D	D	D				D
EOH Evaluation	D		D	D	D		D			D	
Capstone Survey						I	I			I	I
EECS Exit Interview						B	D	D	D	D	
WSU Exit Survey				I	I		I	I			
Co-Op Education Assessment	B	B	B	B	B	B	B	B	B	B	B

Outcome Evaluation:
a). The EOH evaluation shows significant improvement from EE 585 (3.3) to EE 595 (3.9). A high score in EE 595 exceeds the desired performance level (3.5). We will look at the average score of the coop data over the years 2009-11 (last two rows) in column a. Both the Student Evaluation (3.4 out of 4) and the Employer Evaluation (3.5 out of 4) indicate that the BSCE students have this ability; these two numbers also compare very favorably with the CoE data.

b). We will look at the average score of the coop data over the years 2009-11 in column b. Both the Student Evaluation (3.2 out of 4) and the Employer Evaluation (4.0 out of 4) indicate that the BSCE students have this ability; these two numbers also compare very favorably with the CoE data.

c). The EOH evaluation shows two things: Significant improvement from EE 585 to EE 595, in each aspect that contributes to this Outcome and Reasonable scores in EE 595 that are close to the desired performance level (3.5). Our students need improvement in two areas: Robustness (They are able to realize a solution, but their solution needs to be more robust.) and Alternatives (They need to consider multiple alternative solutions.) These areas are being stressed in EE 585/595. We will look at the coop data over the years 2009-11 in column c. Both the Student Evaluation (2.9 out of 4) and the Employer Evaluation (3.6 out of 4) indicate that the BSCE students have this ability; these two numbers also compare very favorably with the CoE data.

d). The EOH evaluation shows two things: Significant improvement from EE 585 (3.0) to EE 595 (3.6) and a good score (3.6) in EE 595 that meets the desired performance level (3.5). So, our students definitely have this ability. We will look at the average score of the Coop data over the years 2009-11 in column d. Both the Student Evaluation (3.4 out of 4) and the Employer Evaluation (3.3 out of 4) indicate that the BSCE students have this ability; these two numbers also compare very favorably with the CoE data. Based on the WSU Exit survey, however, students are not as confident in this skill as we would like.

e). The EOH evaluation shows three things: significant improvement from EE 585 to EE 595, in each aspect that contributes to this Outcome, students have very good ability to identify the problem (3.9), and for identifying a solution, reasonable scores in EE 595 that are close to the desired performance level (3.5). Our students need improvement in two areas: Robustness and Alternatives. These areas are being stressed in EE 585/595. Based on the WSU Exit survey, however, students are not as confident in this skill as we would like. We will look at the average score over the years 2009-11 in column e. Both the Student Evaluation (3.5 out of 4) and the Employer Evaluation (3.2 out of 4) indicate that the BSCE students have this ability; these two numbers also compare very favorably with the CoE data.

f). From our capstone survey data, 95% of the students think that their education helped them to understand their ethical responsibility. This is very good. From our EECS Exit Interview Data, we see that the students definitely understand the importance of ethics in the workplace. But their ethical values, as measured by their peers, is not high. This indicates that students are observing unethical behavior in the program, which needs to be addressed. The department plans to finalize and publicize its own policy on academic dishonesty, and this document should be included with the syllabus of each EECS class. We will consider the average coop score over the years 2009-11 in column f. Both the Student Evaluation (3.7 out of 4) and the Employer Evaluation (3.8 out of 4) indicate that the BSCE students have this ability to a great extent; these two numbers also compare very favorably with the CoE data.

g). The EOH Evaluation shows two things: significant improvement from EE 585 (3.3) to EE 595 (3.8) and a high score (3.8) in EE 595 exceeds the desired performance level (3.5). So, our students definitely have this ability. From the capstone survey, we can see that about 95% of the BSCE students feel that their oral and written communication skills are either excellent or adequate. This very good. From the EECS exit interview data, we also see that the communications skills are acceptable, but there is room for improvement. The WSU Exit Survey shows similar results. Both the Student Evaluation (3.7 out of 4) and the Employer Evaluation (3.8 out of 4) from the coop data indicate that the BSCE students have this ability to a great extent; these two numbers also compare favorably with the CoE data.

h). Based on the EECS exit interview data, the student's understanding of global issues is low. On the WSU Exit Survey, BSCE results match the college, there is need for improvement. Both the Student Evaluation (3.3 out of 4) and the Employer Evaluation (3.3 out of 4) from the Coop indicate that the BSCE students have this ability; these two numbers also compare very favorably with the CoE data. Overall, though, it is clear that students are not getting enough knowledge of global and societal issues from the General Education courses. Advisers should consider coverage of global and societal issues when helping students select these courses (for registration). Also, these issues should be discussed in EECS courses too.

i). Based on the EECS exit interview data, we see that the students have a reasonably good understanding of the need for life-long learning, but there is room for improvement. Both the Student Evaluation (3.5 out of 4) and the Employer Evaluation (3.6 out of 4) from the Coop data indicate that the BSCE students have this ability to a great extent; these two numbers also compare very favorably with the CoE data.

j) The EOH Evaluation shows two things: significant improvement from EE 585 (3.3) to EE 595 (3.9) and a high score (3.9) in EE 595 exceeds the desired performance level (3.5). Based on the EECS exit interview data, the student's understanding of contemporary issues is very low. They are not getting enough of this from Gen Ed courses. These

issues should be discussed in EECS courses too. Both the Student Evaluation (3.3 out of 4) and the Employer Evaluation (3.3 out of 4) from the Coop data indicate that the BSCE students have this ability; these two numbers also compare very favorably with the CoE data.

k) From the capstone survey, we see that students are not confident of their ability to use MATLAB. We are considering requiring a 1 hour course that uses MATLAB to solve electrical and computer engineering problems. The students are more confident in their ability to use C/C++. Both the Student Evaluation (3.6 out of 4) and the Employer Evaluation (3.4 out of 4) from the Coop data indicate that the BSCE students have this ability; these two numbers also compare very favorably with the CoE data.

Review of the BSCS Program

The Student Outcomes are adopted from ABET. While these are similar to those used for BSEE and BSCE, they are different as BSCS is accredited under another commission.

