

MEMORANDUM

TO: Members of the Academic and Research Advancement Committee
of the Board of Visitors

Michael J. Henry, Chair
Toykea S. Jones, Vice Chair
Lisa B. Smith (ex-officio)
Kay A. Kemper(ex-officio)
R. Bruce Bradley
Robert S. Corn
Unwana BDabney
Jerri F. Dickeski
Alton J. Harris
Maurice D. Slaughter
Sebastian Kuh(Faculty Representative)

FROM: Augustine O. Agho
Provost

DATE: November 26, 2018

The purpose of this memorandum is to provide you with background information for our meeting on Thursday, November 29, 2018, at 10:00 AM in the Kate
Committee Room A (Room 2203)

I. Approval of Minutes of the September, 2018 Meeting

The minutes of the September 20, 2018 meeting will be presented for approval as previously distributed.

Its to be discussed in closed session.

III. Reconvene in Open Session and Vote on Resolutions

IV. Consent Agenda

Included in the consent agenda materials are resolutions recommending six faculty appointments, 18 administrative appointments, the appointment of three Louis I. Jaffe Professors, and seven emeritus/emerita appointments.

OLD DOMINION UNIVERSITY
BOARD OF VISITORS
ACADEMIC AND RESEARCH ADVANCEMENT COMMITTEE
DECEMBER 6, 2018
AGENDA

10:00-11:15 a.m. – Kate and John R. Broderick Dining Commons, Committee Room A
(Room 2203)

- I. APPROVAL OF THE MINUTES OF SEPTEMBER 20, 2018
- II. CLOSED SESSION
- III. RECONVENE IN OPEN SESSION AND VOTE ON RESOLUTIONS
- IV. CONSENT AGENDA
 - A. Faculty Appointments (p. 4-5)
 - B. Administrative Appointments (p. 6-9)
 - C. Appointment of Louis I. Jaffe Professors (p. 10-12)
 - D. Emeritus/Emerita Appointments (p. 13-17)
- V. VOTE ON CONSENT A
 - (p. 46-75)
 - C. Approval to Rename the School of Physical Therapy and Athletic Training to the School of Rehabilitation Sciences (p. 76)
- VII. VOTE ON REGULAR AGENDA RESOLUTIONS
- VIII. INFORMATION ITEMS
 - A. Report from the Provost
 - B. Report from the Vice President for Research
 1. Presentation on Digital Shipbuilding by Jennifer Michaeli, Assistant Professor of Engineering Technology
- IX. TOPICS OF INTEREST TO BOARD OF VISITORS MEMBERS

Ms. Jennifer R. Vaziralli Lecturer of Management	\$53,000	10/25/18	10 mos
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Ms. Vaziralli received an M.B.A. from The Wharton School, University of Pennsylvania and a B.S. in Human Resource Management and a B.S. in Marketing Management from Virginia Polytechnic Institute and State University. Previously she was Chief Revenue Officer at Collage Group.

Dr. Honggeng Zhou Visiting Professor of Information Technology and Decision Sciences	\$60,000	12/25/18	5 mos
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Dr. Zhou received a Ph.D. in Business Administration and a Master of Arts in Business Administration from The Ohio State University, a Master of Science in Applied Statistics from the University of Memphis and a Bachelor of Science in Computer Science and Engineering from Zhejiang University. Previously he was a Professor in the School of Management at Zhejiang University. (spring semester only)

Ms. Courtney Kelly \$70,000 10/10/2018 12 mos
Assistant Director, Institutional Equity and
Diversity and Interim Title IX Coordinator
and Assistant Professor

Dr. Kelly received a B.A. in English from East Tennessee State University and a J.D. from Albany Law School. Previously, she worked as the Title IX Investigator for Norfolk State University.

Ms. Lisa Moser \$47,939 10/25/2018 12 mos
Coordinator of Undergraduate Studies,
Electrical and Computer Engineering
and Instructor

Ms. Moser received a B.A. in Business Administration from Ball State University and a Master of Business Administration from Old Dominion University. Previously, she served as the Academic Enrichment and Learning Communities Specialist for the University's Center for High Impact Practices.

Mr. James Palmer \$70,000 11/10/2018 12 mos
Senior Market Research Analyst
and Instructor

Mr. Palmer received a B.S. in Business Administration and an M.B.A. in Global Management from the University of Phoenix. Previously, he worked as the Senior College Research Analyst at Modesto Junior College and as an Information Technology Consultant for California State University at Stanislaus.

Ms. Lanah Stafford \$58,100 9/25/2018 12 mos
Director of CHIP Planning and Project Management,
Center for High Impact Practices and Instructor

Ms. Stafford received a B.S. in Political Science from the University of Wisconsin at Madison and an M.A. in Political Science from George Mason University. Previously, she was a Senior Research Associate for the University's Office of Institutional Effectiveness and Assessment.

Ms. Erica Watson \$55,500 10/25/2018 12 mos
Associate Director of Student Conduct and
Academic Integrity and Assistant Professor

Dr. Watson received a B.A. in Political Science from the University of Tennessee and a J.D. from the University of Tennessee College of Law. Previously, she worked as the Director of Student Conduct and Community Standards at Young Harris College.

December 6, 2018

APPOINTMENT OF LOUIS I. JAFFE PROFESSORS
COLLEGE OF ARTS AND LETTERS

RESOLVED that, upon the recommendation of the Academic and Research Advancement Committee, the Board of Visitors approves the appointment of the following individuals as Louis I. Jaffe Professors in Arts and Letters for 2018-2019 through 2022-2023. A summary of each person's career is included below for information purposes.

The Jaffe Professorship recognizes outstanding faculty scholars in the College of Arts and Letters who have demonstrated sustained excellence in teaching and/or research as well as a continuing, exemplary commitment to the university.

Luisa Igloria
Professor,

Proceeds from the Jaffe Professorship endowment funds will be used to provide a stipend of \$5,000 per year to Professor Toomey in the academic years 2018-2019 through 2022-2023.

