AY23-13-C

1. Institution
 	
   Old Dominion University
	2. Academic Program (Check one):
	   New program proposal ___x___
	   Spin-off proposal _____
	   Certificate document _____

3. Name/title of proposed program
   Electrical and Computer Engineering
	4. CIP code
	   14.4701

5. Degree/certificate designation
   Doctor of Philosophy
	6. Term and year of initiation
	   Fall 2025

7a. For a proposed spin-off, title and degree designation of existing degree program

7b. CIP code (existing program)

8. Term and year of first graduates Spring 2031	9. Date approved by Board of Visitors

10. For community colleges:
   date approved by local board
   date approved by State Board for Community Colleges

11. If collaborative or joint program, identify collaborating institution(s) and attach
   letter(s) of intent/support from corresponding chief academic officers(s)

12. Location of program within institution (complete for every level, as appropriate and
   specify the unit from the choices).

   Departments(s) or division of ____Electrical and Computer Engineering_____

   School(s) or college(s) of ___The Batten College of Engineering and Technology_____

   Campus(es) or off-campus site(s) __Main Campus, Norfolk_____

   Mode(s) of delivery: face-to-face _____distance (51% or more web-based) _____
   hybrid (both face-to-face and distance) ___x___

13. Name, title, telephone number, and e-mail address of person(s) other than the institution's chief academic officer who may be contacted by or may be expected to contact Council staff regarding this program proposal.

TABLE OF CONTENTS

Part I: Description of the Proposed Program

A. Program Background

Old Dominion University in Norfolk, Virginia requests approval to initiate a Doctor of Philosophy (Ph.D.) degree program in Electrical and Computer Engineering (ECE) with CIP Code 14.4701. This proposed degree program will supersede the concentration in ECE of the Ph.D. in General Engineering degree with CIP Code 14.0101 that is currently being offered. The proposed program will be administered by the Department of Electrical and Computer Engineering in the Batten College of Engineering & Technology and is to be initiated by Fall 2025.

The proposed Ph.D. ECE degree will prepare students for engineering research and teaching careers in industry, government, research organizations, and educational institutions. Graduates with the proposed ECE degree will be able to make original contributions that help society in the grand challenges that we are facing and will face, including in autonomous and connected systems, smart cities, intelligent manufacturing, and smart materials. The program will have two core courses to expose the students to foundational tools and the remaining courses will be selected in coordination between the Graduate Program Director and a research advisor to meet the needs of the ECE degree.

B. Institutional Mission

The mission of the institution states: "Old Dominion University, located in the City of Norfolk in the metropolitan Hampton Roads region of coastal Virginia, is a dynamic public research institution that serves its students and enriches the Commonwealth of Virginia, the nation and the world through rigorous academic programs, strategic partnerships, and active civic engagement." The Master of Science in Electrical and Computer Engineering aligns with this mission by (1) offering a robust curriculum that trains individuals in the field of Electrical and Computer Engineering, (2) addressing the critical shortage of employees and managers in the electrical and computer engineering workforce, (3) strengthening ODU's commitment to contributing to the economy and workforce of the Hampton Roads region and the Commonwealth of Virginia, and (4) enhancing the partnerships that ODU has developed throughout the region.

C. Delivery Format

The courses of the proposed Ph.D. ECE degree will be available in both online and on campus formats. Online course access will be through Canvas, the University's course management system. The courses will be taught by an ECE faculty in front of students. All assignment submissions and other course management actions can take place in Canvas. Faculty-student interaction is available via email, phone, in-person meetings, and Zoom-interface meetings.

Faculty members who teach in the web-based format are experienced and can be assisted by ODU's Division of Distance Learning and the Center for Faculty Development. If necessary, instructors can be trained to become effective instructors and to develop their courses for online and on campus delivery.

Students in this doctoral program will be expected to work at least part-time on campus to complete the research for their degree. To this end, ODU has made significant investments in the creation of state-of-the-art infrastructure and laboratories, including

1. Applied Plasma Technology Laboratory (APTL)
2. CAVE Automated Virtual Environment (CAVE)
3. Collaborative Autonomous Systems Laboratory
4. Cybersecurity, Communications & Networking Innovation (CCNI) Laboratory
5. Gene Therapy and Regenerative Medicine Laboratory
6. Machine Intelligence & HR Communications Laboratory
7. Medical Simulations Laboratory
8. Plasma Engineering & Medicine Institute (PEMI)
9. Systems Research Laboratory
10. Virginia Institute for Photovoltaics (VIPV)
11. Vision Lab
12. Virginia Institute for Vision Analysis (VIVA)

In addition, the department has several faculty members with research labs at the Applied Research Center (ARC) at the Jefferson National Laboratory, at the Frank Reidy Center for Bioelectronics, at the Center for Bioelectronics and at the Virginia Modeling, Analysis, and Simulation Center (VMASC).

D. Admission Criteria

All students applying to graduate degrees at Old Dominion University will meet criteria established by the Graduate School. General criteria for acceptance into the PH.D. Ph.D. in ECE degree include the following:

- Online graduate application and application fee
- A bachelor's degree from a regionally-accredited university in the U.S. or an accredited foreign institution
- Official copies of transcripts of all regionally-accredited colleges and universities attended
- Two letters of recommendation from individuals familiar with the applicant's professional and/or academic background
- A current resume
- A statement of professional goals
- GRE scores, with a 50% or better attainment on quantitative reasoning
- Current scores on the Test of English as a Foreign Language (TOEFL) with a minimum of 230 on the computer-based TOEFL or 80 on the TOEFL iBT, if the applicant's native language is not English.

Applicants to a Ph.D. in ECE degree are expected to have completed a master's degree in electrical engineering and/or computer engineering or a closely related technical field with a minimum grade point average of 3.5 (on a 4.0 scale) in graduate course work. The applications are submitted through the Office of Admissions of Old Dominion University. The Frank Batten College of Engineering and Technology at Old Dominion University has the Direct Bachelor-to-Ph.D. and Integrated Bachelor/Ph.D. programs that allow exceptionally well-qualified undergraduate students to apply for admission directly to a Ph.D. program.

Accepted students from disciplines other than ECE are required to complete a number of leveling courses to meet prerequisites for graduate studies. All students are required to have one year of college chemistry and one year of calculus-based college physics in addition to Calculus III and Differential Equations courses. Students at Old Dominion University may complete the leveling requirement by earning a minor in electrical or computer engineering with a GPA of 3.0 or greater. Students that have not earned a minor need to meet with the graduate program director to prepare a course plan and determine which pre-requisite courses are needed. In general, three to four leveling courses are needed and they are chosen from the following lists.

List of Possible Courses to Meet the Leveling Requirement

ECE 202	Circuit Analysis II	3 Credits
ECE 241	Fundamentals of Computer Engineering	4 Credits
ECE 302	Linear System Analysis	3 Credits
ECE 303	Introduction to Electrical Power	3 Credits
ECE 304	Probability, Statistics, and Reliability	3 Credits
ECE 313	Electronic Circuits	4 Credits
ECE 323	Electromagnetics	3 Credits
ECE 332	Microelectronic Materials and Processes	3 Credits
ECE 341	Digital System Design	3 Credits
ECE 346	Microcontrollers	3 Credits
ECE 381	Introduction to Discrete-time Signal Processing	3 Credits

E. Curriculum

Curriculum for Students Admitted with a M.S. Degree

Core courses - 7 credit hours
ECE 651 Statistical Analysis and Simulation (3 cr)
ECE 831 Graduate Seminar (1 cr)
ECE 861 Computational and Statistical Methods in Electrical and Computer Engineering (3 cr)

Electives (Graduate-level course work) - 18 credit hours
For students with a master's degree, the 18 credit hours of elective graduate-level coursework consist of six 3-credit graduate-level courses chosen by the student and the research advisor and approved by the Graduate Program Director. A minimum of four of the six courses must be completed at the 800 level, and no more than 9 credits can be taken in other departments.

Research Requirement - 24 credit hours
Students will repeat this course, as needed, until the minimum credit hours are fulfilled.
ECE 899 Dissertation Research (1-9 cr)

Additional requirements
Students are required to successfully complete a written diagnostic examination, written and oral candidacy examinations, dissertation research proposal, and to write and defend in public their dissertation.

Total credit hours: 49 credit hours

Curriculum for Students Admitted with a B.S. Degree

Core courses: 22 credit hours
ECE 558 Instrumentation (3 cr)
ECE 561 Automatic Control Systems (3 cr)
ECE 601 Linear Systems (3 cr)
ECE 611 Numerical Methods in Engineering Analysis (3 cr)
ECE 612 Digital Signal Processing I (3 cr)
ECE 651 Statistical Analysis and Simulation (3 cr)
ECE 831 Graduate Seminar (1 cr)
ECE 861 Computational and Statistical Methods in Electrical and Computer Engineering (3 cr)

Electives (Graduate-level course work) – 27 credit hours
For students without a master's degree, the 27 credit hours of elective graduate-level coursework consist of nine 3-credit graduate-level courses chosen by the student and the research advisor and approved by the Graduate Program Director.

Research Requirement – 30 credit hours
Students will repeat this course, as needed, until the minimum credit hours are fulfilled.
ECE 899 Dissertation Research (1-9 cr)

Additional requirements
Students are required to successfully complete a written diagnostic examination, written and oral candidacy examinations, dissertation research proposal, and to write and defend in public their dissertation.

Total Credits: 79 credit hours

All Ph.D. students are required to take the department's Ph.D. Diagnostic Examination for the first time before the end of their second semester in the Ph.D. program. The examination is offered every fall and spring semester, and the student needs to pass the examination in no more than two attempts. The second attempt, if necessary, should be taken at the next offered

examination. The topics for the examination and samples of previous examinations are posted in the department's website. The examination rules are given on the first page of each examination.

In consultation with the advisory committee, the student will prepare a candidacy exam for presentation to and approval by the committee. The candidacy exam includes three portions, written report, oral presentation, and dissertation prospectus. It is required that the candidacy examination be taken in the semester when a student is completing the graduate coursework or during the following semester. After passing the candidacy exam, the chair of the advisory committee shall recommend the student's admission to candidacy to the Graduate Program Director. It is a university requirement that students who have advanced to candidacy be enrolled for at least one credit hour every fall, spring, and summer until graduation. Upon completion of the dissertation, the student's dissertation committee will conduct a public examination and defense of the dissertation. For both advisory and dissertation committees, the chair has to be a full time ECE faculty member as well as a minimum of 2 full time ECE faculty members and 1 outside ECE member are required.

Appendix A provides sample schedules for full-time and part-time students. Course descriptions may be found in Appendix B.