ABET Student Outcomes (CAC)

a). An ability to apply knowledge of computing and mathematics appropriate to the discipline.
b). An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
c). An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
d). An ability to function effectively on teams to accomplish a common goal.
e). An understanding of professional, ethical, legal, security and social issues and responsibilities.
f). An ability to communicate effectively with a range of audiences.
g). An ability to analyze the local and global impact of computing on individuals, organizations, and society.
h). Recognition of the need for and an ability to engage in continuing professional development.
i). An ability to use current techniques, skills, and tools necessary for computing practice.
j). An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
k). An ability to apply design and development principles in the construction of software systems of varying complexity.

Description:

Outcomes Assessment from Courses: Each required/elective EECS course for the BSCS program contributes to some Student Outcomes; this is indicated in the syllabi for each course. During spring 2013, the following Outcomes were assessed:

Course (cr hrs)	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
CS 394: Intro to Computer Arch (3)	x							x			
CS 411: Object-Oriented Programming (3)			x								x
CS 540: Operating Systems (3)	x										
CS 560: Data Structs & Algs II (3)		x	x								
CS 665: Intro to Database Systems (3)				x		x			x		
CS 680: Intro to Software Engg (3)				x						x	x

This assessment was based on specific questions in assignments/exams that pertained to each Outcome. The assessment reports consist of the following: individual assessment report from each course and "Big picture" recommendations for the entire program.

Engineering Open House (EOH) Evaluation: Each senior BSCS student is required to complete a two-semester capstone Senior Design Project sequence EE 585/595. The EOH Evaluation is an evaluation of their project presentations during the Engineering Open House in April 2013; this evaluation was performed by two faculty judges who are not associated with EE 585/595. Since each project team consisted of students from multiple programs (BSEE, BSCE and BSCS), this evaluation is common to all the three programs. The scoring rubric and the average scores (average is over the various project presentations, separately for EE 585 and EE 595) follows. For each student outcome, the desired level of performance is 3.5.

Criteria/ Outcome	Score				Avg Score	
	1	2	3	4	EE 585	EE 595
Core Knowl. Base (a, j)	No EECS knowl. used	Some EECS knowl. used	Lower class EECS knowl. used	Full EECS undergrad knowl. used	3.3	3.9
Problem Identification (b)	Problem not clearly defined	Problem is somewhat clear, needs more definition	Problem is mostly clear, could be more tightly defined	Problem clearly defined	3.1	3.9
Solution Identification (b, c)	Solution not clearly stated	Solution is somewhat clear, needs more definition	Solution is mostly clear, could be more tightly defined	Solution is clearly stated	2.8	3.6
Application (b, c)	Solution not applied successfully	Project part addresses solution	Project realizes soln., not robust	Project robustly realizes soln.	2.3	3.3
Alternatives (b, c)	No alternative to solution and applicn. explored	One alternative to solution and applicn. explored	Few alternatv to solution and applicn. explored	Multiple alternatives to solution and applicn. explored	2.4	3.2
Teamwork (d)	Roles and functions of individuals not articulated	Some indivs. had some role and function	Each indiv. participated in some way, unclear how	Each indiv. had an articulatd role and function	3.0	3.6
Communicn (f)	Confusing presentation	Somewhat confusing presentation	Presentation mostly made sense	Presentation clear and professional	3.3	3.8

Co-op Survey: This survey is conducted by the WSU Office of Cooperative Education each academic year. It surveys all the BSCS students in the co-op program and their employers, on the students' performance with respect to Outcomes a–k. Students must complete 24 credit hours before enrolling in the co-op program; so, the respondents are mostly sophomores, juniors and seniors. According to the WSU Exit Survey of graduating seniors, about 36% of BSCS students have participated in co-op education. So, this survey covers a good number of BSCS students. In this survey, the student and the employer are asked whether the student had the ability corresponding to each of the 11 Outcomes. The allowed responses, on a scale of 1 to 4, are as follow: 1). Never, 2). Sometimes, 3). Usually, 4). Always. Since the survey was based on EAC Outcomes, we use the following mapping to convert them to CAC Outcomes.

Mapping of EAC Outcomes to CAC Outcomes

EAC Outcome	CAC Outcome
a	a
c	c
d	d
e	b
f	e
g	f
h	g
i	h
k	i

The following table gives the average response of all the students and the employers.

Co-op Assessment Data: BSCS Student had the Ability

Year	Studt/Empl	a	b	c	d	e	f	g	h	i
2009-10	Studt Evaln	3.4	3.6	3.3	3.5	3.9	3.6	2.7	3.6	3.4
	Empl Evaln	3.5	3.3	3.5	3.4	3.5	3.7	2.9	3.1	3.3
2010-11	Studt Evaln	3.5	3.8	3.0	3.8	3.5	3.3	2.8	3.5	3.8
	Empl Evaln	3.8	3.0	3.7	3.0	4.0	3.8	3.3	3.3	3.3
2009-11	Studt Evaln	3.5	3.7	3.2	3.7	3.7	3.5	2.8	3.6	3.6
Average	Empl Evaln	3.7	3.2	3.6	3.2	3.8	3.8	3.1	3.2	3.3

We evaluate this data later, separately, for each Outcome. For comparison purposes, and to put the above data in perspective, we present below the average evaluation (over 2009-11) of all CoE students enrolled in the co-op program.

Coop Assessment Data: CoE Student has the ability

Year	Studt/Empl	a	b	c	d	e	f	g	h	i
2009-11	Studt Evaln	3.1	3.1	2.5	3.1	3.5	3.5	2.8	3.5	3.3
Average	Empl Evaln	3.1	2.9	2.2	2.9	3.3	3.4	2.8	3.3	3.2

Desired Performance Level: For each Student Outcome, the desired level of performance for BSCS students' ability is the higher of 3.0 and the CoE average.

Exit Interview: This is an interview of seniors, conducted by the department chair or undergraduate coordinator, during the first semester of their senior year (during the senior check).

WSU Exit Survey: An online university survey of all graduating students. The students are required to take this survey when they submit their (online) Application for Degree during their second last semester.

