WICHITA STATE UNIVERSITY

Program Review Self-Study Template

Academic unit: Electrical Engineering and Computer Science

College: Engineering

Date of last review 2008

Date of last accreditation report (if relevant) 2007

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 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 & Graduate Coord

Animesh Chakravarthy, Assistant Professor

Yanwu Ding, Assistant Professor

Murtuza Jadliwala, Assistant Professor

Ward Jewell, Professor

Huzefa Kagdi, Assistant Professor

Preethika Kumar, Assistant Professor

Hyuck Kwon, Professor, Professor _____

Vinod Namboodiri, Assistant Professor _____

Ravi Pendse, Professor and Chief Information Officer _____

Prakash Ramanan, Professor _____

Steven Skinner, Professor and Associate Dean _____

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:

Wichita State University is committed to providing comprehensive educational opportunities in an urban setting. Through teaching, scholarship and public service the University seeks to equip both students and the larger community with the educational and cultural tools they need to thrive in a complex world, and to achieve both individual responsibility in their own lives and effective citizenship in the local, national and global community.

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 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.

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:

- To enable students to enter into the electrical engineering field by providing them with the fundamental knowledge necessary for the practice of electrical engineering, including scientific principles, rigorous analysis, and creative design, to meet the requirements of employer constituents.
- To provide an undergraduate education that will enable qualified students to pursue graduate studies in electrical engineering and related fields.

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

- To enable students to enter into the computer engineering field by providing them with the fundamental knowledge necessary for the practice of computer engineering, including scientific principles, rigorous analysis, and creative design, to meet the requirements of employer constituents.
- To provide an undergraduate education that will enable qualified students to pursue graduate studies in computer engineering and related fields.

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

- To enable students to enter into the computer science field by providing them with the fundamental knowledge necessary for the practice of computer science, including scientific principles, rigorous analysis, and creative design, to meet the requirements of employer constituents.
- To provide an undergraduate education that will enable qualified students to pursue graduate studies in computer science and related fields.

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

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

The roles of the MS in Electrical Engineering program are 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 program is to prepare students for the highest-level careers in electrical engineering and related fields in academia, research and industry.

The programs share in Wichita State University's commitment to (a) "providing comprehensive educational opportunities in an urban setting" and (b) "the highest ideals of teaching, scholarship, and public service, as the University strives to be a comprehensive, metropolitan university of national stature."

The programs' missions are also in line with the College of Engineering's commitment to (a) "prepare graduates who will engage effectively and responsibly in the practice of the engineering profession in a global economy and in pursuing advanced engineering education", (b) "conduct applied and basic research to support and contribute to the social and economic well-being of citizens and organizations in the Wichita metropolitan area, the state of Kansas and beyond", and (c) "evolve thoughtfully in response to the needs of industry and the changing world."

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?

   There is currently no need to change.

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 of the BS in Electrical Engineering program are as follows:

1. To enable students to enter into the electrical engineering field by providing them with the fundamental knowledge necessary for the practice of electrical engineering, including scientific principles, rigorous analysis, and creative design, to meet the requirements of employer constituents.
2. To provide an undergraduate education that will enable qualified students to pursue graduate studies in electrical engineering and related fields.

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:

1. To enable students to enter into the computer engineering field by providing them with the fundamental knowledge necessary for the practice of computer engineering, including scientific principles, rigorous analysis, and creative design, to meet the requirements of employer constituents.
2. To provide an undergraduate education that will enable qualified students to pursue graduate studies in computer engineering and related fields.

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:

1. To enable students to enter into the computer science field by providing them with the fundamental knowledge necessary for the practice of computer science, including scientific principles, rigorous analysis, and creative design, to meet the requirements of employer constituents.
2. To provide an undergraduate education that will enable qualified students to pursue graduate studies in computer science and related fields.

The MS in Computer Science (MSCS) program prepares students for research and design in the area of computers science. 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 CESP750D Engineering Research Writing and two core courses selected from the following: CS615 Compiler Construction, CS665 Introduction to Databases, CS720 Theoretical Foundations of Computer Science, and CS721 Algorithms. The plan of study must also have at least 18 CS hours, 60 percent of the hours at the 700 level or higher, and two 800 or 900 level CS courses.

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 careers in computer networking and information security. The curriculum structure provides the students with an integrated experience in system engineering, economics, architecture, computer security, or policies of computer communication networks. These topics are covered in the core and elective courses. The program encompasses courses offered by departments in several colleges, including Engineering, Liberal Arts and Sciences, and the Barton School of Business. The comprehensive nature of the program aims at enhancing the strong ties that Wichita State University currently enjoys with various companies, including Cisco Systems and NetApp among others. To fulfill the degree requirements, a student must complete the courses on a plan of study to be approved by an adviser, the Graduate Coordinator, and the Dean of the Graduate School. A student's plan of study will ensure sufficient depth in both theory and application of computer networking by completing specific required core courses. It will also

provide enough flexibility by allowing the students to choose courses from a wide range of electives to satisfy their individual career goals. This is what makes it a unique and comprehensive program. The courses in the curriculum provide the students with an integrated experience in system engineering, economics, architecture, computer security, and policies of computer communication networks.

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 prepares students for research and design in the areas of control systems, communications, signal processing, computers and digital systems, energy and power systems or computer networking. 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 plan of study must contain CESP750D Engineering Research Writing and two core courses selected from the following: EE697 Electric Power System Analysis, EE726 Digital Communications, CS736 Data Communications, EE754 Probabilistic Methods in Systems, EE782 Digital Signal Processing, and EE792 Linear Systems. The plan of study must also have at least 18 EECS hours, 60 percent of the hours at the 700 level or higher, and two 800 or 900 level EECS courses.

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 (PhD EE) program prepares students for research and design in the areas of control systems, communications, signal processing, computers and digital systems, energy and power systems and computer networking. The PhD EE degree requires the satisfactory completion of a program approved by the student's doctoral advisory committee and the Dean of the Graduate School. The program normally contains at least 30 hours of post-master's graduate course work. A doctoral student must pass a comprehensive examination, a dissertation approval exam, and a final oral presentation and defense of dissertation.