F. Time to Degree

A full time student will be able to complete the Ph.D. in ECE in 5 years in the average. Students who wish to do so will complete 25 credits graduate courses, pass the diagnostic exam, and advance to the candidate status within 2.5 years including summer semester on average. Part-time students will complete the degree in approximately 7-8 years depending on the time each student can dedicate.

G. Faculty Resources

Twenty-seven faculty members holding tenure-track or tenured positions in the department of Electrical and Computer Engineering have credentials to serve as the committee chair in the dissertation committee. Ph.D. students can also take graduate courses outside ECE. The none-ECE courses are taken in : College of Sciences (Computer Science; Mathematics & Statistics; Physics; Biological Sciences) and the Batten College of Engineering and Technology (Mechanical & Aerospace Engineering; Engineering Management and Systems Engineering).

The faculty have breadth and depth in areas of electrical and computer engineering, ranging from system to physical electronics, from power to renewable energy, and from fundamental signal processing to modeling, simulation, cybersecurity engineering. Combined, they have an extensive record of scholarship. During the past three years they disseminated over 230 peer-reviewed journal publications and over 150 peer-reviewed conference papers in electrical and computer fields. The ECE department has been ranked in the top 30 percent nationally by the National Science Foundation for research expenditures. Faculty members serving as Principal Investigators currently have 145 active research grants that have been awarded over $28,000,000 from prestigious organizations such as the National Science Foundation, Department of

Homeland Security, Department of Defense, National Security Agency, Air Force Research Laboratory, and Department of Energy.

Abbreviated CVs for existing full-time faculty members can be found in Appendix C.

H. Student Learning Assessment

The goal of this graduate level, Ph.D. program is to prepare its graduates to establish themselves as leaders in high-level engineering positions in industry or a government setting - by conducting themselves in a responsible, professional, and ethical manner.

Ph.D. students will be evaluated throughout the program using formative assessments, such as, tests, diagnostics exam, candidacy exam, papers, dissertation, and presentations. Student learning outcomes cover many of the technical and management competencies that are required for the area of electrical and computer engineering. Specifically,:

- The program will produce graduates with an advanced technical understanding and skills in electrical and computer engineering.
- Program graduates will be able to apply advanced knowledge and skills in electrical and computer engineering to solve contemporary problems of industry and society.
- Program graduates will be able to conduct both independent and collaborative research to generate new knowledge in the field of electrical and computer engineering.
- Program graduates will effectively communicate knowledge to the technical and broader public communities.

Ph.D. students' learning outcomes assessment approach:

Outcomes	Ph.D. Students
1. Advanced Knowledge: Graduates will be able to apply new electrical and computer engineering knowledge to their chosen area of expertise in (1) systems, (2) signal and image processing, (3) physical electronics or (4) computer engineering. Graduates should become experts in their field of knowledge and research.	a. Diagnostic Exam: The graduate committee will assess this outcome based on performance on the diagnostic examination b. Candidacy exam: The student's Advisory Committee will assess the applicable outcomes based on the candidacy exam and determine the student's ability by using the "rubrics" developed for this outcome. c. Dissertation (ECE 899): The student's Dissertation Committee will assess the applicable outcomes based on the Ph.D. Dissertation and determine the student's ability by using the "rubrics" developed for this outcome.
2. Independent Research:	Dissertation (ECE 899): The student's Dissertation Committee will assess the applicable outcomes based on the

Graduates will be able to conduct and critique high-level independent research in the field of electrical and computer engineering.	Ph.D. Dissertation and determine the student's ability by using the "rubrics" developed for this outcome.
3. Original Contribution: Graduates will be able to create and produce an "original contribution to knowledge" in the field of electrical and computer engineering.	This outcome is evaluated on the following criteria as judged by the Dissertation Committee. Inadequate: the original contribution through the dissertation research is not publishable in a refereed journal. Adequate: the original contribution is publishable in a refereed journal. Excellent: the original contribution is publishable and can produce at least one article in a reputable journal in the field.
4. Written Communication Skills: Graduates will be able to evaluate scholarly electrical and computer engineering ideas and advanced technical material such as mathematical equations and data analysis in writing prepared for peer-reviewed academic journal articles.	Dissertation (ECE 899): Graduates will be able to evaluate scholarly electrical and computer engineering ideas and advanced technical material such as mathematical equations and data analysis in writing prepared for peer-reviewed academic journal articles. The student's Dissertation Committee will assess the applicable outcomes based on the Ph.D. Ph.D. Dissertation and determine the student's ability by using the "rubrics" developed for this outcome
5. Verbal Communication Skills: Graduates will be able to create electrical and computer engineering research questions, recommend appropriate methodologies, and justify related results both verbally and visually in an academic presentation.	Dissertation (ECE 899): Graduates will be able to create electrical and computer engineering research questions, recommend appropriate methodologies, and justify related results both verbally and visually in an academic presentation. The students' Dissertation Committee will assess the applicable outcomes based upon the student's presentation and ability to answer questions during the defense examination. The Committee will determine the student's ability by using the "rubrics" developed for this outcome

I. Employment Skills

The Ph.D. program in Electrical and Computer Engineering will provide a continuously improving learning environment to its students while maintaining high ethical, multicultural, and global standards. The Ph.D. degree is awarded to candidates who have displayed an in-depth understanding of the subject matter and demonstrated the ability to make an original contribution to knowledge in their chosen field of specialty. Ph.D. degree students must take eight courses beyond their Master's degree, five of which must be at the doctoral 800 level. Ph.D. students must also pass diagnostic and candidacy exams, work on advanced research under direct advising of an ECE faculty member and write and defend an original dissertation. The first main goal of this Ph.D. program is to prepare its graduates so they will be able to establish themselves as leaders in high-level engineering positions in industry and/or a government setting. Ph.D. graduates are employed as electrical and computer engineers supporting industries like automotive, manufacturing, systems integration, shipbuilding, aerospace, defense, telecommunications, etc. They are also employed as researchers by private research and development labs or by federally funded organizations (Jefferson Lab, NASA, or the Naval Research Laboratories). Some of our former doctoral students have also gone into academic careers doing postdoctoral fellowships or are working in universities as faculty members. The second goal of this Ph.D. program is to prepare its graduates so they will be able to continue to create engineering knowledge. The third goal of Ph.D. program is to prepare its graduates and encourage them to establish themselves as successful faculty members if they choose to join academia.

Graduates of the proposed Ph. D. in ECE will have the skills and abilities needed for employment and workplace competencies in the field of electrical and computer engineering. Specifically, they will have the ability to:

- Graduates will have the ability to discover or develop new engineering knowledge and scholarly skills at an advanced level.
- Graduates will be able analyze advanced, complex electrical and computer engineering problems and develop practical solutions that work within provided specifications and constraints.
- Graduates will develop critical thinking skills and competencies in technical aspects of electrical and computer engineering in current and emerging electrical and computer technologies.
- Graduates will apply leading-edge principles, theories, and concepts to the development of standards, procedures, and guidelines in their chosen field of specialty related to electrical and computer engineering.
- Graduates will work effectively as a member of a team and be able to lead others in teamwork-based projects.
- Graduates will be able to communicate effectively in written, oral, and other modes as needed

J. Relationship to Existing Programs

The existing program at ODU is a Ph.D. in General Engineering with a concentration in Electrical and Computer Engineering. The proposed program is not an expansion of an existing program. The proposed program is a standalone program with a new focus in Electrical and Computer Engineering. No degree programs will be compromised or closed as a result of the initiation and operation of the proposed degree program.

Part II: Justification for the Proposed Program

A. Response to Current Needs (Specific Demand)

The Electrical and Computer Engineering CIP Code 14.4701 was introduced in 2020. Since 2020, 35 institutions have adopted the new CIP code. For example, the Rochester Institute of Technology and the University of Michigan adopted the new CIP code and started offering doctoral degrees in electrical and computer engineering. ODU would be the first university in Virginia to offer graduate degrees in electrical and computer engineering to meet current and future needs.

Shortage of Qualified Electrical and Computer Engineers for New Market Opportunities and Global Competitiveness Advanced Technology in USA

According to the U.S. Bureau of Labor Statistics (BLS), two occupations long associated with innovation – electrical and electronics engineering – have all but stalled in their growth. The slow rate of growth in most manufacturing sectors is getting much of the blame for the stall in this occupation. This bleak view of the field is in direct contrast with industry claims that the United States has a massive shortage of skilled electrical engineers. American companies maintain that this is not an issue of declining demand, but rather one of declining investment in U.S. workers in favor of lobbying Congress for access to inexpensive foreign labor. Some observers claim that the demand for American electrical engineers would improve if the U.S. insisted that rockets that launch astronauts, satellites, weather, and GPS equipment were made in the U.S. The BLS predicts that most opportunities for electrical and electronics engineers will be with engineering service firms, as companies seek to reduce costs by contracting. Electrical engineers familiar with developing technologies in the areas of solar arrays, semiconductors, and communications will be best positioned to find jobs[1].

According to a CNBC report[2], the software developer (one field of computer engineering) shortage will be alarming in 2022. According to the U.S. Bureau of Labor Statistics (BLS)[3], by 2030, the number of software job vacancies would rise by almost 22%. The average growth rate of software developers in the USA is only 8% right now, and that clearly emphasizes there is already an overwhelming and severe shortage of skilled workers. The talent shortfall starts with college graduates and advanced professionals in the fields of science, technology, engineering and mathematics (STEM). While a shortage of STEM workers will not stop a company's day-to-day operations, it can hamper the pace of growth for the whole industry and, subsequently, have an impact on the competitiveness of entire countries or regions[4].

The doctoral program prepares students for academia, research laboratories, and industry careers. In 2023, universities in the state of Virginia posted positions for tenure-track and research faculty, including positions seeking expertise in cyber-physical systems (Hampton University), integrated microsystems design and fabrication (Virginia Tech), and statistical estimation, signal processing, and wireless communications (University of Virginia). With their unique electrical and computer engineering foundation, our doctoral students can succeed in these positions by integrating their expertise in electrical engineering and computer systems. The federal government (e.g., U.S. Army Corps of Engineers, Fort Belvoir) and industry (e.g., Amentum,

Dahlgren) have positions for applicants with a Ph.D. degree who can design and develop systems at the crossroads of electrical and computer engineering. Graduates of our Ph.D. in Electrical and Computer Engineering will be needed to ensure that the Virginia Clean Economy Act will deliver practical and innovative solutions while spurring economic growth.

