

Name of Institution

University of South Carolina

Name of Program (include concentrations, options, and tracks)

Doctor of Philosophy in Computer Science and Engineering is being split into Doctor of Philosophy in Computer Science and Doctor of Philosophy in Computer Engineering

Program Designation

- Associate's Degree                       Master's Degree  
 Bachelor's Degree: 4 Year               Specialist  
 Bachelor's Degree: 5 Year               Doctoral Degree: Research/Scholarship (e.g., Ph.D. and DMA)  
 Doctoral Degree: Professional Practice (e.g., Ed.D., D.N.P., J.D., Pharm.D., and M.D.)

Does the program qualify for supplemental Palmetto Fellows and LIFE Scholarship awards?

- Yes  
 No

Proposed Date of Implementation

CIP Code

Fall 2016

11.0701 for Ph.D. in Computer Science  
14.0901 for Ph.D. in Computer Engineering

Delivery Site(s)

Delivery Mode

- Traditional/face-to-face\*               Distance Education  
\*select if less than 50% online               100% online  
 Blended (more than 50% online)  
 Other distance education

Program Contact Information (name, title, telephone number, and email address)

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Institutional Approvals and Dates of Approval  
Graduate Council at USC, Oct 26, 2015 for Ph.D. in CS and Nov 23, 2015 for Ph.D. in CE.  
USC Board of Trustees, June 24, 2016

### Background Information

The University of South Carolina requests approval to replace the Ph.D. program in Computer Science and Engineering with two separate programs: a Ph.D. in Computer Science (CS) and a Ph.D. in Computer Engineering (CE).

The Department of Computer Science and Engineering in the College of Engineering and Computing is formed in 2000 by merging parts of two separate departments, Electrical and Computer Engineering in College of Engineering, and Mathematics and Computer Science in College of Arts and Sciences. Prior to the merger, there were two separate Ph.D. programs in each of these departments: a Ph.D. in Computer Science and a Ph.D. in Computer Engineering. At the time of the merger, it was decided to offer one Ph.D. program in Computer Science and Engineering. Now, this request would revert to that prior organization.

### **Program Objectives**

Ph.D. in Computer Science aims to offer high quality research-intensive graduate program for students interested in computer science research careers. The graduates of this program:

- should have the foundational knowledge of computer science to support their research.
- should be able to achieve the highest level of expertise in their chosen area of research in computer science.
- should demonstrate promise of advancing in their future careers through their research in computer science, through communicating and working effectively as team members and through interacting responsibly with others in society.
- should demonstrate promise of future contributions to their communities and society with innovations in computer science and an understanding of contemporary technological issues.
- three to five years after graduation, should be continuing their professional development through ongoing research in computer science.

Ph.D. in Computer Engineering aims to offer high quality research-intensive graduate program for students interested in computer engineering research careers. The graduates of this program:

- should have the foundational knowledge of computer engineering to support their research.
- should be able to achieve the highest level of expertise in their chosen area of research in computer engineering.
- should demonstrate promise of advancing in their future careers through their research in computer engineering, through communicating and working effectively as team members and through interacting responsibly with others in society.
- should demonstrate promise of future contributions to their communities and society with innovations in computer engineering and an understanding of contemporary technological issues.
- three to five years after graduation, should be continuing their professional development through ongoing research in computer engineering.

We will measure whether these objectives are achieved through the assessment of learning outcomes that are described in the Evaluation and Assessment section of this proposal.

### Assessment of Need

There are several reasons for the proposed modification, which are enumerated below.

- The areas of research and the required coursework for Computer Science (CS) and Computer Engineering (CE) programs are quite different. CE is more hardware-oriented, whereas CS is software-oriented. Students in CE program conduct research in areas such as computer architecture, VLSI, robotics, networking, and systems performance evaluation, whereas students in CS program conduct research in bioinformatics, multi-agent systems, computer security, algorithms, databases, machine learning, etc.
- Offering two separate Ph.D. programs clearly delineates the discipline of CE from CS. It allows students to choose the program that matches their academic and career objectives and to earn credentials that precisely reflect the distinct skills they acquire.
- It is a common practice in peer institutions to offer separate Ph.D. programs in CS and CE. Apart from Clemson University, several universities such as Boston University, University of Virginia, Northwestern University, University of California, San Diego, and Washington University, St Louis, offer separate Ph.D. programs in CS and CE disciplines.
- The Department of Computer Science and Engineering currently offers a BS in Computer Science and a BS in Computer Engineering. By offering the MS and Ph.D. programs also in Computer Engineering in addition to the MS and Ph.D. in Computer Science, we would provide a path towards advanced degrees for our Computer Engineering students.
- The career opportunities for graduates of Computer Science and Computer Engineering programs are different. Bureau of Labor Statistics also tracks them separately.
- The Bureau of Labor Statistics estimates that the number of Computer Hardware Engineers would grow from 77,700 in 2014 to 80,100 in 2024. It also reports that the expected rate of growth between 2014 and 2024 for computer scientists is 11%. Moreover, both of these jobs are highly paid, with a median salary of more than \$108K per year.
- Apart from tenure track faculty positions, graduates with research expertise in CE are expected to receive attractive offers from companies such as Intel, Texas Instruments, AMD, Cisco, Juniper Networks, iRobot, whereas CS doctorates are expected receive offers from Google, Microsoft, Amazon, Apple, Facebook, etc.