Xiushi Yang
Professor, Department of Sociology and Criminal Justice

December 6, 2018

EMERITUS/EMERITA APPOINTMENTS

RESOLVED that, upon the recommendation of the Academic and Research Advancement Committee, the Board of Visitors approves the title of emeritus to the following faculty members and faculty administrators/faculty professionals. A summary of their accomplishments is included.

<u>Name and Rank</u>	<u>Effective Date</u>
Jimmie Carraway University Distinguished Teacher Emeritus and Senior Lecturer Emeritus of Information Technology and Decision Sciences	January 1, 2019
Valerian Derlega Professor Emeritus of Psychology	January 1, 2019
Michael J. Doviak Associate Professor Emeritus of Mathematics and Statistics	January 1, 2019
Sylvia Hudgins Professor Emerita of Finance	January 1, 2019
Karen Kott Associate Professor Emerita of Physical Therapy and Athletic Training	January 1, 2019
Edward P. Markowski University Professor Emeritus and Professor Emeritus of Information Technology and Decision Sciences	January 1, 2019
Kneeland Nesius University Professor Emeritus and Associate Professor Emeritus of Biological Sciences	January 1, 2019

JIMMIE CARRAWAY

Among his notable scholarly accomplishments, Derlega was a pioneer in theory and research on the role of self-disclosure and privacy regulation in personal relationships. He has contributed to research on psychological and social challenges confronting people living with HIV and sickle cell disease. More recently, he has maintained an active research program on the role of vicariously experienced violence (e.g., exposure to widely publicized mass shootings) on people's psychological reactions to these incidents and their willingness to engage in social action.

MICHAEL J. DOVIAK

KAREN KOTT

Karen Kott earned a B.S. in physical therapy, an M.S. in exceptional children education, and a Ph.D. in learning and instruction special education from the State University of New York at Buffalo. She has continuously maintained a license to practice physical therapy since completion of her baccalaureate degree.

Kott joined Old Dominion as an associate professor of physical therapy in 2006.

and mathematical statistics. Markowski has been actively involved in scholarly work throughout his teaching career. He has published approximately 45 articles in leading academic journals in the fields of mathematical and applied statistics, decision sciences, operations and supply chain management, marketing, and strategic management. In addition, he has made a large number of research presentations at academic conferences.

Markowski has made significant contributions to the faculty governance of the university, both a member of important committees as well as leading such committees. He has been a member of the Faculty Senate and has chaired the Faculty Grievance Committee. He has also been a member and chair of Promotion and Tenure Committees at the department and college level. Outside of the university, he has been a member of the American Statistical Association and the American Mathematical Society.

December 6, 2018

APPROVAL OF A BACHELOR OF SCIENCE DEGREE IN CYBERSECURITY

RESOLVED that, upon the recommendation of the Academic and Research Advancement Committee, the Board of Visitors approve the proposed Bachelor of Science degree in Cybersecurity in the College of Arts and Letters effective with the fall 2019 semester

Rationale: Old Dominion University seeks approval to initiate a Bachelor of Science in Cybersecurity to begin fall 2019. The program would be administered by the Center for Cyber Security Education and Research (CCSER) and housed in the Department of Interdisciplinary Studies, College of Arts & Letters.

The degree program is designed to provide students with a strong understanding of cyber systems, threats, defense, and operation technologies. Graduates will be knowledgeable in the theory, technologies, skills, and practices necessary to protect critical cyber infrastructure and assets. They will have enhanced oral and written communication skills to articulate cybersecurity problems and decisions, and clearly understand ethical standards and rules.

The program responds to the vital needs for cybersecurity professionals in the Commonwealth of Virginia, the nation, and the world. Graduates will be prepared to work within the cybersecurity industry, U.S. Army, Navy, Air Force, and other branches of the military, and within federal, state, or local government or government contracting. Graduates will fill the demand for cybersecurity technical positions such as Cyber Intelligence Analyst, Cyber Security Analyst, Data Security Associate, Incident Response Analyst, Information Assurance Analyst, Information Security Analyst, Information Systems Security Officer, Security Consultant, Security Engineer, Security Specialist, Vulnerability Analyst, just to name a few.

The Bachelor of Science degree program in cybersecurity represents an expansion of the current cybersecurity major within the Bachelor of Science in Interdisciplinary Studies, which has been offered for the past three years. This expansion is needed to eliminate curricular restraints of a

major and to allow students to earn a degree that more closely matches the coursework they take and job opportunities they pursue after graduation. Further, a standalone degree program in cybersecurity will provide students with the degree and degree name that more accurately reflects the coursework taken. The focus on cybersecurity will advance students' understanding of a broad range of cybersecurity topics in Virginia, in the Uni

STATE COUNCIL OF HIGHER EDUCATION FOR VIRGINIA
PROGRAM PROPOSAL COVER SHEET

1. Institution Old Dominion University	2. Academic Program (Check one): Certificate document <input type="checkbox"/>
5. Degree/certificate designation Bachelor of Science	6. Term and year of initiation Fall 2019
7a. For a proposed sp off, title and degree designation of existing degree program 7b. CIP code (existing program)	
8. Term and year of first graduates Fall 2019	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 <u>Department of Interdisciplinary Studies</u> School(s) or college(s) of <u>College of Arts & Letters</u> Campus(es) or off-campus site(s) <u>Main</u>	
<input type="checkbox"/> hybrid (both face-to-face and distance)	<input checked="" type="checkbox"/> Distance (51% or more web-based)
13. Name, title, and telephone number(s) 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 the modified program. Jeanie Kline, Ed.D. SCHEV Liaison, 757.683.3261.	

Description of the Proposed Program

Program Background

Old Dominion University (ODU) seeks approval to initiate a Bachelor of Science in Cybersecurity scheduled to begin in Fall 2019 in Norfolk, Virginia. This proposed program will be administered by the Center for Cyber Security Education and Research (CCSER) and housed in the Department of Interdisciplinary Studies, College of Arts & Letters.