[1]The job market for electrical engineers in the United states, CareerExplorer, http://www.careerexplorer.com/careers/electrical-engineer/job-market/#whats-the-supply.
[2]The US has nearly 1 million open IT jobs—here's how much it can pay off to switch industries into tech, CNBC, http://www.cnbc.com/2019/11/06/how-switching-careers-to-tech-could-solve-the-us-talent-shortage.html.
[3]Computer Programmers, U.S. Bureau of Labor Statistics, http:// www.bls.gov/ooh/computer-and-information-technology/computer-programmers.htm.
[4]Engineering Talent Shortage Now Top Risk Factor, Semiconductor Engineering. http:// Engineering Talent Shortage Now Top Risk Factor (semiengineering.com)

B. Employment Demand

The proposed PH.D. in ECE responds to the need for electrical and computer professionals in the Commonwealth of Virginia, the nation, and the world. In recent U.S. Bureau of Statistics, employment of computer and information research scientists is projected to grow 20 percent from 2020 to 2030, much faster than the average for all occupations[1]. About 9,700 openings for computer programmers are projected each year, on average, over the decade[2]. Overall employment of electrical and electronics engineers is projected to grow 7 percent from 2020 to 2030, about as fast as the average for all occupations[3]. "There are more computers on the manufacturing floor than machine tools and other types of equipment," said Judy Marks, CEO of Siemens USA[4]. More and more factory jobs now demand education, technical know-how or specialized skills. And many of the workers set adrift from low-tech factories lack such qualifications[4]. In addition, although computer and information research scientists typically need a master's or higher degree in computer related field, such as electrical and computer engineering, employers prefer to hire candidates who have a Ph.D[5]. Focusing on cutting edge education and training will be essential for Virginia's and U.S. high technology workforce and economic development as occupations in the electrical and computer industry are highly in demand and among the fastest growing in the economy. The proposed degree program will contribute to addressing such needs by preparing students to understand electrical and computer engineering principles and develop more innovative and advanced systems. Graduates will become the next generation in the high technology workforce to safeguard U.S. the leadership in technology.

[1] Computer and Information Research Scientists, U.S. Bureau of Labor Statistics, http:// www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm.
[2] Computer Programmers, U.S. Bureau of Labor Statistics, http:// www.bls.gov/ooh/computer-and-information-technology/computer-programmers.htm.
[3] Electrical and Electronics Engineers, U.S. Bureau of Labor Statistics, http;// www.bls.gov/ooh/architecture-and-engineering/electrical-and-electronics-engineers.htm.

[4] Lots of High-Tech factory Jobs in U.S., but Skilled Workers Are lacking, The Seattle Times, http:// www.seattletimes.com/business/high-tech-us-plants-offer-jobs-even-as-the-laid-off-struggle/

[5] U. S. Bureau of Labor Statistics, http://www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm#tab-4

Labor Market Information: Bureau of Labor Statistics, 2021 -2031 (10-Yr)

Occupation	Base Year Employment	Projected Employment	Total % Change and #s	Typical Entry Level Education
Electrical and Electronics Engineer	303,800	313,600	3%, 9,800	Bachelor's
Computer hardware engineer	76,900	80,600	5%, 3,700	Bachelor's
Computer and information research scientist	33,500	40,600	21%, 7,100	Master's
Computer network architects	174,800	182,300	4%, 7500	Bachelor's
Computer systems analyst	538,800	589,700	9%, 50,900	Bachelor's

Labor Market Information: Virginia Employment Commission, 2020 -2030 (10-Yr)

Occupation	Base Year Employment	Projected Employment	Total % Change and #s	Annual Change #	Education
Electrical Engineer	6155	6666	8.3%, 511	51	Bachelor's
Electronics Engineers, Except Computer	3981	4234	6.3%, 253	25	Bachelor's
Computer and Information Systems Managers	15422	17107	10.9%, 1685	168	Bachelor's
Computer Science Teachers,	1668	1843	10.4%, 175	18	Not applicable

Occupation	Base Year Employment	Projected Employment	Total % Change and #s	Annual Change #	Education
Postsecondary					

C. Student Demand

Our draft student demand survey is attached as Appendix H which will be sent out to ODU ECE majors with Junior, Senior, and MS standing (i.e., those likely already thinking about potential graduate programs) and students outside ODU. SCHEV requires these surveys be conducted within twelve (12) months of submitting the proposal to SCHEV, so we are waiting for the final timeline to be established prior to initiating these efforts.

D. Duplication

No university in the Commonwealth of Virginia offers a Ph.D. degree in Electrical and Computer Engineering. The following tables provide data for similar but not equivalent degrees.

Ph.D. degree:

Engineering, General (CIP Code: 14.0101)				
Institution	Degree	Program Name	Enrollment	Degrees Awards
Virginia Commonwealth University	Ph.D	Engineering	Fall 2021: 57 Fall 2020: 76 Fall 2019: 89 Fall 2018: 86 Fall 2017: 83	Year 2021: 8 Year 2020: 11 Year 2019: 16 Year 2018: 15 Year 2017: 15
Old Dominion University	Ph.D.	Engineering	Fall 2021: 234 Fall 2020: 218 Fall 2019: 233 Fall 2018: 230 Fall 2017: 243	Year 2021: 23 Year 2020: 34 Year 2019: 39 Year 2018: 34 Year 2017: 33

Electrical and Electronics Engineering (CIP Code: 14.1001)				
Institution	Degree	Program Name	Enrollment	Degrees Awards
George Mason University	Ph.D.	Electrical and Computer Engineering	Fall 2021: 69 Fall 2020: 69 Fall 2019: 65 Fall 2018: 65 Fall 2017: 65	Year 2021: 6 Year 2020: 5 Year 2019: 5 Year 2018: 13 Year 2017: 10
University of Virginia	Ph.D.	Electrical Engineering	Fall 2021: 103 Fall 2020: 112	Year 2021: 15 Year 2020: 17

Institution	Degree	Program Name	Enrollment	Degrees Awards
			Fall 2019: 113	Year 2019: 15
			Fall 2018: 110	Year 2018: 15
			Fall 2017: 102	Year 2017: 10
Virginia Tech	Ph.D	Electrical Engineering	Fall 2021: 220	Year 2021: 43
			Fall 2020: 230	Year 2020: 35
			Fall 2019: 252	Year 2019: 36
			Fall 2018: 241	Year 2018: 42
			Fall 2017: 248	Year 2017: 38

Computer Engineering, General (CIP Code: 14.0901)				
Institution	Degree	Program Name	Enrollment	Degrees Awards
University of Virginia	Ph.D.	Computer Engineering	Fall 2021: 44	Year 2021: 2
			Fall 2020: 45	Year 2020: 3
			Fall 2019: 42	Year 2019: 3
			Fall 2018: 34	Year 2018: 3
			Fall 2017: 26	Year 2017: 2
Virginia Tech	Ph.D	Computer Engineering	Fall 2021: 75	Year 2021: 9
			Fall 2020: 69	Year 2020: 11
			Fall 2019: 65	Year 2019: 9
			Fall 2018: 65	Year 2018: 15
			Fall 2017: 76	Year 2017: 14

Virginia Commonwealth University (VCU)

Similarities to ODU
1. The degree is designated as general engineering with a concentration in electrical and computer engineering.
2. It covers disciplines related to electrical and computer engineering.
3. It provides two paths, including students with B.S only and students with B.S. & M.S., to pursue Ph.D.
4. It has diagnostic exam, named qualifier exam, and dissertation proposal and defense.

Differences from ODU
1. For students with B.S., it only requires 60 credits, including 33 credits course works (12 credits for concentration component and 21 credits for option electives) and 27 credits dissertation research. It does not require additional 1 credit graduate seminar.
2. For students with B.S. & M.S., it only requires 30 credits, including 9 credits course works (6 credits for concentration component and 3 credits for option electives) and 21 credits dissertation research. It does not require additional 1 credit graduate seminar.
3. For both paths, it does not require additional candidacy exam to advance candidacy. Instead, it uses dissertation proposal as an assessment to determine the candidacy status.
4. It requires peer-reviewed evidence of the quality of the dissertation work, in terms of at least one accepted or published reputable journal paper or published high-quality conference paper and a second manuscript submitted to a journal or a high-quality conference, must be approved by the doctoral advisory committee and the ECE graduate program director before the

dissertation defense can be scheduled. These publications should be based on the student's dissertation research, with the student as the primary author.

George Mason University (GMU)

<u>Similarities to ODU</u>

1. It covers disciplines related to electrical and computer engineering.
2. It provides two paths, including students with B.S only (72 credits) and students with B.S. & M.S. (42 credits), to pursue Ph.D.
3. It has diagnostic exam, named qualifier exam, and dissertation proposal and defense.

<u>Differences from ODU</u>

1. It does not require additional 1 credit graduate seminar but requires students to present at least one ECE departmental seminar on the topic of their dissertation research.
2. It does not have the candidacy exam to determine the candidacy status. It uses dissertation proposal determine the candidacy status.
3. It requires each Ph.D. student is required to participate in the department's teaching activity. The requirement is typically satisfied by working as a recitation instructor for one semester, presenting several lectures within a course, or performing other teaching work approved by the department.

Virginia Tech (VT)

<u>Similarities to ODU</u>

It covers disciplines related to electrical and computer engineering.

<u>Differences from ODU</u>

1. It must have M.S. degree.
2. It has diagnostic exam, named qualifier exam, and needs complete a minimum of 92 credit hours, consisting of 30 course-credit hours, 60 credit hours of research and dissertation, and 2 course-credit-hours of Seminar. The Seminar requirement is waived for students who earn a master's degree in ECE at Virginia Tech. In addition to completing a dissertation and passing an oral defense of the dissertation, candidates must successfully meet two examination requirements, a Ph.D. Qualifying Examination and a Ph.D. Preliminary Examination
3. This qualifying exam has oral and written components, and serves as a departmental filter to assess the student's broad background in ECE, verbal and writing abilities, and the potential for successfully completing doctoral work.
4. This preliminary exam is an oral exam, before the student's advisory committee that determines the student's ability to develop scholarly research. The student presents the results of his or her current research investigations along with an outline of a proposed Ph.D. dissertation. The examination committee may also ask questions on course work and related topics, including possible written, open-ended questions prior to the oral exam

University of Virginia (UVA)

<u>Similarities to ODU</u>

1. It covers disciplines related to electrical and computer engineering.
2. It provides two paths, including students with B.S only (73 credits) and students with B.S. & M.S. (49 credits), to pursue Ph.D.
3. It has the graduate seminar requirement.
4. Its qualifying exam includes our diagnostic and candidacy exams.

Differences from ODU
It requires 3 credits supervised teaching.