Will the proposed modification impact any existing programs and services at the institution?

- Yes  
 No

**List of Similar Programs in South Carolina**

Program Name	Institution	Similarities	Differences
<p>Ph.D. in Computer Engineering</p> <p>Ph.D. in Computer Science</p>	<p>Clemson University</p>	<p>Course requirements are similar; these programs at Clemson and at USC require 60 hours of graduate credits post Baccalaureate degree. Other requirements such as passing the Ph.D. qualifying exam and Ph.D. comprehensive exam, and completing and defending the dissertation, are also similar.</p>	<p>At Clemson University, the Ph.D. in Computer Engineering is offered by the Department of Electrical and Computer Engineering, and the Ph.D. in Computer Science is offered by the Division of Computer Science in the School of Computing, whereas at USC both programs will be part of the Department of Computer Science and Engineering.</p> <p>The sets of graduate courses offered by these departments and thus available to students in these programs are significantly different. Moreover, considering that the primary substance of a Ph.D. is derived from research supervision and the expertise of our respective faculties is distinct, our programs are expected to produce Ph.D. graduates with distinctly different sets of research skills. For example, the Clemson faculty has strong expertise in Computer Graphics and Human Computer Interaction, while the USC faculty has strengths in Robotics and Bioinformatics.</p> <p>There are also some minor differences in the number of hours of dissertation credits required. Clemson University requires 18 hours whereas we require 12 hours.</p>

Overall, having complementary high-quality Ph.D. programs offers students choice and serves the interests of the State of South Carolina.

### Description of the Program

Projected Enrollment												
Year	Fall				Spring				Summer			
	Headcount		Credit Hours		Headcount		Credit Hours		Headcount		Credit Hours	
	CS	CE	CS	CE	CS	CE	CS	CE	CS	CE	CS	CE
2016	73	9	657	81	73	9	657	81	73	9	73	9
2017	68	14	612	126	68	14	612	126	68	14	68	14
2018	62	20	558	180	62	20	558	180	62	20	62	20
2019	56	26	504	234	56	26	504	234	56	26	56	26
2020	55	27	495	243	55	27	495	243	55	27	55	27

These estimates are based on the current population of 82 Ph.D. students in the CSE department and the 2:1 ratio of CS to CE majors in our BS programs. Also, approximately one third of our faculty conduct research in computer engineering and advise Ph.D. students. We anticipate that when the current Ph.D. program is split, most of the students would opt for the CS program because its course requirements closely match the current CSE program. In the steady state, we anticipate around 52 and 26 Ph.D. students in the CS and CE programs respectively.

### Curriculum

Attach a curriculum sheet identifying the courses required for the program.

### Curriculum Changes

**Note: Complete this table only if there are changes to the curriculum.**

Courses Eliminated from Program	Courses Added to Program

Degree Requirements for Ph.D. in Computer Science (60 Post Baccalaureate Hours)

Requirements for the Ph.D. degree in Computer Science fall into four categories: course requirements, the qualifying examination, the comprehensive examination, and the dissertation.

The coursework must include the following core courses.

- CSCE 513 - Computer Architecture
- CSCE 531 - Compiler Construction
- CSCE 551 - Theory of Computation
- CSCE 750 - Analysis of Algorithms
- CSCE 791 - Seminar in Advances in Computing

The remaining coursework must include an additional 20 hours in CSCE courses numbered above 700.

Students who enter the program with a Bachelor's degree must complete a minimum of 48 credit hours of graduate course work (excluding CSCE 799 and 899) and 12 hours of dissertation preparation (CSCE 899).