The proposed BS in Cybersecurity is designed to provide students with a strong understanding of cyber systems, threats, defense and operation technologies. Graduates will be knowledgeable in the theory, technologies, skills, and practices necessary to protect critical cyber infrastructure and assets. They will have enhanced oral and written communication skills to articulate cybersecurity problems and decisions, and clearly understand ethical standards and rules.

The program will prepare graduates to work within the cybersecurity industry, U.S. Army, Navy, Air Force, and other branches of the military, within federal, state, or local government or government contracting. Graduates will fill the demand for cybersecurity technical positions such as Cyber Intelligence Analyst, Cyber Security Analyst, Data Security Associate, Incident Response Analyst, Information Assurance Analyst, Information Security Analyst, Information Systems Security Officer. (b) (5) - (c) (4) - (e) 24

course management actions will take place in Blackboard. Further, student interaction is available via email, phone, person meetings, and Web Interface meetings.

Faculty members who teach in the web-based format are trained in course development and delivery through the Center for Learning and Teaching (CLT). There, instructional designers and technologists work individually with each faculty member to convert course content, assignments, testing, and other course work to a web-based platform. Faculty work closely with the designers to ensure web-based content is the same as content taught in face-to-face settings.

Beyond the usual online offerings at ODU, cybersecurity is a field that requires extensive hands-on experience, which has been shown to be an important factor in stimulating students' interest and sharpening their scientific reasoning and problem-solving skills. To this end, ODU has made significant investments in the creation of a state-of-the-art cybersecurity infrastructure, including a cybersecurity lab consisting of 24 dedicated workstations, a Nutanix converged system that supports virtual machines, two Cisco lab switches, a Cisco 3172-T data center grade switch, and a Palo Alto 850 NGFW firewall. Online students can remotely connect to the lab facility to conduct various real-world cybersecurity experiments.

Admission Criteria

The requirements for admission to the proposed Bachelor of Science in Cybersecurity include:

- x An online admission application and associated application fee
- x For freshmen: official transcripts from secondary institution(s) and/or General Education Development (GED) work
- x For transfer students: official transcripts from all regionally accredited postsecondary institutions or equivalent foreign institutions attended, with a minimum GPA of 2.5 in prior coursework; a GPA of 3.0 or better will make the applicant more competitive

Non-native English speakers are required to provide official scores of 550 on the paper-based, or 79-80 on the iBT, Test of English as a Foreign Language (TOEFL).

Other factors such as co/extra-curricular activities, community service, personal statements, recommendations, and special talents and leadership may also be considered.

Target Population

The proposed bachelor's program will target students who are enrolled in cybersecurity associate degrees where ODU has developed articulation agreements. These include the following colleges:

- x Tidewater Communication College
- x Thomas Nelson Community College
- x Northern Virginia Community College

The articulations facilitate the seamless transfer of community college graduates to ODU. The students who graduate under the articulations are guaranteed admission to ODU's cybersecurity program, which is the most affordable doctoral research institution in the state.

Curriculum

The proposed Bachelor of Science in Cybersecurity is a 120-credit hour degree program focused on understanding cybersecurity fundamentals, applications, and operations, while providing opportunities for students to integrate education and training with the workplace through solving skills in the lab environment.

The curriculum of the proposed BS in Cybersecurity includes a cybersecurity core that introduces fundamental concepts associated with the field of cybersecurity.

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Student Assessment

Students will be evaluated throughout the program using formative assessments, such as quizzes, tests, cases studies, papers, research projects and presentations. Student learning outcomes cover many of the technical competencies that are required for the cybersecurity field. Specifically, graduates will be able to

1. Analyze ethical and social issues in the area of cybersecurity to clearly understand ethical standards and rules for cybersecurity professionals and to promote social responsibility
2. Communicate in writing their understanding of cybersecurity problems and decisions about cyber defense and operations in a cohesive and well-structured manner;
3. Integrate principles and methods from a variety of disciplines to develop and implement best practices to solve cybersecurity complexities
4. Analyze global cybersecurity problems and make decisions that enhance the effectiveness of cyber defense and operation solutions based on these analyses
5. Orally communicate their understanding of cybersecurity and explain decisions in cohesive and well-structured presentations to both technical and non-technical audience.

These student learning outcomes are provided in the following assessment map.

Curriculum Map of Cybersecurity Program Core Courses

Learning Outcomes	Courses	Assessment Methods
1. Ethics Analyze ethical and social issues in the area of cybersecurity to clearly understand ethical standards and rules for cybersecurity professionals and to promote social responsibility	CYSE 200T Cybersecurity, Technology, and Society	<u>Formative</u> Group reading and book review; critical thinking and analysis assignments <u>Summative:</u> Midterm and final exams assessing knowledge of the ethical standards and rules for cybersecurity professionals
2. Written Communication Communicate in writing their understanding of cybersecurity problems and decisions about cyber defense and operations in a cohesive and well-structured manner	CYSE 200T Cybersecurity, Technology, and Society IDS 300W Interdisciplinary Theory and Concepts	<u>Formative</u> Group reading and discussion; written assignments, short essays; and digital portfolio. <u>Summative:</u> Midterm and final exams assessing critical thinking and written communication skills.