Capstone Survey: Capstone Survey is an online, anonymous survey of the students enrolled in EE 595 (second semester Senior Design Project); students must complete this survey before passing the senior design project.

Mapping of Assessment Tools to Student Outcomes:
The following table shows the mapping of assessment tools to the Student Outcomes that they measure. The entries in the table mean the following: D - Direct measure, I - Indirect measure, and B - Includes both direct and indirect measures.

Assessment Tool	a	b	c	d	e	f	g	h	i	j	k
Outcomes Assessment from Courses	D	D	D	D		D		D	D	D	D
EOH Evaluation	D	D	D	D		D				D	
Capstone Survey					I	I			I		
EECS Exit Interview					I	D	D	D			
WSU Exit Survey		I		I		I	I				
Co-Op Education Assessment	B	B	B	B	B	B	B	B	B		

Outcome Evaluation:
a). The EOH evaluation shows significant improvement from EE 585 (3.3) to EE 595 (3.9). A high score in EE 595 exceeds the desired performance level (3.5). We will look at the average score of the coop data over the years 2009-11 (last two rows) in column a. Both the Student Evaluation (3.5 out of 4) and the Employer Evaluation (3.7 out of 4) indicate that the BSCS students have this ability; these two numbers also compare very favorably with the CoE data.

b). The EOH evaluation shows three things: significant improvement from EE 585 to EE 595, in each aspect that contributes to this Outcome, students have very good ability to identify the problem (3.9), and for identifying a solution, reasonable scores in EE 595 that are close to the desired performance level (3.5). Our students need improvement in two areas: Robustness and Alternatives. These areas are being stressed in EE 585/595. Based on the WSU Exit survey, students also feel confident as well. We will look at the average score over the years 2009-11 in column e. Both the Student Evaluation (3.7 out of 4) and the Employer Evaluation (3.2 out of 4) indicate that the BSCS students have this ability; these two numbers also compare very favorably with the CoE data.

c). The EOH evaluation shows two things: Significant improvement from EE 585 to EE 595, in each aspect that contributes to this Outcome and Reasonable scores in EE 595 that are close to the desired performance level (3.5). Our students need improvement in two areas: Robustness (They are able to realize a solution, but their solution needs to be more robust.) and Alternatives (They need to consider multiple alternative solutions.) These areas are being stressed in EE 585/595. We will look at the coop data over the years 2009-11 in column c. Both the Student Evaluation (3.2 out of 4) and the Employer Evaluation (3.6 out of 4) indicate that the BSCS students have this ability; these two numbers also compare very favorably with the CoE data.

d). The EOH evaluation shows two things: Significant improvement from EE 585 (3.0) to EE 595 (3.6) and a good score (3.6) in EE 595 that meets the desired performance level (3.5). So, our students definitely have this ability. We will look at the average score of the Coop data over the years 2009-11 in column d. Both the Student Evaluation (3.7 out of 4) and the Employer Evaluation (3.2 out of 4) indicate that the BSCS students have this ability; these two numbers also compare very favorably with the CoE data. Based on the WSU Exit survey, however, students are not as confident in this skill as we would like.

e). From our capstone survey data, 84% of the students think that their education helped them to understand their ethical responsibility. This is good, but needs to be improved. From our EECS Exit Interview Data, we see that the students definitely understand the importance of ethics in the workplace. But their ethical values, as measured by their peers, is not high. This indicates that students are observing unethical behavior in the program, which needs to be addressed. The department plans to finalize and publicize its own policy on academic dishonesty, and this document should be included with the syllabus of each EECS class. We will consider the average coop score over the years 2009-11 in column f. Both the Student Evaluation (3.7 out of 4) and the Employer Evaluation (3.8 out of 4) indicate that the BSCS students have this ability to a great extent; these two numbers also compare very favorably with the CoE data.

f). The EOH Evaluation shows two things: significant improvement from EE 585 (3.3) to EE 595 (3.8) and a high score (3.8) in EE 595 exceeds the desired performance level (3.5). So, our students definitely have this ability. From the capstone survey, we can see that about 95% of the BSCS students feel that their oral and written communication skills are either excellent or adequate. This very good. From the EECS exit interview data, we also see that the communications skills very good. The WSU Exit Survey shows similar results. Both the Student Evaluation (3.5 out of 4) and the Employer Evaluation (3.8 out of 4) from the coop data indicate that the BSCS students have this ability to a great extent; these two numbers also compare favorably with the CoE data.

g). Based on the EECS exit interview data, the student's understanding of global issues is low. On the WSU Exit Survey, BSCS scores are lower than the college; there is need for improvement. Both the Student Evaluation (2.8 out of 4) and the Employer Evaluation (3.1 out of 4) from the Coop indicate that the BSCS students' ability is borderline. Overall, though, it is clear that students are not getting enough knowledge of global and societal issues from the General Education courses. Advisers should consider coverage of global and societal issues when helping students select these courses (for registration). Also, these issues should be discussed in EECS courses too.

h). Based on the EECS exit interview data, we see that the students have a reasonably good understanding of the need for life-long learning, but there is room for improvement. Both the Student Evaluation (3.6 out of 4) and the Employer Evaluation (3.2 out of 4) from the Coop indicate that the BSCS students have this ability.

i). From the capstone survey, about 90% of the students are confident of their programming skills in Java, C and C++. This is very good. Both the Student Evaluation (3.6 out of 4) and the Employer Evaluation (3.3 out of 4) indicate that the BSCS students have this ability; these two numbers also compare favorably with CoE data.

Graduate Programs

MS in Computer Science

The admission and degree requirements of the MS in Computer Science program have recently undergone major restructuring, for students starting the program in fall 2014 or later. Its new degree requirements have been designed to ensure that its students demonstrate the following:

1. **An ability to self-educate**

   Students complete the program with either a thesis, project, or just coursework. Thesis and project students will be evaluated by their advisor on the ability demonstrated to self-educate. Coursework students must take at least one course that contains a research project involving self-education. Evaluation of such students will be performed by the course instructor.