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

**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). Complete a separate table for each program if appropriate.**

UG Program - CE (SCH from entire department)

| 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→FY2009 | 14 | 14 | 16.9 | 2.0 | 5.0 | 11,188 | 58 | 15 |
| Year 2→FY2010 | 12 | 12 | 12.9 | 2.9 | 4.3 | 11,604 | 78 | 14 |
| Year 3→FY2011 | 14 | 14 | 14.4 | 2.0 | 4.0 | | 86 | 12 |

| Total Number Instructional (FTE) – TTF+GTA+O | | SCH/ FTE | Majors/ FTE | Grads/ FTE |
|---|---|---|---|---|
| Year 1→FY2009 | 23.9 | 468 | -- | -- |
| Year 2→FY2010 | 23.5 | 493 | -- | -- |
| Year 3→FY2011 | 28.3 | | | |

| 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 CY2009 | 7 | | 14 | | 26 | | | | | | | | | | | | 1,458,492 |
| Year 2 CY2010 | 13 | | 18 | | 35 | | | | | | | | | | | | 1,973,196 |
| Year 3 CY2011 | 8 | | 5 | | 47 | | | | | | | | | | | | 671,762 |

* 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 fifteen full-time faculty members who teach in the department; including the chair John Watkins, who is 0.5 FTE administrator, Steven Skinner, who is a 0.5 FTE Associate Dean in the College of Engineering Dean's office, Animesh Chakravarthy, who is 0.5 FTE in Aerospace Engineering, and Ravi Pendse, who is 1.0 FTE Chief Information Officer for the University. All faculty members have Ph.D. degrees and all teach courses at the graduate and undergraduate level. Faculty expertise is balanced into prominent areas of electrical and computer engineering and computer science including electrical power systems, controls, communications, computer networking, sensor networks, 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 presentations, 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 U.S. Navy Engineering Logistics Office (via Acxiom Corporation), Cisco, Air Force Research Lab, Federal Aviation Administration, Power Systems Engineering Research Center, National Science Foundation, Department of Energy, International Aerospace Quality Group (IAQG), Kansas NSF EPSCoR, NASA EPSCoR CAN, KART and DoD EPSCoR ARO.

The faculty has also strived for excellence in teaching and research and, as a result, has won several awards. Recent awards include: Best-Paper Award at the 25th IEEE AINA-2011 conference in Singapore, College of Engineering Wallace Excellence in Research Award, College of Engineering Wallace Excellence in Teaching Award, Senior Coleman Entrepreneurial Faculty Fellowship, WWU Cooperative Education and Work-Based Learning Faculty Advisor of the Year, WSU Excellence in Teaching Award, and WSU College of Health Professions Leadership Fellow.

The faculty of the Electrical Engineering and Computer Science Department are very active in service to the profession. All EECS faculty are members of the professional society which covers their respective area and have been involved with reviewing articles for technical journals and serving as session chairs to various professional conferences. Below is a sample of some other services to the profession that have been recently performed by EECS faculty members:

- IEEE PES Ramakumar Family Award Committee
- IEEE PES Renewable Technologies Subcommittee
- IEEE PES Distributed Generation and Energy Storage Subcommittee
- IEEE PES Power Engineering Education Committee (PEEC)
- IEEE PES Subcommittee on Implementing Technology for Climate Change
- Program Co-chair of Traceability in Emerging Forms of Software Engineering Workshop
- Proceedings Chair of the IEEE International Conference on Software Maintenance
- Review Board Member of the Proceedings of the VLDB
- Publications Chair for the ASME Dynamic Systems and Control Conference
- Corresponding Editor for Conference Activities, IEEE Control Systems Magazine
- Associate Editor of the Conference Editorial Board of the IEEE Control Systems Society
- Technical Program Committee Members of the following conferences:
    - IEEE Globecom
    - IEEE IPCC
    - IEEE GREENCOM
    - IEEE CCNC-EDCN
    - ICNC-GCNC

- IEEE Vehicular Technology Conference
- IEEE International Conference on Communications
- IEEE International Conference on Software Maintenance
- ACM/IEEE Working Conference on Mining Software Repositories
- International Conference on Advances in Controls and Optimization of Dynamical Systems
- IEEE International Conference on Trust, Security and Privacy in Computing and Communications

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 five tenure track faculty members and two Engineering Educators during the 2012-2013 academic year. These new faculty members will have credentials placing them at the forefront in their area of expertise.

**2b. 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). Complete a separate table for each program if appropriate.**

UG Program - CS

| 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→FY2009 | * | * | * | * | * | N/A | 126 | 22 |
| Year 2→FY2010 | * | * | * | * | * | N/A | 122 | 17 |
| Year 3→FY2011 | * | * | * | * | * | N/A | 101 | 19 |
| | | | Total Number Instructional (FTE) – TTF+GTA+O | | | SCH/ FTE | Majors/ FTE | Grads/ FTE |
| Year 1→ | | | | | N/A | N/A | N/A | N/A |
| Year 2→ | | | | | N/A | N/A | N/A | N/A |
| Year 3→ | | | | | N/A | N/A | N/A | N/A |

| 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 | $ Grant Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ref | Non-Ref | Ref | Non-Ref | Ref | Non-Ref | * | ** | *** | Juried | **** | Juried | Non-Juried | | | | |
| Year 1 | | | | | | | | | | | | | | | | | |
| Year 2 | | | | | | | | | | | | | | | | | |
| Year 3 | | | | | | | | | | | | | | | | | |

* 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.

*From the table on page 3, indicate number of faculty (and instructional FTE) teaching in the undergraduate program.

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.

See section 2a for an assessment of the departmental faculty and staff.

**2c. 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). Complete a separate table for each program if appropriate.**

UG Program -EE

| 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→FY2009 | * | * | * | * | * | N/A | 115 | 29 |
| Year 2→FY2010 | * | * | * | * | * | N/A | 142 | 47 |
| Year 3→FY2011 | * | * | * | * | * | N/A | 148 | 40 |
| | | | Total Number Instructional (FTE) – TTF+GTA+O | | | SCH/ FTE | Majors/ FTE | Grads/ FTE |
| Year 1→ | | | | | N/A | N/A | N/A | N/A |
| Year 2→ | | | | | N/A | N/A | N/A | N/A |
| Year 3→ | | | | | N/A | N/A | N/A | N/A |

| 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 | $ Grant Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ref | Non-Ref | Ref | Non-Ref | Ref | Non-Ref | * | ** | *** | Juried | **** | Juried | Non-Juried | | | | |
| Year 1 | | | | | | | | | | | | | | | | | |
| Year 2 | | | | | | | | | | | | | | | | | |
| Year 3 | | | | | | | | | | | | | | | | | |

* 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.

*From the table on page 3, indicate number of faculty (and instructional FTE) teaching in the undergraduate program.

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.

See section 2a for an assessment of the departmental faculty and staff.