	<p>CYSE 425W Cybersecurity Strategy & Policy</p> <p>CYSE/CRJS/CPS 406 Cyber Law</p> <p>IDS 493 IDS Electronic Portfolio Project</p>	
<p>3. Analytical Problem Solving Integrate principles and methods from a variety of disciplines to develop and implement best practices to solve cybersecurity complexities.</p>	<p>CYSE 250 Basic Cybersecurity Programming and Networking</p> <p>CYSE 300 Introduction to Cybersecurity</p> <p>CYSE 301 Cybersecurity Techniques and Operations</p> <p>CYSE/CRJS/CPS 406 Cyber Law</p> <p>CS 471 Operating Systems</p>	<p><u>Formative:</u> Real-world application scenarios; case analysis; critical thinking and analysis assignments.</p> <p><u>Summative:</u> Midterm and final exams assessing knowledge of the cyber system risks and vulnerabilities and diagnosis principles and methods</p>
<p>4. Global Perspective Analyze global cybersecurity problems and make decisions that enhance the effectiveness of cyber defense and operation solutions based on these analyses</p>	<p>CYSE 200T Cybersecurity, Technology, and Society</p> <p>CYSE 250 Basic Cybersecurity Programming and Networking</p>	<p><u>Formative:</u> Real-world application scenarios; case study of the global impact of a cyberattack; critical thinking and analysis assignments.</p> <p><u>Summative:</u> Midterm and final exams assessing knowledge of the international cybersecurity threats in the Internet.</p>
<p>5. Oral Communication Orally communicate their understanding of cybersecurity and explain decisions in cohesive and well-structured</p>	<p>CYSE 250 Basic Cybersecurity Programming and Networking</p>	<p><u>Formative:</u> Design assignments; oral presentation of a cyber defense plan for a campus network.</p> <p><u>Summative:</u></p>

presentation to both technical and nontechnical audience.		Midterm and final exams assessing knowledge of technical communication principles and practice.
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- x Approved curricular changes and development;
- x Faculty development and research activities;
- x Facilities;
- x Internal and external funding; and
- x Description of strengths and weaknesses with attention to action items for the future

The dean and associate dean in the College of Arts & Letters will read the program review each year to ensure that benchmarks are met and excellence is maintained. The College's annual evaluation of the program will be sent each year to the vice provost of academic affairs for review. The vice provost will offer guidance, as needed, for improvement, and will provide updates about the review to the provost.

The curriculum required for the cybersecurity degree program is not the curriculum required for the cybersecurity major in interdisciplinary studies. The focus on the need for trained cybersecurity professionals has heightened since the major started, and it has become its own disciplinary area. The faculty has determined that cybersecurity needs a separate curriculum in order to provide the didactic and application coursework needed to fully educate students in the area of cybersecurity.

With the increasing reliance on computer systems and networks, more pervasive, sophisticated, and destructive cyberattacks are occurring with greater frequency. In fact, no organization or individual anywhere in the world is completely immune to cyberattacks.

Impact of Cyberattacks on National Security, Private Sectors, and Society

Former national intelligence director James Clapper noted that cyberattacks rank highest on worldwide threats to U.S. national security.⁵ According to Department of Homeland Security, “The federal enterprise depends on information technology (IT) systems and computer networks for essential operations. These systems face large and diverse cyber threats that range from unsophisticated hackers to technically competent intruders using state-of-the-art intrusion techniques. Many malicious attacks are designed to steal information and disrupt, deny access to, degrade, or destroy critical information systems.”⁶ The proposed program will prepare students to help IT professionals in the federal and state government enterprises understand cyber risks and vulnerabilities and design stronger and more robust defense systems against cyberattacks.

IBM Corporation’s Chairman, CEO and President Ginni Rometty, said that cybercrime may be the greatest threat to every company in the world.⁷ According to an analysis conducted by Cybersecurity Ventures, the global annual cybercrime costs have been estimated at \$3 trillion in 2015, and it could reach \$6 trillion by 2021.⁸ Global spending on cybersecurity products and services for defending against cybercrime is projected to exceed \$1 trillion cumulatively over the next five years, from 2017 to 2021, according to the Cybersecurity Market Report, which is published quarterly by Cybersecurity Ventures.⁹ In response to these efforts, the proposed program provides

Shortage of Cybersecurity Talent

As the volume and sophistication of cyberattacks grow, there is a strong demand for a trained cybersecurity workforce to safeguard the cyber space. Dr. Ronald Dodge of the United States Military Academy and Drs. Costis Torgas and Lance Hoffman from The George Washington University noted that the cybersecurity workforce is one of the most critical employment sectors in the world.¹¹

However, recent studies have shown that there is a serious shortage of talent to fill cybersecurity positions. According to a study conducted by Information Systems Audit and Control Association (ISACA), a global leader in cybersecurity, “82 percent of organizations expect to be attacked, but they are relying on a talent pool they view as largely unqualified and unable to handle complex threats or understand their business. More than one in three (35 percent) are unable to fill open positions.¹² According to International Information System Security Certification Consortium’s (ISC)²s, Global Information Security Workforce Study (GISWS) which queried 19,000 cybersecurity professionals worldwide, “The data clearly demonstrate much work is yet to be done to secure businesses, government agencies and organizations of all sizes, and the critical importance of having a properly staffed, agile and reactive workforce. However, in the 2015 edition of the GISWS, 62% of information security workers reported having too few workers to address the threats they encountered. In 2017, that number has ticked higher, with 66% indicating that they do not have the staff necessary to address the threats, indicating that the shortage of information security workers is widening, as more sectors recognize the importance of deploying a skilled cyber workforce to protect their data.”¹³

Based on a g (n)2 (s)1 (o)2 (r)5 /T142 -1.15 Tn16 (y)10 (ef)3 (d]TJ -0.004 Tc 0.004 Tw 2[(4-4 (r6-4 (r1

there from 2017 to 2021²¹.

Virginia Focus

There are over 30,000 cybersecurity job openings in Virginia – one of the highest among states²⁹ “At a time when Virginia is home to 36,000 open jobs in the cybersecurity sector, we must do everything we can to encourage students to enter this growing industry,

in cybersecurity has gained tremendous growth in enrollment since it was launched in 2015. Specifically, the Office of Institutional Research at ODU reports those enrollments in cybersecurity as follows

Fall 2015	11
Fall 2016	69
Fall 2017	121

The first 8 graduates completed their BS in Interdisciplinary Studies with a major in cybersecurity in 2017.