Students who enter the program with a Master's degree in Computer Science must complete at least 24 hours in CSCE courses numbered 700 or above (excluding CSCE 799 and 899) and 12 hours of dissertation preparation (CSCE 899).

Prior to admission to candidacy, the student is required to pass a written qualifying examination. This examination is designed to test fundamental knowledge and conceptual understanding of the core topics of computer engineering. The comprehensive examination combines a written and an oral examination and seeks to discover whether the student has a sufficiently deep understanding of topics in the area of interest to carry out the proposed research. The dissertation committee, consisting of not fewer than 5 members, including one external member outside the Department of Computer Science and Engineering, which also makes the final decision on whether the student has passed, constructs the research component. The oral examination is an in-depth test on the subject matter related to the student's dissertation and written exam. The committee may also examine the student on any other material it deems relevant. After completing the research and writing the dissertation, the student must defend the work in a public presentation.

#### Degree Requirements for Ph.D. in Computer Engineering (60 Post Baccalaureate Hours)

Requirements for the Ph.D. degree in Computer Engineering fall into four categories: course requirements, the qualifying examination, the comprehensive examination, and the dissertation.

The coursework must include the following core courses.

- CSCE 513 - Computer Architecture
- CSCE 611 - Advanced Logic Design
- CSCE 750 - Analysis of Algorithms
- CSCE 791 - Seminar in Advances in Computing

Students must also complete one course from the following list.

- CSCE 512 - System Performance Evaluation
- CSCE 516 - Computer Networks
- CSCE 569 - Parallel Computing
- CSCE 574 - Robotics
- CSCE 613 - Fundamentals of VLSI Chip Design

The remaining coursework must include an additional 20 hours in CSCE courses numbered above 700.

Students who enter the program with a Bachelor's degree must complete a minimum of 48 credit hours of graduate course work (excluding CSCE 799 and 899) and 12 hours of dissertation preparation (CSCE 899).

Students who enter the program with a Master's degree in Computer Engineering must complete at least 24 hours in CSCE courses numbered 700 or above (excluding CSCE 799 and 899) and 12 hours of dissertation preparation (CSCE 899).

Prior to admission to candidacy, the student is required to pass a written qualifying examination. This examination is designed to test fundamental knowledge and conceptual understanding of the core topics of computer engineering. The comprehensive examination combines a written and an oral examination and seeks to discover whether the student has a sufficiently deep understanding of topics in the area of interest to carry out the proposed research. The dissertation committee, consisting of not fewer than 5 members, including one external member outside the Department of Computer Science and Engineering, which also makes the final decision on whether the student has passed, constructs the research component. The oral examination is an in-depth test on the subject matter related to the student's dissertation and written exam. The committee may also examine the student on any other material it deems relevant. After completing the research and writing the dissertation, the student must defend the work in a public presentation.

### **List of Graduate Level Courses in Computer Science and Engineering at USC**

- CSCE 510 - System Programming
- CSCE 512 - System Performance Evaluation
- CSCE 513 - Computer Architecture
- CSCE 515 - Computer Network Programming
- CSCE 516 - Computer Networks
- CSCE 517 - Computer Crime and Forensics
- CSCE 520 - Database System Design
- CSCE 522 - Information Security Principles
- CSCE 526 - Service Oriented Computing
- CSCE 531 - Compiler Construction
- CSCE 547 - Windows Programming
- CSCE 548 - Building Secure Software
- CSCE 551 - Theory of Computation
- CSCE 552 - Computer Game Development
- CSCE 555 - Algorithms in Bioinformatics
- CSCE 557 - Introduction to Cryptography
- CSCE 561 - Numerical Analysis
- CSCE 563 - Systems Simulation
- CSCE 564 - Computational Science
- CSCE 565 - Introduction to Computer Graphics
- CSCE 567 - Visualization Tools
- CSCE 569 - Parallel Computing
- CSCE 571 - Critical Interactives
- CSCE 572 - Human-Computer Interaction
- CSCE 574 - Robotics
- CSCE 578 - Text Processing
- CSCE 580 - Artificial Intelligence
- CSCE 582 - Bayesian Networks and Decision Graphs
- CSCE 587 - Big Data Analytics
- CSCE 590 - Topics in Information Technology
- CSCE 611 - Advanced Digital Design
- CSCE 612 - VLSI System Design