2. **Communicate effectively**

   Thesis and project students will be evaluated by their advisor on their written and oral communication, and coursework students by the instructor of the course taken by them containing the research project, which will also involve submission of a written report.

3. **Competency in core areas**

   The only core course of this program is CS 721 – Advanced Algorithms and Analysis. The competency of the students in this area will be measured and reported by the course instructor.

4. **A knowledge of professional and ethical responsibility**

   All students of the program need to pass 4 CITI modules, namely Research Misconduct, Authorship, Conflicts of Interest, and Data Management. The passing grade in each module is 80%. Students graduate only after passing each module, thus all our graduating students demonstrate this knowledge.

Due to the recent nature of changes to this program, currently assessment scores on the first three items above are not available. Those scores will be reported in future assessment cycles of the program.

MS in Computer Networking

The admission and degree requirements of the MS in Computer Networking program have recently undergone major restructuring, for students starting the program in fall 2014 or later. Its new degree requirements have been designed to ensure that its students demonstrate the following:

1. **An ability to self-educate**

   Students complete the program with either a thesis, project, or just coursework. Thesis and project students will be evaluated by their advisor on the ability demonstrated to self-educate. Coursework

students must take at least one course that contains a research project involving self-education. Evaluation of such students will be performed by the course instructor.

2. **Communicate effectively**

   Thesis and project students will be evaluated by their advisor on their written and oral communication, and coursework students by the instructor of the course taken by them containing the research project, which will also involve submission of a written report.

3. **Competency in core areas**

   The core courses of this program are CS 736 – Data Communications and either CS 721 – Advanced Algorithms and Analysis or CS 797G – Mathematical Foundations of Computer Networking. The competency of the students in this area will be measured and reported by the instructors of these courses.

4. **A knowledge of professional and ethical responsibility**

   All students of the program need to pass 4 CITI modules, namely Research Misconduct, Authorship, Conflicts of Interest, and Data Management. The passing grade in each module is 80%. Students graduate only after passing each module, thus all our graduating students demonstrate this knowledge.

Due to the recent nature of changes to this program, currently assessment scores on the first three items above are not available. Those scores will be reported in future assessment cycles of the program.

MS in Electrical Engineering

The admission and degree requirements of the MS in Electrical Engineering program have recently undergone major restructuring, for students starting the program in fall 2014 or later. Its new degree requirements have been designed to ensure that its students demonstrate the following:

1. **An ability to self-educate**

   Students complete the program with either a thesis, project, or just coursework. Thesis and project students will be evaluated by their advisor on the ability demonstrated to self-educate. Coursework students must take at least one course that contains a research project involving self-education. Evaluation of such students will be performed by the course instructor.

2. **Communicate effectively**

   Thesis and project students will be evaluated by their advisor on their written and oral communication, and coursework students by the instructor of the course taken by them containing the research project, which will also involve submission of a written report.

3. **Competency in core areas**

   Students of this program graduate with one of four major areas: Communication & Signal Processing, Computing Systems, Control Systems & Robotics, or Power & Energy Systems. The competency of the

students in the chosen major area will be measured and reported by the instructors of selected courses in these areas.

4. **A knowledge of professional and ethical responsibility**

   All students of the program need to pass 4 CITI modules, namely Research Misconduct, Authorship, Conflicts of Interest, and Data Management. The passing grade in each module is 80%. Students graduate only after passing each module, thus all our graduating students demonstrate this knowledge.

Due to the recent nature of changes to this program, currently assessment scores on the first three items above are not available. Those scores will be reported in future assessment cycles of the program.

PhD in Electrical Engineering and Computer Science

The degree structure of the PhD in Electrical Engineering & Computer Science program, which was earlier PhD in Electrical Engineering, was recently revised in 2013, to enable students to get a PhD in CS-related areas. Its degree requirements ensure that its students demonstrate the following:

1. **An ability to self-educate and do independent research**

   Students complete the program with a dissertation and will be evaluated by their dissertation committee on the ability demonstrated to self-educate and do independent research.

2. **Communicate effectively in writing and presentation**

   Students will be evaluated by their dissertation committee on their written and oral communication.

3. **Competency in major and minor areas**

   Students of this program graduate with one of six major areas: Control Systems, Communications & Signal Processing, Energy & Power Systems, Computer Networking, Computer Systems & Architecture, or Algorithms & Software Systems. They also choose a minor area. The competency of the graduating students in the chosen major and minor areas is ensured by requiring them to pass major and minor comprehensive exams, thus all our graduating students demonstrate this knowledge.

4. **A knowledge of professional and ethical responsibility**

   All students of the program need to pass 4 CITI modules, namely Research Misconduct, Authorship, Conflicts of Interest, and Data Management. The passing grade in each module is 80%. Students graduate only after passing each module, thus all our graduating students demonstrate this knowledge.

Due to recent changes made to this program, currently assessment scores on the first two items above are not available. Those scores will be reported in future assessment cycles of the program.

d. Provide aggregate data on student majors satisfaction (e.g., exit surveys), capstone results, licensing or certification examination results, employer surveys or other such data that indicate student satisfaction

with the program and whether students are learning the curriculum (for learner outcomes, data should relate to the goals and objectives of the program as listed in 1e).

Undergraduate - CE

Student Satisfaction (e.g., exit survey data on overall program satisfaction).* If available, report by year, for the last 3 years			Learner Outcomes (e.g., capstone, licensing/certification exam pass-rates) by year, for the last three years				
Year	N	Result (e.g., 4.5 on scale of 1-5, where 5 highest)	Year	N	Name of Exam	Program Result	National Comparison±
2012	16	3.6	1				
2013	28	3.8	2				
2014	24	4.0	3				

Undergraduate - CS

Student Satisfaction (e.g., exit survey data on overall program satisfaction).* If available, report by year, for the last 3 years			Learner Outcomes (e.g., capstone, licensing/certification exam pass-rates) by year, for the last three years				
Year	N	Result (e.g., 4.5 on scale of 1-5, where 5 highest)	Year	N	Name of Exam	Program Result	National Comparison±
2012	22	3.3	1				
2013	23	3.7	2				
2014	27	3.6	3				