**2d. 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). Complete a separate table for each program if appropriate.**

MS-CS/CN Programs

| 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→FY2009 | * | * | * | * | * | N/A | 66 | 16 |
| Year 2→FY2010 | * | * | * | * | * | N/A | 105 | 18 |
| Year 3→FY2011 | * | * | * | * | * | N/A | 119 | 34 |
| | | | Total Number Instructional (FTE) – TTF+GTA+O | | | SCH/ FTE | Majors/ FTE | Grads/ FTE |
| Year 1→ | | | | | N/A | N/A | N/A | N/A |
| Year 2→ | | | | | N/A | N/A | N/A | N/A |
| Year 3→ | | | | | N/A | N/A | N/A | N/A |

| 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 | $ Grant Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ref | Non-Ref | Ref | Non-Ref | Ref | Non-Ref | * | ** | *** | Juried | **** | Juried | Non-Juried | | | | |
| Year 1 | | | | | | | | | | | | | | | | | |
| Year 2 | | | | | | | | | | | | | | | | | |
| Year 3 | | | | | | | | | | | | | | | | | |

* 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.

*From the table on page 3, indicate number of faculty (and instructional FTE) teaching in the graduate program.

b. 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.

See section 2a for an assessment of the departmental faculty and staff.

**2e. 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). Complete a separate table for each program if appropriate.**

MS-EE Program

| 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→FY2009 | * | * | * | * | * | N/A | 208 | 90 |
| Year 2→FY2010 | * | * | * | * | * | N/A | 221 | 61 |
| Year 3→FY2011 | * | * | * | * | * | N/A | 195 | 114 |
| | | | | | Total Number Instructional (FTE) – TTF+GTA+O | SCH/ FTE | Majors/ FTE | Grads/ FTE |
| Year 1→ | | | | | N/A | N/A | N/A | N/A |
| Year 2→ | | | | | N/A | N/A | N/A | N/A |
| Year 3→ | | | | | N/A | N/A | N/A | N/A |

| 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 | $ Grant Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ref | Non-Ref | Ref | Non-Ref | Ref | Non-Ref | * | ** | *** | Juried | **** | Juried | Non-Juried | | | | |
| Year 1 | | | | | | | | | | | | | | | | | |
| Year 2 | | | | | | | | | | | | | | | | | |
| Year 3 | | | | | | | | | | | | | | | | | |

* 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.

*From the table on page 3, indicate number of faculty (and instructional FTE) teaching in the graduate program.

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.

See section 2a for an assessment of the departmental faculty and staff.

**2f. 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). Complete a separate table for each program if appropriate.**

PhD Program

| 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→FY2009 | * | * | * | * | * | N/A | 28 | 4 |
| Year 2→FY2010 | * | * | * | * | * | N/A | 37 | 2 |
| Year 3→FY2011 | * | * | * | * | * | N/A | 40 | 2 |
| Total Number Instructional (FTE) – TTF+GTA+O | | | | | | SCH/ FTE | Majors/ FTE | Grads/ FTE |
| Year 1→ | | | | | N/A | N/A | N/A | N/A |
| Year 2→ | | | | | N/A | N/A | N/A | N/A |
| Year 3→ | | | | | N/A | N/A | N/A | N/A |

| 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 | $ Grant Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ref | Non-Ref | Ref | Non-Ref | Ref | Non-Ref | * | ** | *** | Juried | **** | Juried | Non-Juried | | | | |
| Year 1 | | | | | | | | | | | | | | | | | |
| Year 2 | | | | | | | | | | | | | | | | | |
| Year 3 | | | | | | | | | | | | | | | | | |

* 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.

*From the table on page 3, indicate number of faculty (and instructional FTE) teaching in the graduate program.

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.

See section 2a for an assessment of the departmental faculty and staff.

**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→FY2009 | 58 | 126 | 115 | 26.0 | 23.5 | 23.4 | 22.66 |
| Year 2→FY2010 | 78 | 122 | 142 | 25.0 | 24.3 | 24.0 | 22.72 |
| Year 3→FY2011 | 86 | 101 | 195 | 25.2 | 25.4 | 24.4 | 22.81 |

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 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MS | | | PhD | GPA | | | | Comparisons | | | |
| | CS | EE | CN | EE | CS | EE | CN | PhD | College – MS | College – PhD | Univ - MS | Univ PhD |
| Year 1→ | 129 | 343 | 5 | 14 | 3.35 | 3.27 | 3.26 | 3.53 | 3.33 | 3.51 | 3.48 | 3.62 |
| Year 2→ | 131 | 245 | 67 | 21 | 3.31 | 3.32 | 3.40 | 3.64 | 3.36 | 3.57 | 3.48 | 3.62 |
| Year 3→ | 77 | 174 | 100 | 15 | 3.44 | 3.35 | 3.47 | 3.58 | 3.40 | 3.60 | 3.48 | 3.67 |

*If your admission process uses another GPA calculation, revise table to suit program needs and enter your internally collected data.

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. Their six year accreditation is up for renewal during the 2013–2014 academic year. The BSCS program will also seek (first-time) accreditation at that time. Each of these programs has two Program Educational Objectives (PEOs), and eleven Student Outcomes. The Student Outcomes are adopted from ABET.

**Program Educational Objectives**

PEO1 Prepare Students for employment in the industry.
PEO2 Prepare Students for graduate school.

**ABET Student Outcomes**

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.

**Review of the BSEE Program**

| Learning Outcomes | Assessment Tool | Target/Criteria | Results | Analysis |
|---|---|---|---|---|
| a | 38 Co-op Students' Self Evaln | 3.5/4.0 | 3.5/4.0 | Acceptable |
| | 38 Employers' Evaln | 3.5/4.0 | 3.7/4.0 | Good |
| b | | | 3.4/4.0 | Acceptable |
| | " | " | 3.6/4.0 | Acceptable |
| c | | | 3.1/4.0 | Low |
| | " | " | 3.6/4.0 | Acceptable |
| d | | | 3.5/4.0 | Acceptable |
| | " | " | 3.6/4.0 | Acceptable |
| e | | | 3.6/4.0 | Acceptable |
| | " | " | 3.5/4.0 | Acceptable |
| f | | | 3.8/4.0 | Good |
| | " | " | 3.8/4.0 | Good |
| g | | | 3.5/4.0 | Acceptable |
| | " | " | 3.7/4.0 | Good |
| h | | | 3.2/4.0 | Low |
| | " | " | 3.5/4.0 | Acceptable |
| i | | | 3.6/4.0 | Acceptable |
| | " | " | 3.5/4.0 | Acceptable |
| j | | | 3.3/4.0 | Low |
| | " | " | 3.5/4.0 | Acceptable |
| k | | | 3.6/4.0 | Acceptable |
| | " | " | 3.6/4.0 | Acceptable |
| f | Exit Interview: 72 Students | | | |
| | Importance of Ethics | 8.0/10 | 9.2/10 | Very Good |
| | Ethics of Peers | 8.0/10 | 7.0/10 | Low |
| h | Exit Interview: 72 Students | | | |
| | Chair's Evaluation | 8.0/10 | 6.4/10 | Low |
| i | " | 8.0/10 | 7.1/10 | Acceptable |

| | | | | |
|---|---|---|---|---|
| j | " | 8.0/10 | 5.5/10 | Very Low |
| f | Capstone Survey: 74 Students | 90% | 95% | Very Good |
| g | " | 90% | 90% | Good |

**Description:**

**Co-op Survey:** The Co-op survey covered 38 EECS students of all three bachelor degrees who were enrolled in co-op during the 2010–2011 academic year. Each student evaluated his own ability/knowledge and was also evaluated by the employer on each of the eleven outcomes a–k. For each outcome, the score is from 1 to 4: Never, Sometimes, Usually, Always.