2. Results of a survey sent to students enrolled in cybersecurity programs at Tidewater Community College, Thomas Nelson Community College, and Northern Virginia Community College demonstrate strong demand for the program. (To be described)

The student survey and results may be found in Appendix E

Projected enrollment:

Assumptions
Retention 90%
Parttime students 60%/

Part C: Estimated resources to initiate and operate the program

	Program Initiation Year		Expected by Target Enrollment Year	
	2019- 2020		2023- 2024	
Full-time faculty	0.50	0.00	0.00	0.50
salaries	\$75,000			\$75,000
fringe benefits	\$28,927			\$28,927
Part-time faculty (faculty FTI split with unit(s))	3.60	0.00	1.10	4.70
salaries	\$288,000		\$88,000	\$376,000
fringe benefits	\$111,082		\$33,942	\$145,024
Adjunct faculty	0.00	0.00	0.00	0.00
salaries				\$0
fringe benefits				\$0
Graduate assistants	0.00	0.00	0.00	0.00
salaries				\$0
fringe benefits				\$0
Classified Positions	0.25	0.00	0.00	0.25
salaries	\$7,500			\$7,500
fringe benefits	\$2,893			\$2,893
Personnel cost				
salaries	\$370,500	\$0	\$88,000	\$458,500
fringe benefits	\$142,902	\$0	\$33,942	\$176,844
Total personnel cost	\$513,402	\$0	\$121,942	\$635,344
Equipment				\$0
Library				\$0
Telecommunication costs				\$0
Other costs				\$0
TOTAL	\$513,402	\$0	\$121,942	\$635,344

Part D: Certification Statement(s)

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

Yes _____
Signature of Chief Academic Officer

No _____
Signature of Chief Academic Officer

Please complete Items 2, and 3 below.

1. Estimated \$\$ and funding source to initiate and operate the program.

Funding Source	Program initiation year 2019 -2020	Target enrollment year 2023- 2024
Reallocation within the department (Note below the impact this will have within the department.)		
Reallocation within the school or college (Note below the impact this will have within the school or college.)		
Reallocation within the institution (Note below the impact this will have within the institution.)	\$513,402	\$635,344
Other funding sources (Specify and note if these are currently available or anticipated.)		

2. Statement of Impact/Funding Source(s). A separate detailed explanation of funding is required for each source used and a statement of impact on existing resources.

Reallocation within the Institution:

Funding for faculty in departments across Old Dominion University will be reallocated within the institution. The faculty are from the Center for Cyber Security Education and Research, as well as four colleges: College of Arts and Letters (Sociology and Criminal Justice; Philosophy and Religious Studies), Strome College of Business (Information Technology and Decision Science), Batten College of Engineering and Technology (Electrical and Computer Engineering; Modeling, Simulation and Visualization Engineering), and College of Sciences (Computer Science). The colleges and departments will maintain existing funding, and classes will be offered across various programs, including the proposed Bachelor of Science in Cybersecurity. No negative impact is anticipated for any degree program in any of the colleges or from any other areas of the university.

The Center for Cyber Security Education and Research (CCSER) will reallocate personnel funds within the center to accommodate the proposed program. This support from the CCSER will be available at the program's launch and through the target year. The faculty and administration anticipate no negative impact from the implementation of this program.

3. 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.

Agree _____
Signature of Chief Academic Officer

Disagree _____
Signature of Chief Academic Officer

December 6, 2018

APPROVAL OF A MASTER OF SCIENCE DEGREE IN DATA SCIENCE AND ANALYTICS

RESOLVED that, upon the recommendation of the Academic and Research Advancement Committee the Board of Visitors approves the proposed Master of Science degree in Data Science and Analytics in the Graduate School effective with the fall 2019 semester

Rationale: Old Dominion University seeks approval to initiate a Master of Science in Data Science and Analytics to begin fall 2019. The program would be administered by the Graduate School

The purpose of the Master of Science in data science and analytics degree program is to address the need for an expanding workforce that will help companies analyze data and integrate the outcomes with business processes to make them more productive. Data science and analytics is a multidisciplinary field that combines computer science, business analytics, and statistics to understand and leverage data to make advances and decisions that were not possible within previous organizational tools.

The curriculum will provide students with the skills and competencies that will make them successful in today's competitive, data-driven world. The program will prepare students to develop proficiencies in the fields of computational data analytics or in business intelligence and analytics. Specifically, they will be prepared to use state-of-the-art programming languages, tools, and software packages to perform analytics on complex data, develop statistical and machine learning models, and organize, manage, and clean data for its maximum effectiveness in analysis and visualization.

STATE COUNCIL OF HIGHER EDUCATION FOR VIRGINIA
PROGRAM PROPOSAL COVER SHEET

1. Institution Old Dominion University	2. Academic Program (Check one): New program proposal <input checked="" type="checkbox"/> Spin-off proposal <input type="checkbox"/> Certificate document <input type="checkbox"/>
3. Name/title of proposed program Data Science and Analytics	4. CIP code 11.0802
5. Degree/certificate designation Master of Science	6. Term and year of initiation Fall 2019

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

7b. CIP code (existing program)

11. If collaborative or joint program, identify collaborating institution(s) and attach letter

organizational data and use the resulting information to make informed business recommendations.

Mission

The mission of the university is: 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 proposed MS in Data Science and Analytics aligns with this mission by providing a “rigorous academic program” that will prepare the next generation of data scientists to gain key analytic knowledge and skills in their respective fields, and ultimately to “enrich” the Commonwealth of Virginia, the nation, and the world with data driven decisionmaking

Online Delivery

The proposed Master of Science in Data Science and Analytics will be offered in a hybrid format, combining on-campus and online instruction. For online class Blackboard is Old Dominion University’s learning management system, which will be used for the proposed program, with extensive use of synchronous meetings in the Adobe Connect platform. Additionally, faculty utilize Adobe Connect or WebEx for weekly synchronous office hours and other real-time communication throughout each semester.