Part III: Summary of Projected Enrollments in Proposed Program

Projected enrollment:

Year 1		Year 2		Year 3		Year 4			Year 5		
2025-2026		**2026-2027**		**2027-2028**		**2028-2029**			**2029-2030**		
HDCT	FTES	HDCT	FTES	HDCT	FTES	HDCT	FTES	GRAD	HDCT	FTES	GRAD
___	___	___	___	___	___	___	___	___	___	___	___

Assumptions:
Retention percentage: 80%
Part-time students: 20%; Full-time students: 80%
Expected time to graduation for full-time: 5 years; and part-time: 7 years
Number of credit hours per semester for full-time: 9; and for part-time: 3-6

Part IV: Projected Resource Needs for the Proposed Program

Resource Needs

Old Dominion University
Full-Time Faculty
Twenty-seven full-time faculty members who are either tenured or on a tenure track will teach the core course curriculum in the Ph.D. in Electrical and Computer Engineering program, with an additional Two faculty teaching associated electives for a total of twenty-nine full-time program faculty.

Part-Time Faculty
No part-time faculty members are required to launch and sustain the proposed program.

Adjunct Faculty
No adjunct faculty members are required to initiate and sustain the proposed program.

Graduate Assistants
No graduate assistants are required to initiate and sustain the proposed program.

Classified Positions
No classified position is requested to initiate and sustain the proposed program.

Targeted Financial Aid
No targeted financial aid is required to launch and sustain the proposed program.

Library
No new library resources are required to launch and sustain the proposed program. The University Libraries has a strong collection in the Electrical and Computer Engineering. Many current journals are found in the online databases, and the library has a responsive interlibrary loan program for resources outside of the current collection. The Department of Electrical and Computer Engineering has an annual allowance for books or journals.

Telecommunications
No new telecommunication resources are needed to initiate and sustain the proposed program.

Equipment (including computers)
No new equipment resources are needed to initiate and sustain this proposed program.

Space
No additional space is needed to initiate and sustain this proposed program.

Other Resources (specify)
No new resources will be required to launch or operate the proposed Master of Science in Cybersecurity.

Funds to Initiate and Operate the Degree Program

	Informational Category	Program Initiation Year 2025-2026	Program Full Enrollment Year 2028-2029
Cost and Funding Sources to Initiate and Operate the Program
1	Projected Enrollment (Headcount)	50	68
2	Projected Enrollment (FTE)	45	61
3	Projected Enrollment Headcount of In- State Students	$16,369 (in-state) $38,595 (out-of-state)	$18,949 (in-state) $44,679 (out-of-state)
4	Projected Enrollment Headcount of Out- of-State Students	$929,580	$1,468,642
5	Estimated Annual Tuition and E&G Fees for In-state Students in the Proposed Program		
6	Estimated Annual Tuition and E&G Fees for Out-of-State Students in the Proposed Program		
7	Projected Total Revenue from Tuition and E&G Fees Due to the Proposed Program		
8	Other Funding Sources Dedicated to the Proposed Program (e.g., grant, business entity, private sources)	$0.00	$0.00

Resource Needs: Parts A - D

Part A: Answer the following questions about general budget information.

- Has or will the institution submit an addendum budget request to cover one-time costs?   Yes   No   X

- Has or will the institution submit an addendum budget request to cover operating costs? Yes _____ No __X__
- Will there be any operating budget requests for this program that would exceed normal operating budget guidelines (for example, unusual faculty mix, faculty salaries, or resources)? Yes _____ No __X__
- Will each type of space for the proposed program be within projected guidelines? Yes __X__ No _____
- Will a capital outlay request in support of this program be forthcoming? Yes _____ No __X__

Part D: Certification Statement(s)

The institution will require additional state funding to initiate and sustain this program.

_____ Yes _____
                  Signature of Chief Academic Officer

__X__ No _____
                  Signature of Chief Academic Officer

Secondary Certification.

If resources are reallocated from another unit to support this proposal, the institution will **not** subsequently request additional state funding to restore those resources for their original purpose.

__X__ Agree _____
                  Signature of Chief Academic Officer

_____ Disagree _____
                  Signature of Chief Academic Officer

APPENDIX A – SAMPLE PLAN OF STUDY

Sample plan of student for full-time student with a prior MS

Course	Credits	Category
Fall I		
ECE 651 Statistical Analysis and Simulation	3	Core
ECE 861 Computational and Statistical Methods in Electrical and Computer Engineering	3	Core
Elective Courses	3	Elective
TOTAL 9 credits		
Spring I		
Elective Courses	3	Elective
Elective Courses	3	Elective
Elective Courses	3	Electives
TOTAL 9 credits		
Fall II		
Elective Courses	3	Elective
Elective Courses	3	Elective
ECE 831 Graduate Seminar	1	Core
ECE 899 Dissertation	2	Core
TOTAL 9 credits		
Spring II		
ECE 899 Dissertation	9	Core
TOTAL 9 credits all But ABD status		
Summer II		
ECE 899 Dissertation		Core
TOTAL 1 credit all But ABD status		
Fall III		
ECE 800 Dissertation	6	core
TOTAL 6 credit all But ABD status		
Spring III		
ECE 899 Dissertation	1	Core
TOTAL 1 credit all But ABD status		
Summer III		
ECE 899 Dissertation	1	Core
TOTAL 1 credit all But ABD status		
Fall IV		

Course	Credits	Category
ECE 899 Dissertation	2	Core
TOTAL 1 credit all But ABD status		
Spring IV		
ECE 899 Dissertation	1	Core
TOTAL 1 credit all But ABD status		
Summer IV		
ECE 899 Dissertation	1	Core
TOTAL 1 credit all But ABD status		

Total required for degree - 49 credits

Sample plan of student for full-time student with no prior MS

Course	Credits	Category
Fall I		
ECE 558 Instrumentation	3	Core
ECE 561 Automatic Control Systems	3	Core
ECE 601 Linear Systems	3	Core
TOTAL 9 credits		
Spring I		
ECE 611 Numerical Methods in Engineering Analysis	3	Core
ECE 612 Digital Signal Processing I	3	Core
ECE 651 Statistical Analysis and Simulation	3	Core
TOTAL 9 credits		
Fall II		
ECE 651 Statistical Analysis and Simulation	3	Core
ECE 861 Computational and Statistical Methods in Electrical and Computer Engineering	3	Core
Elective Courses	3	Elective
TOTAL 9 credits		
Spring II		
Elective Courses	3	Elective
Elective Courses	3	Elective
Elective Courses	3	Elective
TOTAL 9 credits		
Fall III		
Elective Courses	3	Elective
Elective Courses	3	Elective

Elective Courses	3	Elective
TOTAL 9 credits		
Spring III		
ECE 831 Graduate Seminar	1	Core
ECE 899 Dissertation	5	Core
Elective Courses	3	Elective
TOTAL 9 credits		
Summer III		
ECE 899 Dissertation	1	Core
TOTAL 1 credit all But ABD status		
Fall IV		
ECE 899 Dissertation	9	Core
TOTAL 9 credits		
Spring IV		
ECE 899 Dissertation	9	Core
TOTAL 1 credit all But ABD status		
Summer IV		
ECE 899 Dissertation	1	Core
TOTAL 1 credit all But ABD status		
Fall V		
ECE 899 Dissertation	4	Core
TOTAL 1 credit all But ABD status		
Spring V		
ECE 899 Dissertation	1	Core
TOTAL 1 credit all But ABD status		

Total required for degree - 79 credits

APPENDIX B - COURSE DESCRIPTIONS

Core Courses:

ECE 558 Instrumentation (3 Credit Hours)
Computer interfacing using a graphical programming language with applications involving digital-to-analog conversion (DAC), analog-to-digital conversion (ADC), digital input output (DIO), Virtual Instrument System Architecture (VISA) and universal Service Bus (USB). Analysis of sampled data involving use of probability density function, mean and standard derivations, correlations, and the power spectrum.

ECE 561 Automatic Control Systems (3 Credit Hours)
Analysis and design of control systems as found in automobiles and aircraft, autonomous vehicles, robots, and many other engineering systems. Time and frequency domain techniques such as root locus, Bode, Nyquist and state space techniques are utilized together with computer-aided analysis and design.

ECE 601 Linear Systems (3 Credit Hours)
A comprehensive introduction to the analysis of linear dynamical systems from an input-output and state space point of view. Concepts from linear algebra, numerical linear algebra and linear operator theory are used throughout. Some elements of state feedback design and state estimation are also covered.

ECE 611 Numerical Methods in Engineering Analysis (3 Credit Hours)
Course intended to provide graduate students in Electrical and Computer Engineering with a basic knowledge of numerical methods applied to engineering problem-solving process. The course includes the following topics: Introduction to computing (Matlab), Truncation errors and Taylor series, Numerical integration, Solution of non-linear equations, Least-Square regression, Interpolations, Ordinary and partial differential equations, and Finite difference methods. Applications to the area of electrical engineering.

ECE 612 Digital Signal Processing I (3 Credit Hours)
This course will present the fundamentals of digital signal processing. Topics will include frequency domain analysis of discrete-time linear systems, sampling and reconstruction of signals, the Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), and digital filter design and implementations. Practical applications and examples will be discussed. Problem solving using MATLAB is required.

ECE 651 Statistical Analysis and Simulation (3 Credit Hours)
An introduction to probabilistic and statistical techniques for analysis of signals and systems. This includes a review of probability spaces, random variables, and random processes. Analysis and simulation of systems with random parameters and stochastic inputs are considered.

ECE 861 Computational and Statistical Methods in Electrical and Computer Engineering **(3 Credit Hours)**
This course covers the theoretical foundation and application of commonly used techniques in Computational and statistical methods. Topics include linear algebra, partial differential equations, regression analysis, applied probabilities, multivariate distributions, Bayesian statistics, hypothesis tests, multiple comparisons, ANOVA, solution of non-linear equations, numerical methods and optimization. Programming software will be used to perform simulations and analyze a variety of data.

ECE 831 Graduate Seminar (1 Credit Hour)
Graduate seminar presentations concerning technical topics of current interest given by faculty and invited speakers.

ECE 899 Dissertation Research (1-9 Credit Hours)
Directed research for the doctoral dissertation.

Elective Courses

ECE 607 Machine Learning I (3 Credit Hours)
Course provides a practical treatment of design, analysis, implementation and applications of algorithms. Topics include multiple machine learning models: linear models, neural networks, support vector machines, instance-based learning, Bayesian learning, genetic algorithms, ensemble learning, reinforcement learning, unsupervised learning, etc.

ECE 623 Electromagnetism (3 Credit Hours)
Review of electrostatic and magnetostatic concepts, time varying field, Maxwell's equations, plane wave propagation in various media, transmission lines, optical wave guides, resonant cavities, simple radiation systems, and their engineering applications.

ECE 642 Computer Networking (3 Credit Hours)
The course is based on the ISO (International Standard Organization) OSI (Open Systems Interconnection) reference model for computer networks. A focus is placed on the analysis of protocols at different layers, network architectures, and networking systems performance analysis. Current topic areas include LANs, MANs, TCP/IP networks, mobile communications, and ATM.