Undergraduate - EE

Student Satisfaction (e.g., exit survey data on overall program satisfaction).* If available, report by year, for the last 3 years			Learner Outcomes (e.g., capstone, licensing/certification exam pass-rates) by year, for the last three years				
Year	N	Result (e.g., 4.5 on scale of 1-5, where 5 highest)	Year	N	Name of Exam	Program Result	National Comparison±
2012	33	3.6	1				
2013	37	3.8	2				
2014	51	3.9	3				

While we would like to the student satisfaction for the undergraduate programs in the department to be higher, we are very pleased by the overall improvement in student satisfaction. We had an extremely high student-to-faculty ratio in the department. We believe that some of the improvement that you are seeing is attributed to the hiring that has been done by the department. While we still believe that the student-to-faculty ratio is too high, we have fortunately been given permission by the College of Engineering and the Provost's office to conduct three tenure track faculty searches during the 2015-2016 academic year. This should serve to improve the quality of education that we will be able to offer the students in the department. We have also recently made some significant changes, particularly to our computer science programs, which we believe will improve the quality of the programs and student satisfaction.

Graduate - CN

Student Satisfaction (e.g., exit survey data on overall program satisfaction).* If available, report by year, for the last 3 years			Learner Outcomes (e.g., capstone, licensing/certification exam pass-rates) by year, for the last three years				
Year	N	Result (e.g., 4.5 on scale of 1-5, where 5 highest)	Year	N	Name of Exam	Program Result	National Comparison±
2012	38	4.1	1				
2013	45	4.0	2				
2014	57	4.1	3				

Graduate - CS

Student Satisfaction (e.g., exit survey data on overall program satisfaction).* If available, report by year, for the last 3 years			Learner Outcomes (e.g., capstone, licensing/certification exam pass-rates) by year, for the last three years				
Year	N	Result (e.g., 4.5 on scale of 1-5, where 5 highest)	Year	N	Name of Exam	Program Result	National Comparison±
2012	21	4.1	1				
2013	10	3.7	2				
2014	16	4.2	3				

Graduate - EE

Student Satisfaction (e.g., exit survey data on overall program satisfaction).* If available, report by year, for the last 3 years			Learner Outcomes (e.g., capstone, licensing/certification exam pass-rates) by year, for the last three years				
Year	N	Result (e.g., 4.5 on scale of 1-5, where 5 highest)	Year	N	Name of Exam	Program Result	National Comparison±
2012	67	4.2	1				
2013	66	4.2	2				
2014	60	4.3	3				

Graduate students generally seem very pleased with our graduate programs. There was a small dip in 2013 in our MSCS student satisfaction. However, this may be due to the small sample size. Recently we saw a large increase in the number of applications for our MS programs. This resulted in much larger enrollment in our MS programs and MS classes. As a consequence, we have recently revised our admission process and increased our admission standards in order to make sure that the quality of programs and student satisfaction remain high.

e. Provide aggregate data on how the goals of the *WSU General Education Program* and *KBOR 2020 Foundation Skills* are assessed in undergraduate programs (optional for graduate programs).

Outcomes:	Results	
	Majors	Non-Majors
○ Have acquired knowledge in the arts, humanities, and natural and social sciences ○ Think critically and independently ○ Write and speak effectively ○ Employ analytical reasoning and problem solving techniques		

Note: Not all programs evaluate every goal/skill. Programs may choose to use assessment rubrics for this purpose. Sample forms available at: http://www.aacu.org/value/rubrics/

Many of these goals match with our ABET outcomes in Section 3 b. The table below shows the correlation. We are currently not assessing library research skills directly. See Section 3b for an assessment of EECS undergraduate majors. We did not assess non-majors.

WSU General Education Program and KBOR 2020 Foundation Skills	Similar ABET Student Outcome
Write and speak effectively	(g) An ability to communicate effectively
Think critically and independently	(b) Ability to design/conduct experiments, and analyze/interpret data
Employ analytical reasoning and problem solving techniques	(e) An ability to identify, formulate, and solve engineering problems
Have acquired knowledge in the arts, humanities, and natural and social sciences	(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

f. For programs/departments with concurrent enrollment courses (per KBOR policy), provide the assessment of such courses over the last three years (disaggregated by each year) that assures grading standards (e.g., papers, portfolios, quizzes, labs, etc.) course management, instructional delivery, and content meet or exceed those in regular on-campus sections.

We do not offer concurrent enrollment courses.

g. Indicate whether the program is accredited by a specialty accrediting body including the next review date and concerns from the last review.

Our undergraduate programs are accredited by ABET. Our next visit will be in 2020. Our last visit was in 2013. There were no concerns for any of the 3 programs after the last review.

h. Provide the process the department uses to assure assignment of credit hours (per WSU policy 2.18) to all courses has been reviewed over the last three years.

That catalog has been reviewed to ensure that all courses meet the definitions of 2.18. All new courses go through the CCF process that ensures that they meet the definitions of 2.18. The chair is responsible for the course schedule each semester and ensures that all courses are scheduled for the proper amount of time that matches the catalog and the definitions of 2.18. Faculty are also required to

include the credit hour definitions in their syllabus. This ensures that students are also aware of the out of class requirements.

i. Provide a brief assessment of the overall quality of the academic program using the data from 3a – e and other information you may collect, including outstanding student work (e.g., outstanding scholarship, inductions into honor organizations, publications, special awards, academic scholarships, student recruitment and retention).

The overall quality of the academic programs is high. We have an excellent faculty. Our enrollment numbers indicate that our undergraduate and graduate programs are some of the most sought after programs in the university. While not indicated directly here, the department and college have made significant investments over the last 6 years in laboratory equipment for educational laboratories.

4a. Analyze the student need and employer demand for the program. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).

a. Utilize the table below to provide data that demonstrates student need and demand for the program.