Old Dominion University has a robust distance learning network that supports faculty in web-based course development and delivery. Faculty who teach in the program are trained in course development and delivery through the Center for Learning and Teaching (CLT). Instructional designers, technologists, and other staff work with the library faculty to assist in implementing

- x Official copies of transcripts of all regionally accredited institutions attended (or equivalent non-U.S. institutions)
- x Two letters of recommendation from individuals familiar with the applicant's professional and/or academic background
- x A current resume
- x A statement of professional goals
- x GRE scores, with a 50% or better attainment on quantitative reasoning

Current scores on the Test of English as a Foreign Language (TOEFL) of at least 550 on the paper-based test (or 790 on the iBT) are required for non-native English speakers

Students with previously completed work at a regionally accredited institution may submit a request for a maximum of 9 graduate credit hours to be transferred into a concentration or research area of the program approved by the graduate committee, the Graduate Program Director and faculty members representing each department associated with the degree—they will be added to the transcripts.

Target Population

The proposed Master of Science in Data Science and Analytics degree program will target undergraduates at ODU in various disciplines including computer science, information technology, engineering, and health sciences. The program also targets those in the military and individuals working for federal, state, or local government or for government contractors who wish to gain advanced expertise in data science.

Curriculum

The proposed Master of Science in Data Science and Analytics is a 30-credit hour thesis degree program. The curriculum will offer two concentrations: computational data analytics and business intelligence and analytics.

The focus of the curriculum is to provide students with a solid foundation in data analytics. The objective of the core is to lay the foundation that is required by data scientists working in any field. The core will establish proficiency in data discovery, collection, processing, and cleaning; competency in exploratory data analysis using statistics and visual analytics; and aptitude in statistical modeling implementation for predictive analytics.

The concentration in computational data analytics will provide students with opportunities to learn about different aspects of computational data analysis, such as machine learning, data visualization, web science, and natural language processing. Courses in this concentration are also offered to address relevant data analytics topics such as video analytics, algorithms and data structures, and information retrieval. The concentration in business intelligence and analytics will provide students with knowledge about database management systems, business

intelligence, information and communications technology, business analytics simulation modeling for business systems.

The capstone project brings together students in their final semester of study to synthesize knowledge from their coursework and apply it to solve real world data analytics problems.

New courses are noted with an asterisk.

Program Requirements

Core Courses (5 Credits)

DASC 600	Introduction to Data Science	(3 credits)
STAT 603*	Statistical/Probability Models for Data Science	(3 credits)
CS 625*	Data Visualization	(3 credits)
STAT 604*	Statistical Tools for Data Science	(3 credits)
CS 624*	Data Analytics and Big Data	(3 credits)

Computational Data Analytics Concentration (12 credits)

Four of the following courses to be selected in consultation with the faculty advisor

CS 521*	Machine Learning	(3 credits)
CS 601*	Algorithms and Data Structures for Data Science	(3 credits)
CS 626*	Visual Analytics: Exploring and Analyzing Data Visually	(3 credits)
CS 632*	Web Science	(3 credits)
CS 721*	Machine Learning II	(3 credits)
CS 727*	Large Scale Video Analytics	(3 credits)
CS 733*		

government setting Faculty and business/industry/government representatives serve as external mentors for the students during this experience

Students will learn how to identify problems, gather data and information, understand the business system, define hypotheses, analyze and visualize the data, develop solutions effectively articulate and communicate ideas and results. The capstone course offers valuable experiences through the collaborative efforts to develop design thinking in data science and to exercise leadership in a team environment.

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

Student Retention and Continuation Plan

The Graduate School, along with faculty who oversee this program will offer programming designed to ensure student success. Faculty will require new students to attend an orientation session, in person or online, which introduces the program, curriculum, requirements, expectations, faculty, facilities and other relevant resources students may access. In addition, faculty will publish an up-to-date curriculum and long-range course schedule to help students plan their enrollment and time to completion. They will also hold advising sessions each semester and provide personalized advising throughout students' program of study. Finally, faculty, in collaboration with government/industry/business partners, will monitor students in curricular content and career opportunities.

When individual student performance demonstrates a lack of success, faculty will meet with the student to explore ways that will lead to success. These include holding additional advising sessions with the student, using peer mentors to connect students to each other and to their academic work, and having an external partner meet with the student to discuss areas of career interest.

Continuation within the program is contingent upon maintaining a 3.0 av 12 >>g.015b2 (hi)-(t)-2 (uni)(r)

Assessment Map for Core Courses in Proposed Program

Student Learning Objectives	Measures
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1.

	DASC 690– Capstone Assessment: 8% of students will attain target on the Capstone Project rubric – related to communication skills
6. Research Explore and develop data models in order to recommend optimal solutions facing organizations.	STAT 604 - Statistical Tools for Data Science Assessment: 8% of students will attain target on the final data modeling assignment rubric. DASC 690– Capstone Assessment: 8% of students will attain target on the Capstone Project rubric – related to final recommendations.

Employment Skills/Workplace Competencies

Graduates of the Master of Science in Data Science and Analytics will have the skills, and workplace competencies needed for employment in the field of data science. Specifically, they will have

- x Proficiency in using state of the art programming languages, tools, and software packages to perform analytics on complex data including big data.
- x Capability to develop statistical and machine learning models.
- x Ability to organize, manage, and clean data to maximum effectiveness in analysis and visualization.
- x Proficiency in visually representing complex data to better understand the data and to effectively communicate to higher management the intricacies of data and its relationship with the organization processes.
- x Ability to write professional code adhering to industry standard for building data science applications.
- x Ability to lead teams in working various aspects of data science from retrieving and cleaning data to exploring and modeling data.