ECE 643 Computer Architecture Design (3 Credit Hours)
Digital computer design principles. The course focuses on design of state-of-the-art computing systems. An emphasis is placed on superscalar architectures focusing on the pipelining and out-of-order instruction execution operations.

ECE 648 Advanced Digital Design (3 Credit Hours)
This course introduces methods for using high level hardware description language such as VHDL and/or Verilog for the design of digital architecture. Topics include top-down design approaches, virtual prototyping, design abstractions, hardware modeling techniques, algorithmic and register level design, synthesis methods, and application decomposition issues. Final design project is required.

ECE 652 Wireless Communications Networks (3 Credit Hours)
Fundamental concepts in wireless communication systems and networks: radio waveform propagation modeling (free-space, reflections and multipath, fading, diffraction and Doppler effects); physical and statistical models for wireless channels; modulation schemes for wireless communications and bandwidth considerations; diversity techniques; MIMO systems and space-time coding; multiuser systems and multiple access techniques (TDMA, FDMA. CDMA); spread spectrum and multiuser detection; introduction to wireless networking and wireless standards; current and emerging wireless technologies.

ECE 667 Cooperative Education (1-3 Credit Hours)
Student participation for credit based on academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department and the Cooperative Education/Career Development Services program prior to the semester in which the work experience is to take place.

ECE 695 Topics in Electrical or Computer Engineering (3 Credit Hours)
This course will be offered as needed, depending upon the need to introduce special subjects to target specific areas of master's-level specializations in electrical or computer engineering.

ECE 842 Computer Communication Networks (3 Credit Hours)
This is an advanced level course in data communications. A focus is placed on the analysis, modeling, and control of computer communication systems. Topics include packet switched networks, circuit switched networks, ATM networks, network programming, network control and performance analysis, network security, and wireless sensor networks.

ECE 854 Advanced Bioelectrics (3 Credit Hours)
Bioelectrics is a new field encompassing both the science and technology of applying electrical stimuli to biological systems. This course covers the pulsed power technology that is required to generate electrical stimuli as well as the biological responses they evoke in cells and tissues. Particular emphasis is placed on the medical applications of bioelectrics, including tumor ablation, gene electrotransfer, wound healing, decontamination with cold plasma, and treatment of cardiac arrhythmias.

ECE 855 Biomembranes and Ion Channels (3 Credit Hours)

This course will give an overview of the structure and dynamics of biomembranes, the ion channels that are embedded in them, and the electrical properties of biomembranes. Topics include molecular dynamics modeling of biomembranes, membrane damage and repair, ion channel dynamics and their experimental assessment using patch clamping, and excitability in neurons and cardiomyocytes.

ECE 862 Digital Control Systems (3 Credit Hours)
Mathematical representation, analysis, and design of discrete-time and sampled-data control systems. Topics include transfer function and state space representations, stability, the root locus method, frequency response methods, and state feedback.

ECE 863 Multivariable Control Systems (3 Credit Hours)
A comprehensive introduction to techniques applicable in control of complex systems with multiple inputs and outputs. Both the frequency domain and state variable approaches are utilized. Special topics include robust and optimal control.

ECE 866 Nonlinear Control Systems (3 Credit Hours)
An introduction to mathematical representation, analysis, and design of nonlinear control systems. Topics include phase-plane analysis, Lyapunov stability theory for autonomous and nonautonomous systems, formal power series methods and differential geometric design techniques.

ECE 872 Fundamentals of Solar Cells (3 Credit Hours)
The course provides an overview of the fundamentals of solar cell technologies, design, and operation. The course is designed for graduate students in Engineering and Science interested in the field of alternative energy. The course objectives are to make sure each student: understands the various forms of alternative energies, understands solar cell design, understands solar cell operation, and acquires knowledge of the various solar cells technologies. The topics to be covered include: Alternative energies; Worldwide status of Photovoltaics; Solar irradiance; Review of semiconductor properties; Generation, recombination; Basic equations of device physics; p-n junction diodes; Ideal solar cells; Efficiency limits; Efficiency losses and measurements; Module fabrication; c-Si technology; classical; Photovoltaic systems; Design of stand-alone system; Residential PV systems.

ECE 873 Introduction to Nanotechnologies (3 Credit Hours)
This course will introduce the rapidly emerging field of nanotechnology with special focus on underlying principles and applications relevant to the nanoscale dimensions. Specifically, this course will cover (1) the basic principles related to synthesis and fabrication of nanomaterials and nanostructures, (2) zero-, one-, two- and three-dimensional nanostructures, (3) characterization and properties of nanomaterials, and (4) application of nanoscale devices.

ECE 874 Semiconductor Characterization (3 Credit Hours)
Introduction of basic methods for semiconductor material and device characterization. Topics include resistivity, carrier doping concentration, contact resistance, Schottky barrier height, series resistance, channel length, threshold voltage, mobility, oxide and interface trapped charge, deep level impurities, carrier lifetime, and optical, chemical and physical characterization.

ECE 875 Non-thermal Plasma Engineering (3 Credit Hours)
This course covers the fundamental principals governing low temperature plasma discharges and their applications. First the fundamental properties of plasmas are introduced. These include the kinetic theory of gases, collisional processes, and plasma sheaths. Then in-depth coverage of the physical mechanisms underlying the operation of non-equilibrium plasma discharges is presented, including important characteristics such as their ignition, evolution, and eventual quenching. Finally, practical applications of non-thermal plasmas, including applications in biology and medicine, are presented.

ECE 877 Semiconductor Process Technology (3 Credit Hours)
Theory, design and fabrication of modern integrated circuits that consist of nano scale devices and materials. Topics include crystal growth and wafer preparation process including epitaxy, thin film deposition, oxidation, diffusion, ion implantation, lithography, dry etching, VLSI process integration, diagnostic assembly and packaging, yield and reliability.

ECE 880 Machine Learning II (3 Credit Hours)
Advanced topics in machine learning and pattern recognition systems. Data reduction techniques including principle component analysis, independent component analysis and manifold learning. Introduction to sparse coding and deep learning for data representation and feature extraction.

ECE 882 Digital Signal Processing II (3 Credit Hours)
Review of time domain and frequency domain analysis of discrete time signals and systems. Fast Fourier Transforms, recursive and non-recursive digital filter analysis and design, multirate signal processing, optimal linear filters, and power spectral estimation.

ECE 883 Digital Image Processing (3 Credit Hours)
Principles and techniques of two-dimensional processing of images. Concepts of scale and spatial frequency. Image filtering in spatial and transform domains. Applications include image enhancement and restoration, image compressing, and image segmentation for computer vision.

ECE 884 Computer Vision (3 Credit Hours)
Principles and applications of computer vision, advanced image processing techniques as applied to computer vision problems, shape analysis and object recognition.

ECE 887 Digital Communications (3 Credit Hours)
Fundamental concepts of digital communication and information transmission: information sources and source coding; orthonormal expansions of signals, basis functions, and signal space concepts; digital modulation techniques including PAM, QAM, PSK and FSK; matched filters, demodulation and optimal detection of symbols and sequences; bandwidth; mathematical modeling of communication channels; channel capacity.

ECE 895 Topics in Electrical and Computer Engineering (3 Credit Hours)
Topics in Electrical and Computer Engineering

ECE 897 Independent Study (1-3 Credit Hours)

This course allows students to develop specialized expertise by independent study (supervised by a faculty member).

APPENDIX C
FACULTY CURRICULUM VITAE (ABBREVIATED)

Al-Assadi, **Waleed K.,** Ph.D., 1996, Computer Engineering, Colorado State University. Lecturer of Electrical and Computer Engineering. Specialization areas: IC design, signal integrity, hardware cybersecurity, and reliability of nanotechnology-based systems.

Alsharif, Salim, Ph.D., 2002, Electrical Engineering, Florida Institute of Technology. Lecturer of Electrical & Computer Engineering. Specialization areas: computer network, communication systems, microprocessor interfacing, embedded systems, and signal processing.

Audette, Michel, Ph.D., 2002, Biomedical Engineering, McGill University. Associate Professor of Electrical and Computer Engineering. **Specialization areas: medical/surgical simulation, surgical planning, and medical device facilitation.**

Baumgart, Helmut, Ph.D., 1981, Physics, University of Stuttgart and Max Planck Institute of Solid State Research (Germany). Professor of Electrical and Computer Engineering and Virginia Micro-Electronics Consortium Endowed Professorship in Microelectronics. Specialization areas: thin films, synthesis of nested nanotube composites, microfluidic devices and electroosmotic pumps, silicon-on-insulator (SOI), and high-performance devices.

Belfore II, **Lee A.,** Ph.D., 1990, Electrical Engineering, University of Virginia; PE. Associate Professor of Electrical and Computer Engineering. **Specialization areas: virtual reality, artificial neural networks, fuzzy logic, computer assisted medical diagnosis, and fault-tolerant computing.**

Chen, Chung-Hao, Ph.D., 2009, University of Tennessee Associate Professor of Electrical and Computer Engineering. Specialization areas: Computer Vision, Robotics, Image Processing, Intelligent Systems, Data Mining, Networked Sensors, Biometrics, Network and Transportation Traffic Analysis, Image and Video Forensic.

Dhali, Shirshak K., Ph.D., 1984, Electrical Engineering, Texas Tech University; PE. Professor of Electrical and Computer Engineering. Specialization areas: atmospheric Pressure Plasma Processing, Wind Energy and Analog VLSI.

Elsayed-Ali, Hani E., Ph.D., 1985, Electrical Engineering, University of Illinois-Urbana. Designated as an Eminent Scholar. Batten Endowed Professor of Electrical and Computer Engineering and Director of the Applied Research Center. Specialization areas: materials, lasers, semiconductors, surface analysis, thin film technology, and physical electronics.

Gonzalez, **Oscar R.,** Ph.D., 1978, Electrical Engineering, University of Notre Dame. Professor and Chair of Electrical and Computer Engineering. Specialization areas: control systems, autonomous, fault tolerant and cyber-security systems.

Gray, William Steven, Ph.D., 1989, Electrical Engineering, Georgia Institute of Technology. Associate Professor of Electrical and Computer Engineering. Specialization areas: formal power series methods for nonlinear systems analysis; realization theory and model reduction for nonlinear systems; fault-tolerant control for safety critical systems.

Iftekharuddin, Khan M., Ph.D., 1995, Electrical Engineering, University of Dayton. Professor of Electrical and Computer Engineering and Batten Endowed Chair in Engineering. Specialization areas: signal and image processing, neural networks applications, time-frequency analysis, sensors and embedded system design, and cybersecurity.