- CSCI 613 - Fundamentals of VLSI Chip Design
- CSCI 711 - Advanced Operating Systems
- CSCI 713 - Advanced Computer Architecture
- CSCI 715 - Network Systems Security
- CSCI 716 - Design for Reliability
- CSCI 717 - Computer System Performance and Reliability Analysis
- CSCI 718 - Real-Time Computer Applications
- CSCI 719 - Security and Privacy for Wireless Networks
- CSCI 721 - Physical Database Design
- CSCI 723 - Advanced Database Design
- CSCI 725 - Information Retrieval: Algorithms and Models
- CSCI 727 - Information Warfare
- CSCI 730 - Programming Language Semantics
- CSCI 740 - Software Engineering
- CSCI 741 - Software Process
- CSCI 742 - Software Architectures
- CSCI 743 - Software Requirements
- CSCI 744 - Object-Oriented Analysis and Design
- CSCI 745 - Object-Oriented Programming Methods
- CSCI 747 - Software Testing and Quality Assurance
- CSCI 750 - Analysis of Algorithms
- CSCI 755 - Computability, Automata, and Formal Languages
- CSCI 758 - Probabilistic System Analysis
- CSCI 760 - Numerical Analysis I
- CSCI 761 - Numerical Analysis II
- CSCI 763 - Digital Image Processing
- CSCI 765 - Computer Graphics System Design
- CSCI 766 - Scientific Visualization
- CSCI 767 - Interactive Computer Systems
- CSCI 768 - Pattern Recognition and Classification
- CSCI 769 - Computational Structural Biology
- CSCI 771 - Computer Processing of Natural Language
- CSCI 772 - Computer Speech Processing
- CSCI 774 - Robotics Systems
- CSCI 780 - Knowledge Representation
- CSCI 781 - Knowledge Systems
- CSCI 782 - Multiagent systems
- CSCI 784 - Neural Information Processing
- CSCI 787 - Introduction to Fuzzy Logic
- CSCI 790 - Topics in Information Technology
- CSCI 791 - Seminar in Advances in Computing
- CSCI 793 - Internship in Software Engineering
- CSCI 797 - Individual Study and Research
- CSCI 798 - Directed Study and Research
- CSCI 799 - Thesis Preparation
- CSCI 813 - Internet Security
- CSCI 814 - Distributed Systems Security
- CSCI 815 - Computer Communications
- CSCI 818 - Top-Down VLSI Design
- CSCI 819 - Custom VLSI Design
- CSCI 821 - Distributed Database Design

- CSCE 822 - Data Mining and Warehousing
- CSCE 824 - Secure Database Systems
- CSCE 826 - Cooperative Information Systems
- CSCE 846 - Software Reliability and Safety
- CSCE 850 - Advanced Analysis of Algorithms
- CSCE 853 - Formal Methods in Computer Security
- CSCE 865 - Advanced Computer Graphics
- CSCE 867 - Computer Vision
- CSCE 868 - Advanced Pattern Recognition
- CSCE 883 - Machine Learning
- CSCE 895 - Ph.D. Seminar
- CSCE 899 - Dissertation Preparation

### **Faculty**

Provide a brief explanation of any additional institutional changes in faculty and/or administrative assignment that may result from implementing the proposed program modification. (1000 characters)

This modification adds additional workload on the staff and the Graduate Director for administering two Ph.D. programs instead of one. We estimate the additional cost to be 25% of the current cost to administer one Ph.D. program. Besides the program administration cost, this modification does not require additional faculty positions, as we have sufficient faculty and expertise to support the two Ph.D. programs. The responsibilities for the operation of these two Ph.D. programs will be distributed among the existing CSE faculty.

### **Resources**

Identify any new library/learning resources, new instructional equipment, and new facilities or modifications to existing facilities needed to support the modified program. (2000 characters)

The existing library resources, instructional equipment, and lab space satisfy most of the teaching and research requirements of the two Ph.D. programs. In addition, to support the operation of the two Ph.D. programs, the CSE department plans to allocate a recurring budget of \$2000 per year for library collections and \$5000 per year for equipment upgrades.