**Exit Interview:** The chair conducted an exit-interview with each of the 72 BSEE graduating seniors, during spring 2010–fall 2011. The exit-interview included both evaluation by the student and evaluation of the student by the chair. Among other things, the student evaluation provides information about how the students perceive the quality of instruction by the faculty and the professional ethics of the students. The students' answers to other questions allow the chair to evaluate the students understanding of the need for life-long learning and their knowledge of global and contemporary issues. It also allows the chair to evaluate their oral communication abilities. Each evaluation is on a scale of 1 to 10, with 10 being the best.

**Capstone Survey:** Each senior BSEE student is required to complete a two-semester capstone sequence EE 585/595. Capstone survey is a survey of the students enrolled in EE 595, during spring 2010–fall 2011. The percentages correspond to students who chose the two most positive answers (out of 4 or 5 answers), such as very-well/well, strongly-agree/agree, or excellent/adequate.

**Evaluation:**

- Scores for Outcomes a, b, d, e, g, i and k are acceptable, but can be improved.
- On Outcome c (ability to design a system/component/process), the co-op students' self-evaluation is low, but their employers' evaluation is higher (acceptable).
- On Outcome f (Understanding of professional/ethical responsibility), students definitely seem to understand the importance of ethics, but the peer-evaluation of their ethics is low.
- On Outcomes h and j, the self-evaluation and chair's evaluation are low. During the exit interview, students were asked questions related to global and contemporary issues. The chair's evaluation is based on their responses to these questions.
- We are trying to rectify the problem with Outcomes f, h and j through the course Phil 385: Engineering Ethics that is required of all BSEE students

**Review of the BSCE Program**

| Learning Outcomes | Assessment Tool | Target/Criteria | Results | Analysis |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| a | 38 Co-op Students' Self Evaln | 3.5/4.0 | 3.5/4.0 | Acceptable |
| | 38 Employers' Evaln | 3.5/4.0 | 3.7/4.0 | Good |
| b | | | 3.4/4.0 | Acceptable |
| | " | " | 3.6/4.0 | Acceptable |
| c | | | 3.1/4.0 | Low |
| | " | " | 3.6/4.0 | Acceptable |
| d | | | 3.5/4.0 | Acceptable |
| | " | " | 3.6/4.0 | Acceptable |
| e | | | 3.6/4.0 | Acceptable |
| | " | " | 3.5/4.0 | Acceptable |
| f | | | 3.8/4.0 | Good |
| | " | " | 3.8/4.0 | Good |
| g | | | 3.5/4.0 | Acceptable |
| | " | " | 3.7/4.0 | Good |
| h | | | 3.2/4.0 | Low |
| | " | " | 3.5/4.0 | Acceptable |
| i | | | 3.6/4.0 | Acceptable |
| | " | " | 3.5/4.0 | Acceptable |
| j | | | 3.3/4.0 | Low |
| | " | " | 3.5/4.0 | Acceptable |
| : | | | 3.6/4.0 | Acceptable |
| | " | " | 3.6/4.0 | Acceptable |
| f | Exit Interview: 34 Students | | | |
| | Importance of Ethics | 8.0/10 | 8.9/10 | Very Good |
| | Ethics of Peers | 8.0/10 | 7.3/10 | Low |
| h | Exit Interview: 34 Students | | | |
| | Chair's Evaluation | 8.0/10 | 6.7/10 | Low |
| i | " | 8.0/10 | 7.4/10 | Acceptable |
| j | " | 8.0/10 | 6.0/10 | Very Low |
| f | Capstone Survey: 32 Students | 90% | 93% | Very Good |
| g | " | 90% | 90% | Good |

**Description:**

**Co-op Survey:** The Co-op survey covered 38 EECS students of all three bachelor degrees who were enrolled in co-op during the 2010–2011 academic year. Each student evaluated his own ability/knowledge and was also evaluated by the employer on each of the eleven outcomes a–k. For each outcome, the score is from 1 to 4: Never, Sometimes, Usually, Always.

**Exit Interview:** The chair conducted an exit-interview with each of the 34 BSCE graduating seniors, during spring 2010–fall 2011. The exit-interview included both an evaluation of the program by the student and evaluation of the student by e chair. Among other things, the student evaluation provides information about how the students perceive the quality of instruction by the faculty and the professional ethics of the students. The students' answers to other questions allow the chair to evaluate the students understanding of the need for life-long learning and their knowledge of global and

contemporary issues. It also allows the chair to evaluate their oral communication abilities. Each evaluation is on a scale of 1 to 10, with 10 being the best.

**Capstone Survey:** Each senior BSCE student is required to complete a two-semester capstone sequence EE 585/595. Capstone survey is a survey of the students enrolled in EE 595, during spring 2010–fall 2011. The percentages correspond to students who chose the two most positive answers (out of 4 or 5 answers), such as very-well/well, strongly-agree/agree, or excellent/adequate.

**Evaluation:**

- Scores for Outcomes a, b, d, e, g, i and k are acceptable, but can be improved.
- On Outcome c (ability to design a system/component/process), the co-op students' self-evaluation is low, but their employers' evaluation is higher (acceptable).
- On Outcome f (Understanding of professional/ethical responsibility), students definitely seem to understand the importance of ethics, but the peer-evaluation of their ethics is low.
- On Outcomes h and j, the self-evaluation and chair's evaluation are low. During the exit interview, students were asked questions related to global and contemporary issues. The chair's evaluation is based on their responses to these questions.
- We are trying to rectify the problem with Outcomes f, h and j through the course Phil 385: Engineering Ethics that is required of all BSCE students.