Jiang, Chunqi, Ph.D., 2002, Electrical Engineering, Old Dominion University. Professor of Electrical and Computer Engineering. Specialization areas: atmospheric pressure nanosecond pulsed plasma jets, compact pulsed power systems, and non-equilibrium plasmas for environmental and biomedical applications.

Kong, Michael Ganyu, Ph.D., 1992, Electrical Engineering, University of Liverpool (UK). Professor of Electrical and Computer Engineering and Batten Endowed Chair in Bioeletrics. Specialization areas: cold atmospheric plasma, and its biological effects and applications in medicine, agriculture, and environmental remediation.

Lakdawala, Vishnukumar K., Ph.D., 1980, Electrical Engineering, University of Liverpool (U.K.). Associate Professor of Electrical and Computer Engineering. **Specialization areas:** electron attachment in fluorine compounds, breakdown studies in compressed gases and vacuum, material characterization and simulation studies in compound semiconductors, and high-power semiconductor switches.

Laroussi, **Mounir,** Ph.D., 1988, Electrical Engineering, University of Tennessee, Knoxville. Professor of Electrical and Computer Engineering. Specialization areas: plasma science, biomedical applications of plasmas, gaseous electronics, EM waves interactions with plasmas, and plasma processing.

Leathrum, James F., Ph.D., 1992, Electrical Engineering, Duke University. Associate Professor of Electrical and Computer Engineering. Specialization areas: investigation of ways to accelerate force computations underlying molecular dynamics and astrophysical simulations on parallel computers.

Li, Jiang, Ph.D., 2004, Electrical Engineering, University of Texas at Arlington. Professor of Electrical and Computer Engineering. Specialization areas: machine learning, computer-aided medical diagnosis systems, medical signal/image processing, neural network and modeling and simulation.

Marsillac, Sylvain, Ph.D., 1996, Nanoscale Materials Science, University of Nantes (France). Designated as an Eminent Scholar. Professor of Electrical and Computer Engineering. Specialization areas: microelectronics, solar cells, inorganic materials synthesis and deposition, materials and devices, characterization, and thin films and devices fabrication.

Namkoong, Gon, Ph.D., 2003, Electrical and Computer Engineering, Georgia Institute of Technology. Professor of Electrical and Computer Engineering. Specialization areas: development of nitride/ZnO-based thin films, nanorods and their devices on innovative substrate materials as well as applying new nanoscale thin film growth techniques to facilitate material and device improvement.

Nawarathna, Dharmakeerthi, Ph.D., 2005, Applied Physics, University of Houston. Associate Professor of Electrical and Computer Engineering. Specialization areas: electromagnetism, circuit design and micro/nano fabrication for developing next generation tools for biology, clinical diagnostics and screening.

Popescu, Dimitrie C., Ph.D., 2002, Electrical and Computer Engineering, Rutgers University. Professor of Electrical and Computer Engineering. Specialization areas: embedded systems and wireless networking.

Shen, Yuzhong, Ph.D., 2004, Electrical Engineering, University of Delaware. Professor of Electrical and Computer Engineering. Specialization areas: signal and image processing, visualization and computer graphics, and modeling and simulation.

Shetty, Sachin, Ph.D., 2007, Modeling and Simulation, Old Dominion University. Professor of Electrical and Computer Engineering. Specialization areas: cybersecurity.

Slaughter, Gymama, PhD., 2005, Computer Engineering, Virginia Commonwealth University. Executive Director of the Center for Bioelectronics and Associate Professor of Electrical and Computer Engineering. Specialization areas: biosensors and bioelectronics, BioMems, cell-instructive adhesive materials for regenerative medicine, wound healing, and biomaterials for modulating inflammation and infection.

Sosonkina, **Masha,** Ph.D., 1997, Computer Science and Applications, Virginia Polytechnic Institute and State University. Professor of Electrical and Computer Engineering. Specialization areas: massively parallel optimization, electronic structure theory, next generation hpc architectures, and exoscale computing.

Vahala, Linda L., Ph.D., 1983, Applied Physics, Old Dominion University. Associate Professor of Electrical and Computer Engineering. Specialization areas: plasma physics and atomic physics with an emphasis on laser interactions with plasma and with neutral/rare gas collisions.

Xiao, Shu, Ph.D., 2004, Electrical Engineering, Old Dominion University. Professor of Electrical and Computer Engineering. Specialization areas: pulsed power, bioelectrics, high power antennas.

Xin, Chunsheng, Ph.D., 2002, Computer Science and Engineering, State University of New York at Buffalo. Professor of Electrical and Computer Engineering. Specialization areas: cybersecurity, cognitive radio networks, wireless communications and networking, cyber-physical systems, and performance evaluation and modeling.

Yang, Hong, Ph.D., 2012, Civil Engineering, Rutgers University. Associate Professor of Electrical and Computer Engineering. **Specialization areas:** multi-sensor system for data-driven performance, and modeling and simulation.

APPENDIX D – EXTERNALLY FUNDED GRANTS

APPENDIX E - EMPLOYMENT DEMAND – LETTER OF SUPPORT

APPENDIX F -EMPLOYMENT DEMAND - EMPLOYER SURVEY

 Old Dominion University (ODU) is proposing a Ph.D. in Electrical and Computer Engineering to begin in Fall 2025. We are contacting you to determine the level of interest in this graduate program among potential employers. Your participation is voluntary and your responses are anonymous.

The Ph.D. in Electrical and Computer Engineering is a 49 credit hours degree with a M.S. degree and 79 credit hours degree without a M.S. degree It is designed to prepare graduates to
- have the ability to discover or develop new engineering knowledge and scholarly skills at an advanced level.
- be able analyze advanced, complex electrical and computer engineering problems and develop practical solutions that work within provided specifications and constraints.
- develop critical thinking skills and competencies in technical aspects of electrical and computer engineering in current and emerging electrical and computer technologies.
- apply leading-edge principles, theories, and concepts to the development of standards, procedures, and guidelines in their chosen field of specialty related to electrical and computer engineering.
- work effectively as a member of a team and be able to lead others in teamwork-based projects.
- be able to communicate effectively in written, oral, and other modes as needed.

This proposed program consists of 7 credit hours core courses for students with a M.S. degree, including Statistical Analysis and Simulation, Computational and Statistical Methods in Electrical and Computer Engineering, and graduate seminar, and 22 credit hours for students without a M.S. degree, including instrumentation, automatic control systems, linear systems, numerical methods in engineering analysis, digital signal processing, statistical Analysis and Simulation, Computational and Statistical Methods in Electrical and Computer Engineering, and graduate seminar, and selective courses includes advanced topics related to physical electronics, cybersecurity engineering, networking, biomedical engineering, data analytics, power, semiconductor, and computer vision.

X→

How interested would your organization be in hiring an applicant with the Ph.D in Electrical and Computer Engineering described on the previous page?

○ Very interested

○ Somewhat interested

○ Not sure

○ Not very interested

○ Not at all interested

X→

What is the likelihood that you would hire an applicant with Ph.D. in Electrical and Computer Engineering from ODU if that applicant met all other hiring requirements?

○ Very likely

○ Somewhat likely

○ Not sure

○ Somewhat unlikely

○ Not at all likely

X→

Does your organization need skills that are difficult to find in the typical applicant pool?

○ Yes

○ No

X→

Does the Ph.D. in Electrical and Computer Engineering address some of those needed skills?

○ Yes

○ No

Please provide feedback on how this Ph.D. in Electrical and Computer Engineering program would fit with your current and/or future hiring needs.

_____

_____

_____

_____

_____

X→

What type of organization/industry do you work in? (check all that apply)

☐   Education

☐   Energy

☐   Federal, State, or Local Government

☐   Technology

☐   Healthcare

☐   IT

☐   Military

☐   Other _____

In what city/state is your organization located?

_____

Thank you for completing this survey. Please click "next" to submit your answers.

End of Block: Default Question Block

APPENDIX G- EMPLOYMENT DEMAND - JOB ANNOUNCEMENTS

Job Postings

Aerospace Controls Researcher

Aurora Flight Sciences · Manassas, VA (On-site) Reposted 2 weeks ago · 43 applicants

- $90,000/yr - $199,000/yr (from job description) · Full-time · Director
- 501-1,000 employees · Aviation and Aerospace Component Manufacturing
- 2 company alumni work here · 3 school alumni work here
- See how you compare to 43 applicants. Try Premium for $0

Apply
SaveSave Aerospace Controls Researcher at Aurora Flight Sciences
Share
Show more options

Aerospace Controls Researcher

Aurora Flight Sciences Manassas, VA On-site
Apply
SaveSave Aerospace Controls Researcher at Aurora Flight Sciences
Show more options

About the job

Position Overview

At Aurora Flight Sciences, we design, build, and fly advanced aircraft and enabling
technologies. We are searching for a talented and self-motivated **Aerospace Controls**

Researcher to help us advance the future of flight. Responsibilities will include but not be limited to the following:

Responsibilities

- Collaborate with top-tier universities to bring the latest exciting developments in research into practical application for Aurora/Boeing projects.
- Contribute to research proposals for government/DOD programs.
- Conduct novel research in autonomy and control for aircraft, leveraging and advancing the state of the art in topics such as adaptive control, machine learning, optimal estimation, and new vehicle architectures that present novel GNC opportunities.
- Present/organize at conferences, workshops, and invited sessions, and publish journal papers.
- Lead the specification, design, development, integration, and test of aircraft GNC/Autonomy systems on ongoing Aurora Programs.
- Supervise technical work.

Minimum Requirements

- Ph.D. or Masters Degree in Aero/Astro, Mechanical or Electrical Engineering with guidance and control emphasis or relevant field.
- Expertise in some, and working knowledge of most of the following: Adaptive control, learning-based control, nonlinear control, optimal control, optimal trajectory design, optimal guidance, missile guidance, and control, reinforcement learning, Kalman filtering, stochastic estimation.
- 3+ years of related professional experience in the aerospace industry.
- Must be fluent in MATLAB and Simulink, with working knowledge of C++ desired.
- Must be a US Person (US Citizen or US Permanent Resident).

Preferred Requirements

- Active DOD clearance.

Physical Requirements

- None.

Salary Range (Annualized USD)

- Minimum Range: $90,000.00 to $160,000.00
- Maximum Range: $112,000.00 to $199,000.00

Aurora Company Overview Aurora Flight Sciences, a Boeing Company, is a leader in the development and manufacturing of advanced unmanned systems and aerospace vehicles. Our mission is to apply autonomy and robotics to the development, production, and operation of advanced aircraft. During the last three decades, Aurora has designed, rapid-prototyped, and flown an average of one new vehicle a year for both government and commercial customers. Now, as an independent subsidiary of Boeing, Aurora's innovation is combined with Boeing's size and strength, creating an unprecedented opportunity to shape the future of aerospace systems.