Undergraduate - CE

Majors						Employment of Majors*					
Last 3 FYs – Su, Fl, and Sp	No. new applicants	No. admitted	No. census day	Total no. of grads	Average Salary	Employment % In state	Employment % in the field	Employment: % related to the field	Employment: % outside the field	No. pursuing graduate or professional education	Projected growth from BLS**
2012	89	80	48	24	See Table 1						Current year only
2013	104	92	46	23							
2014	149	148	58	17							

Race/Ethnicity by Major***										Race/Ethnicity by Graduate***								
	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK
2011	20	12	2	12	12	0	83	2	7	7	0	1	0	1	0	11	0	2
2012	17	15	0	16	7	0	79	3	9	7	0	0	1	2	0	11	0	1
2013	15	15	0	17	7	0	89	1	9	2	1	0	2	1	0	9	0	0

* May not be collected every year

** Go to the U.S. Bureau of Labor Statistics Website: http://www.bls.gov/oco/ and view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data)

*** NRA=Non-resident alien; H=Hispanic; AI/AN=American Indian/ Alaskan Native; A=Asian; B=Black; NH/PI=Native Hawaiian/Pacific Islander; C=Caucasian; MR=Multi-race; UNK=Unknown

KBOR data minima for UG programs: Majors=25; Graduates=10; Faculty=3; KBOR data minima for master programs: Majors=20; Graduates=5; Faculty=3 additional; KBOR data minima for doctoral programs: Majors=5; Graduates=2; Faculty=2 additional.

Provide a brief assessment of student need and demand using the data from the table above. Include the most common types of positions, in terms of employment, graduates can expect to find.

As indicated by the number of majors and the number of graduates in the table above, there is a strong student interest in our BS in Computer Engineering program. Computer engineering graduates could be employed as computer programmers, computer system analysts, information security analysts, web developers, computer network architects, network and computer systems administrators, software developers, database administrators, or computer hardware engineers. As shown in Table 1, the Bureau of Labor and Statistics expects job growth from 2012 to 2022 in all of these areas. In fact, many of these career areas are expected to grow much faster than average.

Table 1 Data from the Bureau of Labor & Statistics

	Median Pay	Jobs in 2012	Job Outlook 2012-2022	Entry Level Education
Computer Programmers	$74,280	343,700	8% (As fast as average)	Bachelor
Computer System Analysts	$79,680	520,600	25% (Much faster than average)	Bachelor
Information Security Analysts	$86,170	75,100	37% (Much faster than average)	Bachelor
Network and Computer Systems Administrators	$72,560	366,400	12% (As fast as average)	Bachelor
Software Developers	$93,530	1,018,000	22% (Much faster than average)	Bachelor
Database Administrators	$77,080	118,700	15% (Faster than average)	Bachelor
Electrical and Electronics Engineers	$89,630	306,100	4% (Slower than average)	Bachelor
Computer Hardware Engineers	$100,920	83,300	7% (Slower than average)	Bachelor

4b. Analyze the student need and employer demand for the program. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).

a. Utilize the table below to provide data that demonstrates student need and demand for the program.

Undergraduate – CS

Majors						Employment of Majors*					
Last 3 FYs – Su, Fl, and Sp	No. new applicants	No. admitted	No. census day	Total no. of grads	Average Salary	Employment % In state	Employment % in the field	Employment: % related to the field	Employment: % outside the field	No. pursuing graduate or professional education	Projected growth from BLS**
2012	159	138	64	20	See Table 1						Current year only
2013	151	143	82	18							
2014	211	205	100	14							

Race/Ethnicity by Major***										Race/Ethnicity by Graduate***								
	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK
2011	17	10	3	13	8	0	125	1	13	0	0	0	1	1	0	16	0	2
2012	24	12	2	19	8	0	121	2	14	2	0	0	2	1	0	11	0	2
2013	17	10	3	26	8	0	149	6	13	3	0	0	0	0	0	11	0	0

* May not be collected every year

** Go to the U.S. Bureau of Labor Statistics Website: http://www.bls.gov/oco/ and view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data)

*** NRA=Non-resident alien; H=Hispanic; AI/AN=American Indian/ Alaskan Native; A=Asian; B=Black; NH/PI=Native Hawaiian/Pacific Islander; C=Caucasian; MR=Multi-race; UNK=Unknown

KBOR data minima for UG programs: Majors=25; Graduates=10; Faculty=3; KBOR data minima for master programs: Majors=20; Graduates=5; Faculty=3 additional; KBOR data minima for doctoral programs: Majors=5; Graduates=2; Faculty=2 additional.

Provide a brief assessment of student need and demand using the data from the table above. Include the most common types of positions, in terms of employment, graduates can expect to find.

As indicated by the number of majors and the number of graduates in the table above, there is strong student interest in our BS in Computer Science program. Computer science graduates could be employed as computer programmers, computer system analysts, information security analysts, web developers, computer network architects, network and computer systems administrators, software developers, or database administrators. As shown in Table 1, the Bureau of Labor and Statistics expects job growth from 2012 to 2022 in all of these areas. In fact, many of these career areas are expected to grow much faster than average.

4c. **Analyze the student need and employer demand for the program. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).**

a. Utilize the table below to provide data that demonstrates student need and demand for the program.

Undergraduate – EE

Majors						Employment of Majors*					
Last 3 FYs – Su, Fl, and Sp	No. new appli-cants	No. admitted	No. census day	Total no. of grads	Average Salary	Employ-ment % In state	Employment % in the field	Employment: % related to the field	Employment: % outside the field	No. pursuing graduate or profes-sional educa-tion	Projected growth from BLS**
2012	110	103	61	41	See Table 1						Current year only
2013	83	74	39	34							
2014	126	124	68	30							

Race/Ethnicity by Major***										Race/Ethnicity by Graduate***								
	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK
2011	48	9	2	25	7	0	95	8	15	13	1	0	9	0	0	15	0	3
2012	51	7	1	17	14	0	92	5	13	12	3	1	4	2	0	9	0	2
2013	57	16	0	22	11	0	100	4	14	9	1	0	4	1	0	12	0	3

* May not be collected every year

** Go to the U.S. Bureau of Labor Statistics Website: http://www.bls.gov/oco/ and view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data)

*** NRA=Non-resident alien; H=Hispanic; AI/AN=American Indian/ Alaskan Native; A=Asian; B=Black; NH/PI=Native Hawaiian/Pacific Islander; C=Caucasian; MR=Multi-race; UNK=Unknown

KBOR data minima for UG programs: Majors=25; Graduates=10; Faculty=3; KBOR data minima for master programs: Majors=20; Graduates=5; Faculty=3 additional; KBOR data minima for doctoral programs: Majors=5; Graduates=2; Faculty=2 additional.