**Review of the BSCS Program**

| Learning Outcomes | Assessment Tool | Target/Criteria | Results | Analysis |
|---|---|---|---|---|
| a | 38 Co-op Students' Self Evaln | 3.5/4.0 | 3.5/4.0 | Acceptable |
| | 38 Employers' Evaln | 3.5/4.0 | 3.7/4.0 | Good |
| b | | | 3.4/4.0 | Acceptable |
| | " | " | 3.6/4.0 | Acceptable |
| c | | | 3.1/4.0 | Low |
| | " | " | 3.6/4.0 | Acceptable |
| d | | | 3.5/4.0 | Acceptable |
| | " | " | 3.6/4.0 | Acceptable |
| e | | | 3.6/4.0 | Acceptable |
| | " | " | 3.5/4.0 | Acceptable |
| f | | | 3.8/4.0 | Good |
| | " | " | 3.8/4.0 | Good |
| g | | | 3.5/4.0 | Acceptable |
| | " | " | 3.7/4.0 | Good |
| | | | 3.2/4.0 | Low |
| | " | " | 3.5/4.0 | Acceptable |
| i | | | 3.6/4.0 | Acceptable |
| | " | " | 3.5/4.0 | Acceptable |

| | | | | |
|---|---|---|---|---|
| j | | | 3.3/4.0 | Low |
| | " | " | 3.5/4.0 | Acceptable |
| k | | | 3.6/4.0 | Acceptable |
| | " | " | 3.6/4.0 | Acceptable |
| f | Exit Interview: 36 Students | | | |
| | Importance of Ethics | 8.0/10 | 9.0/10 | Very Good |
| | Ethics of Peers | 8.0/10 | 7.8/10 | Acceptable |
| h | Exit Interview: 36 Students | | | |
| | Chair's Evaluation | 8.0/10 | 7.6/10 | Acceptable |
| i | " | 8.0/10 | 7.6/10 | Acceptable |
| j | " | 8.0/10 | 6.8/10 | Low |

**Description:**

**Co-op Survey:** The Co-op survey covered 38 EECS students of all three bachelor degrees who were enrolled in co-op during the 2010 – 2011 academic year. Each student evaluated his own ability/knowledge and was also evaluated by the employer on each of the eleven outcomes a–k. For each outcome, the score is from 1 to 4: Never, Sometimes, Usually, ways.

**Exit Interview:** The chair conducted an exit-interview with each of the 36 BSCS graduating seniors, during spring 2010–fall 2011. The exit-interview included both evaluation by the student and evaluation of the student by the chair. Each evaluation is on a scale of 1 to 10, with 10 being the best.

**Capstone Survey:** BSCS students who entered WSU prior to 2009 were not required to complete the capstone sequence EE 585/595. So, there is no Capstone survey pertaining to BSCS students.

**Evaluation:**

- Scores for Outcomes a, b, d, e, g, i and k are acceptable, but can be improved.
- On Outcome c (ability to design a system/component/process), the co-op students' self-evaluation is low, but their employers' evaluation is higher (acceptable).
- On Outcome f (Understanding of professional/ethical responsibility), students definitely seem to understand the importance of ethics, but the peer-evaluation of their ethics is not high.
- On Outcomes h and j, the self-evaluation and chair's evaluation are low.
- We are trying to rectify the problem with Outcomes f, h and j through the course Phil 354: Ethics and Computers that is required of all BSCS students.

**raduate Programs**

At the May 25, 2012 Graduate Coordinator meeting, the following objectives, outcomes, and assessment methods were adopted for all the graduate programs in the College of Engineering. Data will be collected annually and included in our next program review.

a. Each MS and each PhD program should have common/similar program objectives, learner outcomes, and assessment procedures. The main reasons were for simplicity and that we can benefit of each other.
b. For the MS programs, we would not distinguish between thesis, project, and course-only students in objectives and outcomes
c. MS Program Objects would be for graduates to (not exact wording):
    i. Be employed in their field
    ii. Be accepted to a PhD program
d. MS Learner Outcomes are that upon graduation, students will have demonstrated:
    i. **An ability to self-educate** - Assessment: rubric score on MS project, MS thesis, or score of a course research project. Will require instructors, who have research projects in their course, to report average scores. May require thesis and project committees to complete a rubric. Each program needs to ensure each course-only student takes a course with a communication component.
    ii. **Communicate effectively** - Assessment: For programs that require CESD 750D, average assessment scores from instructor. Else, rubric score on MS project, MS thesis, or score on a course paper or presentation. May require instructors, who have papers or presentations in their course, to report average scores. May require thesis and project committees to complete a rubric. Each program needs to ensure each course-only student takes a course with a communication component.
    iii. **Competency in core areas** (Each program has different areas) - Assessment: Average scores from learning outcome assignments in core areas. Will require instructors, who teach core area courses to report learning objective assessment. Each program needs to ensure each student takes courses in core areas.
    iv. **The design of an engineering system to meet desired needs** - Assessment: Average scores from learning outcome assignments in courses with design component. Will require instructors, who teach courses with a design component to report score of a design problem. Each program needs to ensure each student takes a course with a design component.
    v. **A knowledge of professional and ethical responsibility** - Assessment: CITI average scores
e. PhD Learner Outcomes are that upon graduation, students will have demonstrated:
    i. **An ability to self-educate and do independent research** - Assessment: rubric score dissertation. Will require thesis and project committees to complete a rubric, or will require program to collect publication data.
    ii. **Communicate effectively in writing and presentation** - Assessment: Writing rubric score on dissertation and presentation rubric score on defense. Will require dissertation committees to complete two rubrics.
    iii. **Competency in major and minor areas** - Assessment: Average scores from qualifying exam. Will require dissertation chair to report a numerical score.

iv. **The design of an engineering system to meet desired needs** - Assessment: Average scores from learning outcome assignments in courses with design component. Will require instructors, who teach courses with a design component to report score of a design problem. Each program needs to ensure each student takes a course with a design component.

v. **A knowledge of professional and ethical responsibility** - Assessment: CITI average scores

These outcomes will be adopted by EECS and tailored for our specific programs. Assessment data will be included in the next report.

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± |
| 1 | | | 1 | | | | |
| 2 | | | 2 | | | | |
| 3(12) | 16 | 3.56/5 | 3 | | | | |

*Available for graduate programs from the Graduate School Exit Survey. Undergraduate programs should collect internally. ± If available.

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± |
| 1 | | | 1 | | | | |
| 2 | | | 2 | | | | |
| 3(12) | 22 | 3.27/5 | 3 | | | | |

*Available for graduate programs from the Graduate School Exit Survey. Undergraduate programs should collect internally. ± If available.

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± |
| | | | 1 | | | | |
| | | | 2 | | | | |
| 3(12) | 33 | 3.64/5 | 3 | | | | |

*Available for graduate programs from the Graduate School Exit Survey. Undergraduate programs should collect internally. ± If available.