**Financial Support**

<b>Estimated New Costs by Year</b>						
<b>Category</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>5<sup>th</sup></b>	<b>Total</b>
Program Administration	7,623	7,852	8,087	8,330	8,580	40,472
Faculty and Staff Salaries	767,500	790,525	814,241	838,668	863,828	4,074,762
Graduate Assistants						
Equipment	5,000	5,000	5,000	5,000	5,000	25,000
Facilities						
Supplies and Materials						
Library Resources	2,000	2,000	2,000	2,000	2,000	10,000
Other*						
<b>Total</b>	<b>782,123</b>	<b>805,377</b>	<b>829,328</b>	<b>853,998</b>	<b>879,408</b>	<b>4,150,234</b>
<b>Sources of Financing</b>						
<b>Category</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>5<sup>th</sup></b>	<b>Total</b>
Tuition Funding						
Program-Specific Fees						
State Funding (i.e., Special State Appropriation)*						
Reallocation of Existing Funds*	983,136	1,012,630	1,043,009	1,074,299	1,106,528	5,219,602
Federal Funding*						
Other Funding*						
<b>Total</b>	<b>983,136</b>	<b>1,012,630</b>	<b>1,043,009</b>	<b>1,074,299</b>	<b>1,106,528</b>	<b>5,219,602</b>
<b>Net Total</b> (i.e., Sources of Financing Minus Estimated New Costs)	<b>201,013</b>	<b>207,253</b>	<b>213,681</b>	<b>220,301</b>	<b>227,120</b>	<b>1,069,368</b>

\*Provide an explanation for these costs and sources of financing in the budget justification.

### **Budget Justification**

Provide a brief explanation for the other new costs and any special sources of financing (state funding, reallocation of existing funds, federal funding, or other funding) identified in the Financial Support table. (1000 characters)

**Note: Institutions need to complete this budget justification *only* if any other new costs, state funding, reallocation of existing funds, federal funding, or other funding are included in the Financial Support table.**

There are no other new costs, state funding, reallocation of existing funds, federal funding, or other funding included in the financial support table. However, in the following, we provide a brief explanation of the budget.

For the program administration, the graduate director is paid an amount equivalent to 60% of his/her salary for one month. The cost for faculty and staff salaries is estimated considering that 30% of the effort of the department's faculty and staff goes towards the Ph.D. programs (20% for Masters and 50% for Bachelors). The tuition funding is calculated based on 82 Ph.D. students, of which 16 (~20%) pay out-of-state tuition fees, each taking 19 credits per year.

### **Evaluation and Assessment**

Will any the proposed modification impact the way the program is evaluated and assessed?

Yes

No

If yes, explain. (1000 characters)

There will be a separate evaluation and assessment for Ph.D. in CS and Ph.D. in CE. While the programmatic assessment will be similar for these programs, assessment of student learning outcomes for CS program will be different from that of CE program.

### **Evaluation and Assessment**

**Programmatic Assessment:** The assessment of the modification will be performed by the assessment of the learning outcomes and the assessment of the program's success.

We will periodically measure the success of the two Ph.D. programs to ensure continuous quality improvement and that the programs meet the changing demands. Initially, we plan to perform yearly assessment on the programs, followed by a full assessment of the programs and the learning outcomes in the 5th year. We plan full assessment every 5 years afterwards.

The assessment of the programs will be based on the 1) rate of recruitment, 2) rate of retention, 3) satisfactory offering of the core and elective courses, 4) Ph.D. dissertation and professional publications, and 5) the placement of the graduates.

Recruitment: We anticipate a steady enrollment after the first five years. We will compare enrollment demographics (e.g., field of undergraduate studies, transfer information, GRE score, etc.) of the Ph.D. in CS and Ph.D. in CE students with other programs.

Retention: We will collect and analyze data about the rate of successful completion of the programs. We will also collect data for identifying the characteristics of students who dropped out of the programs. We aim to use these characteristics to provide intervention and reduce the number of students who transfer out or drop out of the programs.

Ph.D. Dissertation and peer-reviewed publications: We will keep a record of student research activities manifested in the Dissertation work and/or professional publications.

Job placement: We will track the job placement of the graduates of these programs. We will analyze the data on the employment of graduates these programs immediately after graduation and after more than 5 years after graduation. We will gather information about the position title, rank, size of the organization, and primary responsibilities. It is anticipated, that near graduation employment will be primarily in the technical areas of computer science and computer engineering. However, after 5 years, graduates are expected to move into leadership positions.