Provide a brief assessment of student need and demand using the data from the table above. Include the most common types of positions, in terms of employment, graduates can expect to find.

As indicated by the number of majors and the number of graduates in the table above, there is strong student interest in our BS in Electrical Engineering program. Electrical Engineering graduates could be employed as electrical or electronics engineers. As shown in Table 1, the Bureau of Labor and Statistics expects job growth from 2012 to 2022 in these areas.

4d. **Analyze the student need and employer demand for the program. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).**

a. Utilize the table below to provide data that demonstrates student need and demand for the program.

Graduate – MSCN

Majors						Employment of Majors*					
Last 3 FYs – Su, Fl, and Sp	No. new applicants	No. admitted	No. census day	Total no. of grads	Average Salary	Employment % In state	Employment % in the field	Employment: % related to the field	Employment: % outside the field	No. pursuing graduate or professional education	Projected growth from BLS**
2012	126	109	47	34	See Table 1						Current year only
2013	133	120	51	48							
2014	256	244	139	44							

Race/Ethnicity by Major***										Race/Ethnicity by Graduate***								
	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK
2011	62	1	1	3	2	0	6	0	2	30	1	0	0	1	0	1	0	1
2012	61	1	2	4	0	0	9	0	1	41	3	0	2	1	0	3	0	1
2013	93	0	1	8	0	0	8	0	1	43	0	0	1	0	0	0	0	0

* May not be collected every year

** Go to the U.S. Bureau of Labor Statistics Website: http://www.bls.gov/oco/ and view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data)

*** NRA=Non-resident alien; H=Hispanic; AI/AN=American Indian/ Alaskan Native; A=Asian; B=Black; NH/PI=Native Hawaiian/Pacific Islander; C=Caucasian; MR=Multi-race; UNK=Unknown

KBOR data minima for UG programs: Majors=25; Graduates=10; Faculty=3; KBOR data minima for master programs: Majors=20; Graduates=5; Faculty=3 additional; KBOR data minima for doctoral programs: Majors=5; Graduates=2; Faculty=2 additional.

Provide a brief assessment of student need and demand using the data from the table above. Include the most common types of positions, in terms of employment, graduates can expect to find.

As indicated by the number of majors and the number of graduates in the table above, there is strong student interest in our Computer Networking program. Computer networking graduates could be employed as information security analysts, web developers, computer network architects, and network systems administrators. As shown in Table 1, the Bureau of Labor and Statistics expects job growth from 2012 to 2022 in all of these areas. In fact, many of these career areas are expected to grow much faster than average.

4e. **Analyze the student need and employer demand for the program. Complete for each program if appropriate**

(refer to instructions in the WSU Program Review document for more information on completing this section).

a. Utilize the table below to provide data that demonstrates student need and demand for the program.

Graduate – MSCS

Majors						Employment of Majors*					
Last 3 FYs – Su, Fl, and Sp	No. new applicants	No. admitted	No. census day	Total no. of grads	Average Salary	Employment % In state	Employment % in the field	Employment: % related to the field	Employment: % outside the field	No. pursuing graduate or professional education	Projected growth from BLS**
2012	132	83	28	20	See Table 1						Current year only
2013	192	181	38	11							
2014	472	461	112	12							

Race/Ethnicity by Major***											Race/Ethnicity by Graduate***								
	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK
2011	29	0	0	4	2	0	5	0	2	16	0	0	3	0	0	1	0	0
2012	23	0	0	6	1	0	7	0	3	7	0	0	1	0	0	1	0	2
2013	85	0	0	7	2	0	8	1	2	9	0	0	2	1	0	0	0	0

* May not be collected every year

** Go to the U.S. Bureau of Labor Statistics Website: http://www.bls.gov/oco/ and view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data)

*** NRA=Non-resident alien; H=Hispanic; AI/AN=American Indian/ Alaskan Native; A=Asian; B=Black; NH/PI=Native Hawaiian/Pacific Islander; C=Caucasian; MR=Multi-race; UNK=Unknown

KBOR data minima for UG programs: Majors=25; Graduates=10; Faculty=3; KBOR data minima for master programs: Majors=20; Graduates=5; Faculty=3 additional; KBOR data minima for doctoral programs: Majors=5; Graduates=2; Faculty=2 additional.

Provide a brief assessment of student need and demand using the data from the table above. Include the most common types of positions, in terms of employment, graduates can expect to find.

As indicated by the number of majors and the number of graduates in the table above, there is strong student interest in our MS in Computer Science programs. Computer science graduates could be employed as computer programmers, computer system analysts, information security analysts, web developers, computer network architects, network and computer systems administrators, software developers, or database administrators. As shown in Table 1, the Bureau of Labor and Statistics expects job growth from 2012 to 2022 in all of these areas. In fact, many of these career areas are expected to grow much faster than average.

4f. Analyze the student need and employer demand for the program. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).

a. Utilize the table below to provide data that demonstrates student need and demand for the program.

Graduate – MSEE

Majors						Employment of Majors*					
Last 3 FYs – Su, Fl, and Sp	No. new appli-cants	No. admitted	No. census day	Total no. of grads	Average Salary	Employ-ment % In state	Employment % in the field	Employment: % related to the field	Employment: % outside the field	No. pursuing graduate or profes-sional educa-tion	Projected growth from BLS**
2012	286	213	77	64	See Table 1						Current year only
2013	296	231	72	57							
2014	594	572	152	41							

Race/Ethnicity by Major***										Race/Ethnicity by Graduate***								
	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK
2011	113	3	0	5	3	0	17	0	2	56	0	0	2	1	0	3	0	2
2012	97	3	0	8	5	0	17	0	4	57	1	0	5	1	0	2	0	1
2013	134	2	0	10	1	0	6	0	3	34	1	0	2	1	0	1	0	2

* May not be collected every year

** Go to the U.S. Bureau of Labor Statistics Website: http://www.bls.gov/oco/ and view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data)

*** NRA=Non-resident alien; H=Hispanic; AI/AN=American Indian/ Alaskan Native; A=Asian; B=Black; NH/PI=Native Hawaiian/Pacific Islander; C=Caucasian; MR=Multi-race; UNK=Unknown

KBOR data minima for UG programs: Majors=25; Graduates=10; Faculty=3; KBOR data minima for master programs: Majors=20; Graduates=5; Faculty=3 additional; KBOR data minima for doctoral programs: Majors=5; Graduates=2; Faculty=2 additional.