Student satisfaction for the undergraduate programs in the department is lower than we would like. As is this the first year that the university has conducted the survey of students receiving their undergraduate degrees, we do not have the longitudinal data that we need to determine if this is a trend. While the department plans to conduct more analysis to better understand these results, one clear problem is the high student-to-faculty ratio in the department. Fortunately, we have been given permission by the College of Engineering and the Provost's office to conduct five tenure track faculty searches and two engineering educator searches during the 2011-2012 academic year. This should serve to improve the quality of education that we will be able to offer the students in the department.

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± |
| 1 | | | 1 | | | | |
| 2 | | | 2 | | | | |
| 3(12) | 38 | 4.13/5 | 3 | | | | |

*Available for graduate programs from the Graduate School Exit Survey. Undergraduate programs should collect internally. ± If available.

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± |
| 1 | | | 1 | | | | |
| 2 | | | 2 | | | | |
| 3(12) | 21 | 4.1/5 | 3 | | | | |

*Available for graduate programs from the Graduate School Exit Survey. Undergraduate programs should collect internally. ± If available.

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± |
| 1 | | | 1 | | | | |
| 2 | | | 2 | | | | |
| 3(12) | 67 | 4.16/5 | 3 | | | | |

*Available for graduate programs from the Graduate School Exit Survey. Undergraduate programs should collect internally. ± If available.

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).

| Goals/Skills Measurements of: | Results |
|---|---|

| -Oral and written communication<br>-Numerical literacy<br>-Critical thinking and problem solving<br>-Collaboration and teamwork<br>-Library research skills<br>-Diversity and globalization | Majors | Non-Majors |
|---|---|---|
| | | |
| | | |
| | | |

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 |
|---|---|
| ral and written communication | (g) An ability to communicate effectively |
| Numerical literacy | (a) An ability to apply knowledge of mathematics, science, and engineering |
| Critical thinking and problem solving | (e) An ability to identify, formulate, and solve engineering problems |
| Collaboration and teamwork | (d) An ability to function on multi-disciplinary teams |
| Library research skills | None |
| Diversity and globalization | (h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context |

f. 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, Engineering Accreditation Commission. Our next visit will be in 2013. Our last visit was in 2007. The BS in computer engineering had one concern. I have copied the concern and our response below.

**Program Concern**

The program criteria for computer engineering require that graduates have knowledge of discrete mathematics. Currently, there is minimal coverage of discrete mathematics, however, several course modifications are planned to increase discrete math topics in the curriculum. If the proposed course modifications are not implemented, there is a potential for the coverage of discrete mathematics to degrade.

**Response**

The ABET editor got the impression that the curriculum changes to include elements of Discrete Mathematics in our computer engineering program were only proposed and not implemented. This is incorrect.

The curriculum changes have already been implemented, starting fall 2007, and include the following:

- The course Math 321 - *Discrete Structures I*, cross listed with CS 321, has been included in the list of required courses for a B.S. in Computer Engineering. Contents of this course include elementary logic, properties of sets, mathematical induction, counting problems using permutations and combinations, trees, elementary probability, and an introduction to graph theory. This course addition was described on page 69 of the CE self-study, and the course is shown as a requirement for the CE degree on page 78 in the 2007-2008 Undergraduate Catalog. Please note, however, that Math 321 was listed incorrectly as Math 311 in the self-study.

- Increasing the number of credit hours, from three to four, in ECE 138, *Engineering Computing in C*. This change included adding portions of discrete structures and predicate logic. This was also mentioned on page 69 of the self-study and the credit hour change is seen on page 78 in the 2007-2008 Undergraduate Catalog.

We feel that discrete math is now adequately covered in our present requirements for the CE degree and no further modifications are planned.

g. Provide a brief assessment of the overall quality of the academic program using the data from 3a – 3f 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 or declared majors | No. who enter or are admitted in the major | No. enrolled one year later | 1 Year Attrition % | 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** |
| Year 1→ | | | | | 15 | See Table 1 | | | | | | Current year only ↓ |
| Year 2→ | | | | | 14 | | | | | | | |
| Year 3→ | | | | | 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 |
| Year 1→ | 10 | 3 | 0 | 2 | 6 | 0 | 32 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 2 |
| Year 2→ | 17 | 3 | 1 | 4 | 4 | 0 | 44 | 0 | 5 | 4 | 0 | 1 | 0 | 0 | 0 | 9 | 0 | 0 |
| Year 3→ | 19 | 4 | 0 | 5 | 6 | 0 | 44 | 0 | 8 | 2 | 1 | 0 | 0 | 0 | 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 2010 to 2020 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 2010 | Job Outlook 2010-2020 | Entry Level Education |
|---|---|---|---|---|
| Computer Programmers | $71,380 | 363,100 | 12% (About as fast as average) | Bachelor |
| Computer System Analysts | $77,740 | 544,400 | 22% (Faster than average) | Bachelor |
| Information Security Analysts, Web Developers, and Computer Network Architects | $75,660 | 302,300 | 22% (Faster than average) | Bachelor |
| Network and Computer Systems Administrators | $69,160 | 347,200 | 28% (Faster than average) | Bachelor |
| Software Developers | $90,530 | 913,100 | 30% (Much faster than average) | Bachelor |
| Database Adminitrators | $73,490 | 110,800 | 31% (Much faster than average) | Bachelor |
| Electrical and Electronics Engineers | $87,180 | 294,000 | 6% (Slower than average) | Bachelor |
| Computer Hardware Engineers | $98,810 | 70,000 | 9% (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 appli-cants or declared majors | No. who enter or are admit-ted in the major | No. enroll-ed one year later | 1 Year Attri-tion % | 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** |
| Year 1→ | | | | | 22 | See Table 1 | | | | | | Current year only ↓ |
| Year 2→ | | | | | 17 | | | | | | | |
| Year 3→ | | | | | 19 | | | | | | | |

| 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 |
| Year 1→ | 16 | 4 | 3 | 10 | 7 | 0 | 73 | 0 | 13 | 6 | 0 | 0 | 4 | 0 | 0 | 10 | 0 | 2 |
| Year 2→ | 15 | 3 | 3 | 8 | 5 | 0 | 76 | 0 | 12 | 6 | 0 | 0 | 1 | 0 | 0 | 10 | 0 | 0 |
| Year 3→ | 4 | 5 | 2 | 7 | 7 | 0 | 64 | 0 | 12 | 1 | 1 | 1 | 1 | 0 | 0 | 14 | 0 | 1 |