**Student Learning Assessment For Ph.D. in Computer Science**

Expected Student Learning Outcomes	Methods of/Criteria for Assessment
Students will demonstrate knowledge of the theory of computation.	On assignments and exams, students will describe finite state automata, context-free grammars, and their languages, demonstrate computability or non-computability using a Turing machine, and measure the computational complexity of an algorithm. 75% of students will score at least 70% on the assignments/exam questions related to this outcome.
Students will demonstrate knowledge of compiler construction.	On assignments and assigns, students will formally define the grammar and semantics of a language, design and implement finite state machines appropriate for use as a lexical scanner, design either a bottom-up or top-down parser for the given context-free grammar, implement the semantic routines for a top-down or bottom-up parser for the given the semantic definitions of a language, and perform code generation at the tuple level. 75% of students will score at least 70% on the assignments/exam questions related to this outcome.
Students will demonstrate knowledge of the analysis of algorithms.	On assignments and exams, students will solve recurrence relations, analyze complex algorithms for their correctness and use of resources, use high-order principles of algorithm construction, e.g., divide-and-conquer, dynamic programming, simulate and answer basic questions about the most common graph algorithms. 75% of students will score at least 70% on the assignments/exam questions related to this outcome.
At the time of graduation a Ph.D. in Computer Science student should be able to formulate problems in their research area that are challenging and of wide interest in the area.	At the dissertation defense, the committee will evaluate the level and importance of the problem being addressed. For this, the percentage rated excellent or very good should be greater than 80%. [This outcome is used as an indirect measure of the graduates' ability to advance in their careers and contribute to the society though their research.]
At the time of graduation a Ph.D. in Computer Science student should be able to achieve the highest level of expertise in their chosen area of research.	At the time of graduation, the Graduate Committee will evaluate the publication list of the graduate. Each publication venue will be rated based on its intellectual stature in its area of research. Then, 80% of the graduates should have at least one publication in a venue rated in the top 10% within their chosen area of research. [This outcome is used as an indirect measure of the graduates' ability to advance in their careers and contribute to the society though their research.]

**Student Learning Assessment For Ph.D. in Computer Engineering**

Expected Student Learning Outcomes	Methods of/Criteria for Assessment
Students will demonstrate knowledge of computer architecture.	On assignments and exams, students will describe the principles of computer architecture, techniques and principles for the development of high performance computer systems, details of extant computer architectures, and quantitatively analyze aspects of computer architecture and draw conclusions about their performance. 75% of students will score at least 70% on the assignments/exam questions related to this outcome.
Students will demonstrate knowledge of the design techniques for logic systems.	On assignments and exams, students will design large-scale digital systems using VHDL, perform behavioral verification using test benches and simulation, design a pipelined Microprocessor, design a system bus architecture with CPU, memory, and I/O interfaces, synthesize, place-and-route, and implement a computer system on a programmable hardware platform. 75% of students will score at least 70% on the assignments/exam questions related to this outcome.
Students will demonstrate knowledge of the analysis of algorithms.	On assignments and exams, students will solve recurrence relations, analyze complex algorithms for their correctness and use of resources, use high-order principles of algorithm construction, e.g., divide-and-conquer, dynamic programming, simulate and answer basic questions about the most common graph algorithms. 75% of students will score at least 70% on the assignments/exam questions related to this outcome.
At the time of graduation a Ph.D. in Computer Engineering student should be able to formulate problems in their research area that are challenging and of wide interest in the area.	At the dissertation defense, the committee will evaluate the level and importance of the problem being addressed. For this, the percentage rated excellent or very good should be greater than 80%. [This outcome is used as an indirect measure of the graduates' ability to advance in their careers and contribute to the society through their research.]
At the time of graduation a Ph.D. in Computer Engineering student should be able to achieve the highest level of expertise in their chosen area of research.	At the time of graduation, the Graduate Committee will evaluate the publication list of the graduate. Each publication venue will be rated based on its intellectual stature in its area of research. Then, 80% of the graduates should have at least one publication in a venue rated in the top 10% within their chosen area of research. [This outcome is used as an indirect measure of the graduates' ability to advance in their careers and contribute to the society through their research.]

ACAP  
9/29/16  
Agenda Item 5e

Will the proposed modification affect or result in program-specific accreditation?

- Yes  
 No

If yes, explain; if the modification will result in the program seeking program-specific accreditation, provide the institution's plans to seek accreditation, including the expected timeline for accreditation. (500 characters)

Will the proposed modification affect or lead to licensure or certification?

- Yes  
 No

If yes, explain how the program will prepare students for licensure or certification. (500 characters)

### **Teacher or School Professional Preparation Programs**

Is the proposed modified program a teacher or school professional preparation program?

- Yes  
 No

If yes, complete the following components.

Area of Certification

Attach a document addressing the South Carolina Department of Education Requirements and SPA or Other National Specialized and/or Professional Association Standards.