Equal Opportunity Employer Aurora Flight Sciences, A Boeing Company, is an Equal Opportunity Employer. Employment decisions are made without regard to race, color, religion, national origin, gender, sexual orientation, gender identity, age, physical or mental disability, genetic factors, military/veteran status or other characteristics protected by law.

Aurora Total Rewards At Aurora Flight Sciences, a Boeing Company, we strive to deliver a Total Rewards package that will attract, engage and retain the top talent. Elements of the Total Rewards package include competitive base pay and variable compensation opportunities. Aurora Flight Sciences provides eligible employees with an opportunity to enroll in a variety of benefit programs, generally including health insurance, flexible spending accounts, health savings accounts, retirement savings plans, life and disability insurance programs, and a number of programs that provide for both paid and unpaid time away from work. The specific programs and options available to

any given employee may vary depending on eligibility factors such as geographic location and date of hire. Please note that the salary information shown is a general guideline only. Salaries are based upon candidate experience and qualifications, as well as market and business considerations.

Pay found in job post

Retrieved from the description.

Is this accurate?Yes/No
Base salary

$90,000/yr - $199,000/yr (from job description)

Benefits found in job post

- Medical insurance
- Disability insurance

About the company

[Aurora Flight Sciences](#)
27,976 followers
Follow
Aviation and Aerospace Component Manufacturing 501-1,000 employees 879 on LinkedIn
Aurora Flight Sciences, a Boeing Company, advances the future of flight by developing and applying innovations across aircraft configurations, autonomous systems, propulsion technologies, and manufacturing processes. With a passionate and agile team, Aurora delivers solutions to its customers' toughest challenges while meeting high standards of safety and quality.…show more

Chief Microelectronics Engineer with Security Clearance

ClearanceJobs · Arlington, VA (On-site) **5 hours ago** · 0 applicants

- $134,600/yr - $250,000/yr (from job description) · Part-time · Mid-Senior level
- 11-50 employees · Defense and Space Manufacturing
- See recent hiring trends for ClearanceJobs. Try Premium for $0
- Skills: Service Delivery, SC Clearance, +8 more

Apply
SaveSave Chief Microelectronics Engineer with Security Clearance at ClearanceJobs
Share
Show more options

About the job

Job Number: R0163144 Chief Microelectronics Engineer

Key Role: Lead a team of engineers and scientists supporting innovative microelectronics research and development programs. Oversee recruiting, training, retention, and delivery for a team of approximately 25 staff from multiple engineering and scientific fields. Coordinate with Booz Allen senior leaders to drive exceptional delivery of staff and identify and capture new opportunities. Apply subject matter expertise to directly support one or more Department of Defense (DoD) clients on related microelectronics projects. This position is a hybrid role with a combination of working at a Booz Allen office or client site and working remotely . Basic Qualifications: *

7+ years of experience with overseeing science and engineering research

- 7+ years of experience with delivering services or solutions into the DoD or Intelligence Community
- 5+ years of experience with building and leading teams of engineers or scientists
- Secret clearance * Master's degree in Engineering Additional Qualifications: * 5+ years of experience with delivering services or solutions into an ARPA, including DARPA or IARPA agency
- Experience with business development in the government sector
- Possession of excellent verbal and written communication skills
- Possession of excellent analytical skills
- Top Secret clearance * Ph.D. degree in an engineering or scientific field Clearance: Applicants selected will be subject to a security investigation and may need to meet eligibility requirements for access to classified information ; Secret clearance is required. Compensation At Booz Allen, we celebrate your contributions, provide you with opportunities and choices, and support your total well-being. Our offerings include health, life, disability, financial, and retirement benefits, as well as paid leave, professional development, tuition assistance, work-life programs, and dependent care. Our recognition awards program acknowledges employees for exceptional performance and superior demonstration of our values. Full-time and part-time employees working at least 20 hours a week on a regular basis are eligible to participate in Booz Allen's benefit programs. Individuals that do not meet the threshold are only eligible for select offerings, not inclusive of health benefits. We encourage you to learn more about our total benefits by visiting the Resource page on our Careers site and reviewing Our Employee Benefits page. Salary at Booz Allen is determined by various factors, including but not limited to location, the individual's particular combination of education, knowledge, skills, competencies, and experience, as well as contract-specific affordability and organizational requirements. The projected compensation range for this position is $134,600.00 to $250,000.00 (annualized USD). The estimate displayed represents the typical salary range for this position and is just one component of Booz Allen's total compensation package for employees. Work Model Our people-first culture prioritizes the benefits of flexibility and collaboration, whether that happens in person or remotely. * If this position is listed as remote or hybrid, you'll periodically work from a Booz Allen or client site facility.
- If this position is listed as onsite, you'll work with colleagues and clients in person, as needed for the specific role. EEO Commitment We're an equal employment opportunity/affirmative action employer that empowers our people

to fearlessly drive change - no matter their race, color, ethnicity, religion, sex (including pregnancy, childbirth, lactation, or related medical conditions), national origin, ancestry, age, marital status, sexual orientation, gender identity and expression, disability, veteran status, military or uniformed service member status, genetic information, or any other status protected by applicable federal, state, local, or international law.

Pay found in job post

Retrieved from the description.

Is this accurate?Yes/No
Base salary

$134,600/yr - $250,000/yr (from job description)

Research Analyst

[CNA Corporation](#) · Arlington, VA (On-site) 1 week ago · 29 applicants

- Full-time · Mid-Senior level
- 501-1,000 employees · Research Services
- [4 school alumni work here](#)
- See how you compare to 29 applicants. [Try Premium for $0](#)
- [Skills: Research Skills](#)

Apply
SaveSave Research Analyst at CNA Corporation
Share
Show more options

Research Analyst

About the job

Systems, Tactics, and Force Development conducts quantitative analyses of weapons, sensors, networks and systems — and the tactics for mission success. We develop scientific performance estimates for fleet systems against China, Russia and other threats. Capabilities are assessed under realistic conditions for both current and future-force maritime operations.

Primary Purpose

Staff at this level will be leading smaller/less complex activitiesor will be serving as an important contributing team member on projects.Demonstrates analytical competence.

Job Description And/Or Duties

- With minimal or no guidance, meets CNA's quality standards when working on well-structured pieces of a project. Demonstrates ability to develop sound analytic frameworks and associated analytic methodologies/ techniques for addressing both structured and unstructured problems.With direction and supervision, clearly defines, structures, and executes a piece of a complex study to meet quality standards.Demonstrates analytic creativity and curiosity.
- Develops and maintains broad, general institutional knowledge of primary clients/sponsors; their culture, organization, and issues.
- Contributes productively and harmoniously to the work of others; treats everyone respectfully, professionally and fairly. Keeps others informed. Proactively identifies and seeks out others working on similar topics. Works to identify opportunities for collaborations within team, division, and operating unit.
- Supports business development efforts and/or marketing activities by maintaining strong client relationships through high quality work, increasing the visibility of our work, and other related activities such as proposal preparation.
- Interacts with sponsors/clients under the supervision of an experienced colleague, and with study POCs independently.
- Makes significant contributions to research publications and analytic products for individual projects.
- Demonstrates ability to communicate results of work in a clear and concise fashion. Effectively communicates one-on-one and in groups. Can document work efficiently and accurately. Can effectively present work to colleagues, sponsors, and small audiences that are familiar with content.
- Works with minimal or no guidance on focused, well-structured pieces of projects. Works under closer supervision on more complex, less-structured tasks. Can serve as task lead for pieces of projects by managing own activities. May lead small projects under the supervision of an RTL/CMD.
- Exhibits a positive attitude in interactions with colleagues and clients/sponsors.Provides clear guidance to colleagues on tasks.Takes responsibility for own actions and outcomes.
- Performs other duties as assigned.

Job Requirements

- Education: Minimum Master's degree in a STEM field or equivalent experience, Ph.D. preferred.
- Experience: Typical minimum requirements Ph.D. & 0+ years or Master's & 2+ years of experience in research and analysis.
- Skills: Ability to make significant contributions to projects/analyses; Strong analytic curiosity/ creativity;Ability to operate independently in the execution of assignments; Ability to work in a multi-disciplinary environment; Strong critical thinking skills; Knowledge of research techniques; Strong planning and organizational skills; Excellent interpersonal, oral and written communication skills; Ability to interact positively and somewhat independently with clients.
- Other: Ability to obtain and maintain an Active Secret Security Clearance.
- Voluntary (but highly desired) document*** Please include a personal statement as part of your application. A personal statement is a chance for us to get to know you. The statement is your opportunity to share your goals, interests, influences and show us that you will be a valuable asset to our organization. Please click here for personal statement guidelines – Click here Personal statements will not be used as an elimination criteria for this position. They will only be used to enhance a candidate's application

Assistant or Associate Professor

Hampton University · Hampton, VA (On-site) 2 months ago · **21 applicants**

- Full-time · Mid-Senior level
- 1,001-5,000 employees · Higher Education
- 17 company alumni work here
- See how you compare to 21 applicants. Try Premium for $0
- Skills: Curriculum Development, Computer Engineering, +8 more

Apply

SaveSave Assistant or Associate Professor at Hampton University

Share

Show more options

Assistant or Associate Professor

Hampton University Hampton, VA On-site

Apply

SaveSave Assistant or Associate Professor at Hampton University

Show more options

About the job

Position

Assistant or Associate Professor

Department

Electrical and Computer Engineering

Date Posted

02/16/2023

Closing Date

Open Until filled

Description

The Hampton University School of Engineering and Technology is seeking candidates for faculty positions in the Department of Electrical and Computer Engineering as an Assistant or Associate Professor.

The appointment is expected to begin in August 2023.

Founded in 1868, Hampton University (www.hamptonu.edu) is located on approximately 300 acres of the Virginia Peninsula. It is a privately endowed, co-educational, nonsectarian institution of higher education and the Southern Association of Colleges and Schools accredit all programs. Hampton University, a member of the Historically Black College and University (HBCU) community of higher education institutions, is currently enjoying tremendous growth and development from a traditionally teaching to a more research-intensive institution.

Hampton University is currently a Masters-level institution of higher learning with a primarily undergraduate student population of approximately 4,600 students pursuing degrees in diverse areas of study.

Duties and Responsibilities

The Department of Electrical and Computer Engineering at Hampton University is seeking candidates for faculty positions at the rank of Assistant or Associate Professor.

The individual selected for this position will be expected to contribute to the educational missions of the Departments of Electrical & Computer Engineering through teaching, curriculum development, and research.

We are interested in candidates who can help expand the departments expertise in Computer Engineering and Cyber Physical System Security.