* 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 2010 to 2020 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).**

b. 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 applicants or declared majors | No. who enter or are admitted in the major | No. enrolled one year later | 1 Year Attrition % | 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** |
| Year 1→ | | | | | 29 | See Table 1 | | | | | | Current year only |
| Year 2→ | | | | | 47 | | | | | | | |
| Year 3→ | | | | | 40 | | | | | | | |

| 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 |
| Year 1→ | 24 | 4 | 1 | 15 | 7 | 0 | 56 | 0 | 8 | 5 | 1 | 0 | 3 | 4 | 0 | 14 | 0 | 2 |
| Year 2→ | 35 | 9 | 0 | 23 | 5 | 0 | 60 | 0 | 10 | 14 | 2 | 0 | 6 | 1 | 0 | 19 | 0 | 5 |
| Year 3→ | 36 | 6 | 1 | 22 | 3 | 0 | 70 | 0 | 10 | 12 | 0 | 0 | 8 | 2 | 0 | 17 | 0 | 1 |

* 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 2010 to 2020 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 – MS CS/CN

| Majors | | | | | | Employment of Majors* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Last 3 FYs – Su, Fl, and Sp | No. new applicants or declared majors | No. who enter or are admitted in the major | No. enrolled one year later | 1 Year Attrition % | 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** |
| Year 1→ | | | | | 16 | | | | | | | Current year only ↓ |
| Year 2→ | | | | | 18 | | | | | | | |
| Year 3→ | | | | | 34 | | | | | | | |

| 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 |
| Year 1→ | 48 | 0 | 0 | 9 | 1 | 0 | 7 | 0 | 1 | 10 | 0 | 0 | 4 | 0 | 0 | 2 | 0 | 0 |
| Year 2→ | 88 | 0 | 0 | 8 | 1 | 0 | 17 | 0 | 5 | 17 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Year 3→ | 87 | 2 | 0 | 4 | 4 | 0 | 17 | 0 | 5 | 31 | 0 | 0 | 0 | 0 | 0 | 3 | 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 and Computer Networking programs. In fact, the number of graduates has doubled over the last three years. 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. 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

**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 – MSEE

| Majors | | | | | | Employment of Majors* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Last 3 FYs – Su, Fl, and Sp | No. new applicants or declared majors | No. who enter or are admitted in the major | No. enrolled one year later | 1 Year Attrition % | 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** |
| Year 1→ | | | | | 90 | | | | | | | Current year only ↓ |
| Year 2→ | | | | | 61 | | | | | | | |
| Year 3→ | | | | | 114 | | | | | | | |

| 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 |
| Year 1→ | 175 | 0 | 0 | 10 | 4 | 0 | 14 | 0 | 5 | 83 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 2 |
| Year 2→ | 194 | 0 | 0 | 8 | 4 | 0 | 13 | 0 | 2 | 56 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 |
| Year 3→ | 163 | 3 | 1 | 8 | 1 | 0 | 13 | 1 | 5 | 101 | 0 | 0 | 4 | 2 | 0 | 7 | 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 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 2010 to 2020 in these areas.

**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 – PhD

| Majors | | | | | | Employment of Majors* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Last 3 FYs – Su, Fl, and Sp | No. new applicants or declared majors | No. who enter or are admitted in the major | No. enrolled one year later | 1 Year Attrition % | 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** |
| Year 1→ | | | | | 4 | | | | | | | Current year only ↓ |
| Year 2→ | | | | | 2 | | | | | | | |
| Year 3→ | | | | | 2 | | | | | | | |

| 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 |
| Year 1→ | 20 | 0 | 0 | 2 | 0 | 0 | 6 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Year 2→ | 26 | 0 | 0 | 3 | 1 | 0 | 7 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Year 3→ | 28 | 0 | 0 | 3 | 0 | 0 | 8 | 0 | 1 | 2 | 0 | 0 | 0 | 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.

The number of majors indicates that the interest in this program is growing. As shown in Table 1, the Bureau of Labor and Statistics expects job growth from 2010 to 2020 in these areas. As the students will graduate with doctorates, many will be employed in academic and research careers.

5. **Analyze the cost of the program and 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 (2008) | Year 2 (2009) | Year 3 (2010) |
| UG Majors | 36.6 | 46.5 | 50.7 |
| Gr Majors | 28.4 | 39.1 | 35.8 |
| Non-Majors | 35.0 | 14.4 | 13.5 |

a. Provide a brief assessment of the cost and 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.

The Department of Electrical Engineering and Computer Science is a very cost effective program in regards to cost per credit hour and cost per graduate. Table 2 summarizes financial costs and credit hour production of the department.

Table 2 – Cost per credit hour

| | FY 2009 | FY 2010 | Average |
|---|---|---|---|
| Salaries/Benefits | $1,913,399 | $1,618,613 | $1,766,106 |
| Other Operating Expenditures | $160,692 | $106,501 | $133,596 |
| Total | $2,074,091 | $1,725,114 | $1,899,603 |
| SCH | 11,188 | 11,604 | 11,396 |
| Cost/SCH | $185 | $148 | $167 |

Credit hour production for peer institutions in Kansas is difficult to come by. However, the American Society for Engineering Education keeps statistics on the number of degrees awarded by programs throughout the US. Table 3 shows a FY 2011 comparison of effectiveness, with regard to degrees awarded per faculty member, between the Electrical Engineering and Computer Science Department at WSU and the corresponding departments at peer institutions Kansas State University and University of Kansas. As seen in Table 3, when compared with KSU and KU, WSU is extremely cost effective.

Table 3 - FY2011 comparison of degrees awarded per faculty

| | WSU | KSU | KU |
|---|---|---|---|
| BS Degrees Awarded: EE | 40 | 34 | 25 |
| CE | 12 | 19 | 7 |
| CS | 19 | 22 | 31 |
| IS | NA | 9 | NA |
| Total BS Degrees Awarded | 71 | 83 | 63 |
| MS Degrees Awarded: EE | 105 | 20 | 14 |
| CE | NA | NA | 10 |
| CS | 26 | 21 | 13 |
| CN | 19 | NA | NA |
| SE | NA | 8 | NA |
| Total MS Degrees Awarded | 150 | 49 | 37 |
| PhD Degrees Awarded: EE | 1 | 2 | 4 |
| CS | NA | 0 | 2 |
| Total PhD Degrees Awarded | 1 | 2 | 6 |
| Total Degrees Awarded | 222 | 134 | 106 |
| | | | |
| Faculty | 16 | 37* | 36 |
| Degrees/Faculty | 13.9 | 3.6 | 2.9 |

* 20 in ECE and 17 in CIS

The EECS Department also has significant income with regards to research grants. Research expenditures for 2009, )10, and 2011 were $1,458,492, $1,973,196, and $671,762 respectively. Given the research nature of our department and the research dollars that we bring into the university, we are extremely cost effective and beneficial to the university system.

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, which was conducted in 2008, did not require program goals.