Program Assessment

The program will be assessed by faculty and administrators in the Graduate School of the College of Sciences, the Strome College of Business, and the Provost's office. The review will be completed annually in the fall starting the second year after the program is launched and will consist of:

- x Analyzing retention and attrition rates in order to maximize the positive influences and improve the negative ones that affect program completion
- x Analyzing the results of the ODU Graduate Student Satisfaction Survey, as well as areas where additional student support is needed

- x Analyzing graduate job placement to assess if the program is preparing students with the knowledge, skills and abilities for jobs in data science and evaluating the program's ability to meet market demands (following initial graduates' completion)

The results of these assessments will be used to evaluate the quality of the program, to stimulate program development, and to assess the role of the program in fulfilling its institutional mission. The program review may (a) result in strategic decisions about the program, (b) identify areas of improvement, (c) make resource recommendations, (d) articulate considerations for expansion or contraction.

- x 80% of graduates will be employed in data science positions using knowledge acquired in their graduate studies within one year of program completion
- x 80% of students will be satisfied with the program as determined by the university's Graduate Student Satisfaction Survey
- x 80% of alumni will be satisfied with the program as determined by the university's Graduate Alumni Survey administered within one year of program completion
- x 80% of employers will be satisfied with the level of education and skill of graduates, as measured by an employer survey administered within one year of hire.

After the first year and subsequent years, periodic evaluation of the success of the program in meeting these benchmarks will be undertaken. If program benchmarks are not achieved, the Dean of the Graduate School, along with the Graduate Program Director and the program faculty, will examine the program's admissions policies, curriculum, instructional methods, advising practices, and course evaluations to determine where changes need to be made.

Expansion of an Existing Program

The proposed program is not an expansion of an existing certificate, concentration, emphasis, focus, major, minor, or track at Old Dominion University

Relationship to Existing ODU Degree Programs

The proposed program is not similar or related to any existing master's program at Old Dominion University.

Compromising Existing Programs

No degree programs will be compromised or closed as a result of the initiation and operation of the proposed degree program.

Collaboration or Standalone

This is a standalone program. No other organization was involved in its development, and no other organization will collaborate in its operation.

Justification for the Proposed Program

Response to Current Needs (Specific Demand)

Data science and analytics is being recognized as the key discipline in utilizing growing data to solve challenging problems facing multiple economic sectors. The latest NIE-Government Survey 2018 concludes that the fourth industrial revolution and convergence of big data technologies and machine learning is making a dramatic shift towards more data and machine-driven societies. The survey report states: "Data is being currently referred to as the new oil, the new raw material driving innovation and growth in both the private and public sectors. Indeed, data use will grow exponentially in the next decade and will offer the ability to systematically analyze and act in real time in solving more complex business problems, creating more competitive advantage and making better informed decisions in a tightly connected world."

Amazon CEO, Jeff Bezos, in a recent letter to shareholders highlights the importance of data analytics and machine learning and how it impacts every part of the company. He wrote: "Machine learning drives our algorithms for demand forecasting, product search ranking, product and deals recommendations, merchandising placements, fraud detection, translations, and much more. Though less visible, much of the impact of machine learning will be of this type quietly but meaningfully improving core operations."

Data is growing exponen(t)-2 (h i)-w (n(t)-2 (h:a -180.72 0 Td [(h i)-w (n(t)- (c)4 (t)-2 (e)C /P <</MCID

Finance and Banking. The financial and banking sector is using data to reduce fraudulent transactions, reduce customer churning, find new areas of growth, and reduce risk. With increased access to online transactions, bank frauds have become more sophisticated. According to a McKinsey report, banking data along with machine learning techniques can help institutions to fight against bank frauds. The finance and banking industry can use machine learning techniques to predict customers that are likely to reduce their business with the bank. This information can be used by the banks for target campaigning to reduce costs. Data analytics techniques can be used for risk assessment, stress testing, and developing regulatory systems.⁶

Defense. The Defense Logistics Agency created a new Strategic Data and Analysis office in March 2018 to help in making data-driven decisions.⁷ The new office will harness emerging tools and technology in the area of data analytics for reducing costs, making faster decisions, and offering new services. The office plans to use advanced predictive analytics approaches to forecast deployment needs. For example, by analyzing data from past deployments it is possible to predict the need of supply items by a unit in the future so as to supply the required items to the unit more efficiently, and at a cost reduction by avoiding emergency orders.

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A report from the

several institutions in the US, including Virginia have launched master programs, but they will not meet the current and future demand in the field

Why Old Dominion University?

The economy in Hampton Roads is driven, in large part, by federal resources, with many organizations increasingly analyzing data for critical decision making. Among these entities are national research laboratories, large military organizations and government contractors including the NASA Langley Research Center, Naval Station Norfolk, and Allen Hamilton. NASA is collecting

- x Twenty-five percent of employers hiring analysts prefer or require candidates to have a graduate degree, according to research from job market analytics firm Glass Technologies
- x In 2015 the number of job postings for data scientist and advanced analysts was 1629, 30% above the national average for all occupations
- x Among these job postings in 2015, the number of job posting that required a master or higher level degree was 612. This number will grow to 678 by 2020.
- x

Commonwealth of Virginia

The Commonwealth of Virginia recognizes the importance of data and is already investing in this area. One of the initiatives, Virginia Longitudinal Data System²⁸, enables data analysis on a diverse set of large datasets. Executive Directive 7 (2016) makes the case for leveraging the use of shared data and analytics²⁹. The directive states:

In order to continue the Commonwealth's advancement towards a New Virginia Economy that draws on all of the Commonwealth's vast resources, it is important state agencies have access to all information necessary to better provide services to our citizens. Increasing the use of shared data and analytics among Virginia agencies through a comprehensive and coordinated effort an (a)-6 (f[(t)-2 ()]T1 (ar)-10.9 (g)6 (e nhh)-4 (eo10 (a

Occupation	Total change for 2016-2026 (%)	Annual Average Growth (%)
Operations Research Analysts	36.53	3.16
Mathematical Scientists	35.94	3.12
Statisticians	43.36	3.67
Computer Systems Analysts	12.95	1.23
Software Developers	32.71	2.87

The annual average percent change for computer and mathematical occupations for 2016-2026 is 1.69% as compared to the 0.89% for all occupations during that time period. The total percent change for Computer Mathematical occupations from 2016-2026 is 18.23% as compared to 9% change for all occupations.