Qualifications

The successful applicant must have earned a Ph.D. in Computer Engineering, Electrical Engineering, or a closely related field with expertise in cyber, robotics, automation, energy systems, and/or cloud-based computing.

The candidate should have a strong record of scholarly work along with a passion for teaching undergraduate students.

The successful candidate will possess the following skills and abilities: Demonstrated ability to effectively manage and to provide vision for departmental growth Demonstrated ability to mentor junior faculty Demonstrated ability to work on interdisciplinary teams at the university

How to Apply

All Interested Applicants Should Submit a Hampton University Application For Employment For Faculty, a Cover Letter, Curriculum Vitae, Teaching Statement, And Research Statement Via Email To

Review of applications will begin immediately and will continue until the position is filled. The compensation package will be commensurate with rank and experience.

Joyce T. Shirazi, D.Sc., PE Dean, School of Engineering and Technology Hampton University Hampton, VA 23668 joyce.shirazi@hamptonu.edu

We encourage inquiries concerning this career opportunity and welcome the opportunity to answer questions from potential applicants.

Joyce T. Shirazi Email: joyce.shirazi@hamptonu.edu

- Hampton University is an Affirmative Action/Equal Opportunity Employer.

Return to Employment Opportunities List

Assistant or Associate Professor (Autonomy and Robotics)

- Full-time · Mid-Senior level
- 1,001-5,000 employees · Higher Education
- 17 company alumni work here
- See how you compare to 20 applicants. Try Premium for $0
- Skills: Curriculum Development, Research Skills, +8 more

Apply
SaveSave Assistant or Associate Professor (Autonomy and Robotics) at Hampton University
Share
Show more options

Assistant or Associate Professor (Autonomy and Robotics)

About the job

Position

Assistant or Associate Professor (Autonomy and Robotics)

Department

Electrical and Computer Engineering

Date Posted

02/16/2023

Closing Date

Open Until filled

Description

The Hampton University School of Engineering and Technology is seeking candidates for faculty positions in the Department of Electrical and Computer Engineering as an Assistant or Associate Professor. The appointment is expected to begin in August 2023. Founded in 1868, Hampton University (www.hamptonu.edu) is located onapproximately 300acres of the Virginia Peninsula. It is a privately endowed, co-educational, nonsectarian institution of higher education and the Southern Association of Colleges and Schools accredit all programs. Hampton University, a member of the Historically Black College and University (HBCU) community of higher education institutions, is currently enjoying tremendous growth and development from a traditionally teaching to a more research-intensive institution. Hampton University is currently a Masters-level institution of higher learning with a primarily undergraduate student population of approximately 4,600 students pursuing degrees in diverse areas of study.

Duties and Responsibilities

The Department of Electrical and Computer Engineering at Hampton University is seeking candidates for faculty positions at the rank of Assistant or Associate Professor. The individual selected for this position will be expected to contribute to the educational missions of the Departments of Electrical & Computer Engineering through teaching, curriculum development, and research related to Autonomy, Cyber Physical Systems, and Robotics. We are interested in candidates who can help expand the departments expertise in Computer Engineering and Cyber Physical System Security.

Qualifications

The successful applicant must have earned a Ph.D. in Computer Engineering, Electrical Engineering, or a closely related field with expertise in cyber, robotics, automation, energy systems, and/or cloud-based computing. The successful candidate will possess the following skills and abilities: Demonstrated ability to effectively manage multiple priorities-research, education and outreach; Teaching and research experience in related areas Demonstrated ability to work on interdisciplinary teams

How to Apply

Review of applications will begin immediately and will continue until the position is filled. The compensation package will be commensurate with rank andexperience. All interested applicants should submit a Hampton University Application for Employment for faculty, a cover letter, curriculum vitae, teaching statement, and research statement via emailto: Joyce T. Shirazi, D.Sc., PE Dean, School of Engineering and Technology Hampton University Hampton, VA 23668 joyce.shirazi@hamptonu.edu We encourage inquiries concerning this career opportunity and welcome the opportunity to answer questions from potential applicants. Joyce T. Shirazi Email: joyce.shirazi@hamptonu.edu **Hampton University is an Affirmative Action/Equal Opportunity Employer.

[Research Manager – Next-Gen Wi-Fi](#)

[Link Consulting Services (LinkCS)](#) · Reston, VA (On-site) 5 months ago · **9 applicants**

- Full-time · Mid-Senior level
- 51-200 employees · Staffing and Recruiting
- See how you compare to 9 applicants. [Try Premium for $0](#)
- [Skills: Patent Law, Electrical Engineering, +8 more](#)

Apply
SaveSave Research Manager – Next-Gen Wi-Fi at Link Consulting Services (LinkCS)
Share
Show more options

[Research Manager – Next-Gen Wi-Fi](#)

Link Consulting Services (LinkCS) Reston, VA On-site
Apply
SaveSave Research Manager – Next-Gen Wi-Fi at Link Consulting Services (LinkCS)
Show more options

About the job

This role is for an experienced Research Manager, Next-Gen Wi-Fi to provide leadership in the research and development of Wi-Fi transmission and reception mechanisms. You will provide the planning, implementation, and expansion of short-term and long-term team goals. You will be responsible for all aspects of team management including meeting company goals, planning team resourcing, identifying key priorities, and developing team members. You possess expert knowledge and experience IEEE 802.11, 802.15, and 802.19. Additionally, you have 7+ years of experience in patent creation and processing.

Responsibilities

- Lead a team of researchers on the Next-Gen Wi-Fi research group.
- Provide leadership and mentorship to the Next-Gen Wi-Fi research team.
- Focus on and meet company targets for the Next-Gen Wi-Fi research team.
- Research and optimize advanced Wi-Fi transmission and reception mechanisms.
- Development of novel enhanced algorithms based on IEEE 802.11, 802.15, and 802.19 protocols.
- Provide patentable and standardization-oriented solutions for implementation of new features in Wi-Fi and Wi-Fi/Cellular coexistence technologies.
- Participate in IEEE and other relevant standards bodies to help drive advanced solutions to support business needs.
- Write and present technical contributions to standards bodies including IEEE 802.11
- Supporting the entire patent process from start to end.
- Interact with and present to clients.

Qualifications

You possess expert knowledge of communication theory and IEEE 802.11 standards related technologies such as wireless local area network (WLAN) Wi-Fi, 802.11ac/ax, 802.11ad/aj, ZigBee, 802.19 coexistence, V2X, multi-band, MIMO, Wi-Fi based positioning, and advanced spatial multiplexing mechanisms.

Specifically, you have:

- Advanced technical team leadership
- Ph.D. or M.Sc. degree in Electrical Engineering with at least 7+ years of research and development experience
- A proven track record of successful contributions to IEEE standards and activities
- Experienced in WLAN/Wi-Fi and unlicensed spectrum:
  - Develop physical/MAC layer protocols/procedures – channel access mechanism (e.g., LBT/FBE), MIMO, dual-band operation, channel access mechanisms for mmWave frequencies, multi-beam operation, positioning, power saving techniques
  - Develop use cases and requirements for next generation Wi-Fi, Zigbee, and wireless personal area network (WPAN) communications
  - Link-level/system-level simulation/optimization of wireless systems, protocol layer design, and network signaling

- A proven record of patents related to WLAN/Wi-FI and unlicensed spectrum protocols/applications
- Theoretical understanding of network performance, queuing analysis, and spectral efficiency

Because work will be presented and demonstrated internally and externally, the ideal candidate will be able to be a strong team player.

- Good communicator/presenter
- Creative thinker and problem solver
- Detail-oriented professional
- Strong writer

Additional Information

- 401(K) matching – The company helps you plan and save for retirement with a 401(K) matching program that's available on day one.
- Free PPO healthcare -- You and your family are covered at no charge under great PPO Health plans.
- Free Food -- The kitchen is always fully stocked, including lunch, protein bars, fruit, sodas, coffee and tea.
- Relocation package -- To bring the best in the industry on board, excellent relocation packages are offered.
- Unlimited Paid Time Off -- Lives are enriched by family time, vacations and personal time, so the company offers unlimited paid time off and sick leave.
- On-campus gym -- Unwind, reduce stress and feel great – even when you're at work.

Student Survey

Old Dominion University (ODU) is proposing a Ph.D. in Electrical and Computer Engineering degree, instead of General Engineering degree with the concentration on Electrical and Computer Engineering. We are contacting you to determine the level of interest in this program among potential students. Your participation is voluntary, and your responses are anonymous.

The proposed Ph.D. in Electrical and Computer Engineering degree would be a 79-credit hours program beyond the bachelor's degree (49-credit hours post master's). The program is designed to prepare future leaders in electrical and computer engineering research. Graduates will develop skills and competencies in technical aspects of electrical and computer in a diversity of current and emerging electrical and computer technologies and will be prepared to assume responsibility for the management of electrical and computer projects and coordination of electrical and computer research and development teams. Graduates will fill the demand for senior lead positions such as Research Analyst, Program Manager, Scientist, Faculty, and R&D Manager within academic, federal government, state government, non-profit, and private sector environments. The program will also prepare graduates to teach electrical and computer courses in 2- and 4-year colleges and universities.

- -

What is your level of interest in the Electrical and Computer Engineering Ph.D. program described above?

◯ Very interested

◯ Somewhat interested

◯ Not very interested

◯ Not at all interested

- -

What is the likelihood that you would enroll in the Electrical and Computer Engineering Ph.D. program at Old Dominion University described above?

◯ Very likely

◯ Somewhat Likely

◯ Not very likely

◯ Not at all likely

**Thank you for your time. Please click "Next" to submit
your survey responses.**

If you enrolled in the Electrical and Computer Engineering Ph.D. program, would you expect to earn:

◯ General Engineering Degree with the concentration on Electrical and Computer Engineering

◯ Electrical and Computer Engineering Degree

If you enrolled in the Electrical and Computer Engineering Ph.D. program would you expect to be:

○ A full-time student

○ A part-time student

What is your class rank?

○ Freshman

○ Sophomore

○ Junior

○ Senior

○ Other, please specify: _____

Which of the following would influence your decision to pursue an Electrical and Computer Engineering Ph.D. program at ODU?
Select all that apply

☐   Opportunity to achieve professional goals

☐   Opportunity to work in Electrical & Computer Engineering industry

☐   Opportunity to work in Electrical & Computer Engineering industry with the Hampton Roads are

☐   Proximity of the campus to where I work/live

☐   Reputation of faculty

☐   Availability of night courses

☐   Availability of streamed courses

☐   Opportunity to expand working knowledge of Electrical and Computer Engineering

☐   Other: _____

- -

Could you please comment on how this Ph.D. program in Electrical and Computer Engineering would fit with current or future career goals?

_____

_____

_____