Provide a brief assessment of student need and demand using the data from the table above. Include the most common types of positions, in terms of employment, graduates can expect to find.

As indicated by the number of majors and the number of graduates in the table above, there is strong student interest in our MS in Electrical Engineering program. In fact, this is one of the largest graduate programs on campus. Electrical Engineering graduates could be employed as electrical or electronics engineers, information security analysts, computer network architects, or network systems administrators. As shown in Table 1, the Bureau of Labor and Statistics expects job growth from 2012 to 2022 in these areas.

4g. **Analyze the student need and employer demand for the program. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).**

a. Utilize the table below to provide data that demonstrates student need and demand for the program.

Graduate – PhD

Majors						Employment of Majors*					
Last 3 FYs – Su, Fl, and Sp	No. new appli-cants	No. admitted	No. census day	Total no. of grads	Average Salary	Employ-ment % In state	Employment % in the field	Employment: % related to the field	Employment: % outside the field	No. pursuing graduate or profes-sional educa-tion	Projected growth from BLS**
2012	Data was provided to department with MSEE data.			2	See Table 1						Current year only
2013				5							
2014				10							

	Race/Ethnicity by Major***									Race/Ethnicity by Graduate***								
	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK	NRA	H	AI/AN	A	B	NH/PI	C	MR	UNK
2011	29	0	0	3	0	0	7	0	0	2	0	0	0	0	0	0	0	0
2012	26	0	0	3	0	0	5	0	0	4	0	0	1	0	0	0	0	0
2013	25	0	0	1	0	0	4	0	0	8	0	0	1	1	0	0	0	0

* May not be collected every year

** Go to the U.S. Bureau of Labor Statistics Website: http://www.bls.gov/oco/ and view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data)

*** NRA=Non-resident alien; H=Hispanic; AI/AN=American Indian/ Alaskan Native; A=Asian; B=Black; NH/PI=Native Hawaiian/Pacific Islander; C=Caucasian; MR=Multi-race; UNK=Unknown

KBOR data minima for UG programs: Majors=25; Graduates=10; Faculty=3; KBOR data minima for master programs: Majors=20; Graduates=5; Faculty=3 additional; KBOR data minima for doctoral programs: Majors=5; Graduates=2; Faculty=2 additional.

Provide a brief assessment of student need and demand using the data from the table above. Include the most common types of positions, in terms of employment, graduates can expect to find.

While we have recently graduated a large number of PhD students, interest in the program remains strong. As shown in Table 1, the Bureau of Labor and Statistics expects job growth from 2012 to 2022 in these areas. As the students will graduate with doctorates, many will be employed in academic and research careers.

5. **Analyze the service the Program provides to the discipline, other programs at the University, and beyond. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).**

Percentage of SCH Taken By (last 3 years)			
Fall Semester	Year 1 (2011)	Year 2 (2012)	Year 3 (2013)
UG Majors	51.8	53.9	45.3
Gr Majors	36.9	32.4	42.2
Non-Majors	11.3	13.7	12.4

a. Provide a brief assessment on the service the Program provides. Comment on percentage of SCH taken by majors and non-majors, nature of Program in terms of the service it provides to other University programs, faculty service to the institution, and beyond.

As we have a large number of majors in the department, over 1000, it is not surprising that the majority of our SCH, over 90%, are taken by our majors. The majority of non-major SCH are from other majors in the CoE, but students outside of the CoE will take some of our computer science courses.

6. **Report on the Program'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
	NA		
	NA		
	NA		

The previous program review actually had 6 goals. They are listed below along outcomes.

1. To improve student to faculty ratio we plan to increase # of tenure track faculty – Our faculty to student ratio went from 59 (fall census 2010) to 51 (fall census 2013). It increased in 2014 due to a large increase in the number of graduate students, but as mentioned earlier we are making adjustments to our MS admission processes to make the sure the quality of our programs are maintained.
2. Improve technical support – went from 0 technicians in the department at the time of the last review to 2 technicians in the department. This has greatly increased the productivity of faculty and staff both and inside and outside the classroom. It has also improved the quality of education that we can offer the students.
3. Expand scope of PhD program to include CS majors – PhD program has been expanded from an EE program to an EECS program. This reflects a change in the research direction of our merged department and better serves all our students and faculty.
4. Complete strategic plan for department – this has been completed and is used to guide direction of department and allocation of resources.
5. Strengthen research programs in department – some progress has been made, but this is still a work in progress.
6. Move department to a culture of continuous assessment and improvement – some progress has been made, but this is still a work in progress.

7. Summary and Recommendations

a. Set forth a summary of the report including an overview evaluating the strengths and concerns. List recommendations for improvement of each Program (for departments with multiple programs) that have resulted from this report (relate recommendations back to information provided in any of the categories and to the goals and objectives of the program as listed in 1e). Identify three year goal (s) for the Program to be accomplished in time for the next review.

Electrical Engineering and Computer Science (EECS) has only been a department since 2008. The merged department was formed from the Electrical and Computer Engineering (ECE) department and the Computer Science (CS) department. We are also a very young department in the sense that less than more than half of our faculty are untenured. A list of strengths, concerns, and goals are listed below.

Strengths:

1. Strong Enrollments
2. Productive Faculty

Concerns:

1. Large student to faculty ratio

Plan/Goals:

1. To improve student to faculty ratio we plan to increase # of tenure track faculty
2. Strengthen research programs in department
3. To meet the goals of our strategic plan, while improving our student to faculty ratio, we need to make changes to the makeup of our student enrollment by growing our BS and PhD programs and reducing our MS program