Hampton Roads

The Hampton Roads area includes organizations that are keenly interested in this program. Letters of support from several of these employers may be found in Appendix D

Employer Survey

The results of survey among employers are provided in Appendix E

Appendix F contains current job announcements demonstrating a need for prospective employees with the knowledge that this data science degree program would provide.

Student Demand

Evidence of student demand is available with the following data:

1. Student Survey:

https://odu.co1.qualtrics.com/jfe/preview/SV_afy4dgxJokEzvjD?Q_CHL=preview

The results of student survey are presented in Appendix G

2. Alumni survey or second student survey

George Mason University(GMU) offers a Master of Science

Virginia Commonwealth University (VCU) offers a Master of Decision Analytics that requires 30 credit hours.

Similarities to ODU: The VCU School of Business offers the Master of Decision Analytics degree. It has a similar structure as the proposed MS in Data Science: consisting of five courses (15 credit hours) and five approved electives (15 credit hours) offered by several departments in the college. The VCU course Statistical Analysis and Modeling, is similar to the proposed ODU course Stat by

Location

Old Dominion University is in south Hampton Roads and will be the only program in this area.

Enrollments ³⁵	Fall 2013	Fall 2014	Fall 2015	Fall 2016 47	Fall [REDACTED]
College of William and Mary					

Adjunct faculty

No adjunct faculty are required to launch and sustain the proposed degree program.

Graduate Assistants

No graduate assistants are required to launch and sustain the proposed degree program.

Classified Positions

There is currently a full-time classified position within the Graduate School Administrative Assistant who will assist faculty who teach in the proposed SMH Data Science and Analytics program. The program will require 2.0 FTE of classified support to initiate and this level of effort will remain constant through the target year. Salary for the administrative assistant will be \$7,500 in salary and \$2,893 in benefits.

Targeted financial aid

No targeted financial aid is required or designated to initiate and sustain the proposed degree program.

Equipment (including computers)

No new equipment, including computers, is necessary to launch and sustain the proposed degree program.

Library

No new library resources are required to launch and sustain the proposed degree program. The University Libraries will be able to fully support the SMH Data Science and Analytics Major journals in the field, including International Journal of Data Science and Analytics, ACM Transactions on Knowledge Discovery from Data, Statistical Analysis and Data Mining, Big Data, and many others, are available in the University Libraries. Obtaining articles is extremely easy through (1) online subscriptions held by the university, (2) physical subscriptions for some journals, and (3) rapid delivery via Interlibrary Loan.

Telecommunications

No new telecommunications resources are required to launch and sustain the proposed degree program.

Space

No new space is required to launch and sustain the proposed degree program.

Other Resources (specify)

No additional resources are required to launch and sustain the proposed degree program.

Resource Needs: Parts A D

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

- x Has the institution submitted or will it submit an addendum budget request to cover ~~o~~time costs? Yes No
- x Has the institution submitted or will it 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)?

Part C: Estimated resources to initiate and operate the program				
	Program Initiation Year		Expected by Target Enrollment Year	
	2020- 2021		2024- 2025	
Full-time faculty	0.75	0.00	0.00	0.75
salaries	\$84,642			\$84,642
fringe benefits	\$32,646			\$32,646
Part-time faculty (faculty FT split with unit(s))	1.00	0.00	0.50	1.50
salaries	\$112,856		\$56,428	\$169,284
fringe benefits	\$43,529		\$21,764	\$65,293
Adjunct faculty	0.00	0.00	0.00	0.00
salaries				\$0
fringe benefits				\$0
Graduate assistants	0.00	0.00	0.00	0.00
salaries				\$0
fringe benefits				\$0
Classified Positions	0.20	0.00	0.00	0.20
salaries	\$7,500			\$7,500
fringe benefits	\$2,893			\$2,893
Personnel cost				
salaries	\$204,998	\$0	\$56,428	\$261,426
fringe benefits	\$79,068	\$0	\$21,764	\$100,832
Total personnel cost	\$284,066	\$0	\$78,192	\$362,258
Equipment				\$0
Library				\$0
Telecommunication costs				\$0
Other costs				\$0
TOTAL	\$284,066	\$0	\$78,192	\$362,258

The Graduate School will provide operational funding for the program, and the Department of Computer Science and Department of Information Technology and Decision Sciences will provide faculty for course offerings in the concentrations. No adverse impact is anticipated on academic programs in either department or the Graduate School as a result of opening the proposed program.

3. Secondary Certification.

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

Agree _____
Signature of Chief Academic Officer

Disagree _____
Signature of Chief Academic Officer

December 6, 2018

APPROVAL TO RENAME THE SCHOOL OF PHYSICAL THERAPY AND
ATHLETIC TRAINING THE SCHOOL OF REHABILITATION SCIENCES

RESOLVED that, upon the recommendation of the Academic and Research
Advancement Committee, the Board of Visitors approves renaming the School of
Physical Therapy and Athletic Training the School of Rehabilitation Sciences effective
July 1, 2019.

Rationale: The School of Physical Therapy and Athletic Training has progressed
from offering only a Doctorate in Physical Therapy (DPT) to also offering
a Master of Science in Athletic Training and a Ph.D. in Kinesiology and
Rehabilitation. The current name of the school does not represent the three
programs and would not accurately portray programmatic expansion, such
as the potential addition of Occupational Therapy.

The proposed name—School of Rehabilitation Sciences—reflects the
commonalities of the current programs and would continue to be
appropriate for new related programs. The name is consistent with the
vision of the College of Health Sciences, which is to “advance healthcare
education and research through interdisciplinary and global connections.”
Further, the proposed name is commonly used for similar schools across
the country (e.g., George Mason University, Temple University, and the
University of Kentucky). The new name will better represent the work
taking place in the school and the future of rehabilitation sciences
education and research at Old Dominion University.