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. This was a particularly challenging merger as the original departments were in separate colleges (CS in LAS and ECE in CoE) and separate buildings (CS in Jabara and ECE in Wallace Hall). The MS in Computer Networking is also a new program to the department. A list of strengths, concerns, and goals for are listed below.

Strengths:

1. Strong Enrollments
2. Productive Faculty

Concerns:

1. Large student to faculty ratio
2. Inadequate technical support for EECS program
3. PhD program not suitable for CS majors and faculty

Plan/Goals:

1. To improve student to faculty ratio we plan to increase # of tenure track faculty
2. Improve technical support
3. Expand scope of PhD program to include CS majors
4. Complete strategic plan for department
5. Strengthen research programs in department
6. Move department to a culture of continuous assessment and improvement

**College**: Engineering

**Department/Program (s)**: Electrical Engineering and Computer Science

**Degree (s) Offered**:

Bachelor, Master and Doctorate (PhD) in Electrical Engineering
Bachelor and Master in Computer Science
Master in Computer Networking
Bachelor in Computer Engineering

**Triggers**: Each program meets or exceeds all minimum criteria. Average composite ACT score is above university average at 24-25 for all bachelors' programs.

**Brief Description of Each Degree**:
***Undergraduate*:** The three undergraduate programs prepare students for "corporate or governmental entry level jobs" or for graduate study. Solving technological problems relevant to each discipline is the emphasis. The programs focus on content and skills needed for the respective disciplines and the requirements for entry level professional positions. A senior one-year design course is the capstone experience for each degree. Shared or common electives and courses are mentioned, particularly for computer science majors; however, details are not provided.

***MS in Computer Science:*** This program prepares students for advanced careers in computer science and includes courses in compiler construction, databases, algorithms and theoretical foundations. The Engineering writing course is a requirement.

***MS in Computer Networking***: This program prepares students for careers in computer networking and information security. Both theory and application of computer networking are included. The program aims "...at enhancing the strong ties... with various companies including Cisco Systems and Netapp." The program is described as unique.

***MS in Electrical Engineering***: This program prepares students for advanced careers or further study in controlled systems, communications, signal processing, computers and digital systems, energy, power systems and computer networking.

***PhD in Electrical Engineering:*** This programs builds on the foundation of the MS in Electrical engineering and includes additional study in the areas listed with the master's degree. Advance research in the field is a major focus. These students are prepared of the "highest-level" careers in academia, research and industry.

**Assessment of Learning Outcomes (for UG and GR)**:
***Undergraduate**:* The degrees in electrical engineering and computer engineering are ABET accredited. Faculty will seek accreditation for the degree in computer science in 2013-14 when the other two programs are under review. The three programs share common outcomes measures that are based on ABET requirements. The programs share the same assessment methodology that includes the following indirect measures: COOP student self-evaluations, COOP

employer surveys, exit interview by the department chair, and the survey of students following the year-long capstone course. Detailed results of the surveys are listed for each program separately with means provided and summary analyses of the findings ranging from low to very good. (The year-long design course is new for computer science majors; thus no results are provided for the course.) Student satisfaction data are also included with scores at 3.6, 3.3 and 3.6 with a maximum score of 5.0 for computer engineering, computer science and electrical engineering respectively. The department considers these scores lower than desirable and will continue to review over time to determine trends. The high student to faculty ratio is seen by the faculty as a possible contributing factor to the somewhat low scores.

Faculty addressed comments from the last ABET review relative to Discrete Mathematics.

***Graduate:*** The faculty recently (May 2012) approved learner outcomes for both the master and doctoral programs. The outline of the assessment plan is included in the document with specific rubrics to be developed. Some specific measures are also included. Plans indicate that data will be available for the next review. Student satisfaction scores for the three graduate programs are at 4.1-4.2 on a five point scale.

**Placement of Graduates (types of positions, starting salary)**:

**Undergraduates**: Information about employment of graduates is not provided. Salary information and potential employment options are included. Employment opportunities are predicted to continue with higher than average salaries for bachelor's graduates.

**Master and doctoral graduates**: Information about employment of graduates is not provided. Salary information and potential employment options are included. Employment opportunities are predicted to continue with higher than average salaries for bachelor's graduates.

**Faculty Resources:** There were 14 tenured or probationary faculty and these faculty teach approximately 54 percent of the SCH and GTAs another 30 percent. Faculty members are productive producing refereed, articles, presentations, and conference proceedings and have won awards in for teaching and for their scholarly endeavors. They are involved in service to the profession, the university and the community. The department is searching for five TTT faculty positions and two engineering educators. The department operates three bachelor's degrees, three master's degrees and a PhD program with 14 TTT faculty with at least three on reduced loads for research or administrative activities each year.

**Sources of External Support**: The department has a long history of external funded that has averaged 1.3 million over the last 3 years.

**Conclusions and Recommendations**:

Commendations:

- Faculty productivity in teaching, research, publications, and external funding.
- Service to the university and the profession.
- Maintenance of enrollment and degree production with what might be considered limited faculty resources.

- Efficiency in delivering instruction with limited faculty resources
- The integration of the computer science majors and faculty into the department
- Detailed assessment plan for the undergraduate programs with outcome data
- Outline of the detailed assessment plan for the graduate programs

By April 1, 2013 (send to the Office of the Provost):

- Document that the program review process is a part of a continuous improvement approach involving all departmental faculty.
- Document program changes that occurred through assessment of student learner outcomes and other data collected.
- The learning outcomes for all programs should be further developed and a revised assessment process needs to be implemented to include the following for all programs:
    - Learning Outcomes: Statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire through their program (e.g., graduates will have the ability to apply principles of digital systems).
    - Assessment Methods: Direct measures used to identify, collect, and prepare data to evaluate the achievement of learning outcomes (e.g., quantitative literacy evaluated by a rubric, not grades or other indirect measures).
    - Targets: Expectations of students to achieve the desired outcome to demonstrate program effectiveness (e.g., 90% of students will demonstrate at least the benchmark performance on a project).
    - Results: Actual achievement on each measurement (e.g., 94% of the students achieved at least the benchmark performance on the project).
    - Analysis: An evaluation that determines the extent to which learning outcomes are being achieved and leads to decisions and actions to improve the program. The analysis and evaluation should align with specific learning outcomes and consider whether the measurement and target remain valid indicators of the learner.
- Address concerns of the Graduate School in terms of the assessment process for the graduate programs.

Prior to the next review in 2015:

- Recruit faculty to address increased enrollment as required by the Senate Bill 127. Current faculty/student ratio is high at almost 1/50.
- Include the university's alumni and exit surveys within the assessment plans for all programs. Continue to review student satisfaction indicators particularly for the undergraduate programs.
- Improve technical support for the EECS program (department identified).
- Expand the scope of the PhD program to include computer science majors (department identified)