

AY21-17-C

*STATE COUNCIL OF HIGHER EDUCATION FOR VIRGINIA*  
**PROGRAM PROPOSAL COVER SHEET**

1. Institution

Old Dominion University

2. Program action (Check one):

New program proposal   X  

Spin-off proposal

**Proposal for PhD in Biology  
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APPENDIX A—SAMPLE PLANS OF14(S.CTJET002C0 G[( H20912 0 4q0.0002 792 reW\*in40029)MC

## Description of the Proposed Program

### **Program Background**

Old Dominion University in Norfolk, Virginia requests approval to initiate a Doctor of Philosophy (PhD) degree program in Biology. The proposed program will be administered by the Department of Biological Sciences in the College of Sciences and is to be implemented by Spring Semester 2022.

The proposed PhD in Biology



program. Such transfer courses, if approved, be added to the program requirements or elective requirements.

Admission as a graduate student in the program admissions committee. Faculty members from the program will determine by the committee.

The proposed PhD in Biology is for students who have completed an undergraduate or master's degree and wish to pursue their respective fields. This program is open to international undergraduate and master's degree holders.

A minimum of 48 semester credit hours of master's coursework is required or, in the absence of a master's degree, 36 semester credit hours beyond the bachelor's degree is required.

Courses are listed below for the program of study of the PhD in Biology. Elective options are provided in Appendix B.

**Biology Core:**

- One of the following foundation courses (3 credits)
- BIOL859 Foundations of Biology (3 credits)
- BIOL804 Animal Ecology (3 credits)
- BIOL810 Advanced Cell Biology (3 credits)
- BIOL849 Biogeography (3 credits)

- One of the following core courses (3 credits)
- BIOL801 Practical Cell Biology (3 credits)
- BIOL803 Advanced Cell Biology (3 credits)
- BIOL832 GIS in Life Sciences (3 credits)
- BIOL872 Modeling and Simulation in Life Sciences (4 credits)

Plus:  
BIOL0453.33 Tm0 G

in the admission committee for approval, and if approved, transfer courses may be accepted for research course requirements or substituted for by transfer courses.

Admission to the PhD in Biology does not imply acceptance into the PhD in Biology. A student must be approved by the Program Director, and at least two other faculty members from the program will determine by the committee.

**Population**

The proposed PhD in Biology is for students who have completed an undergraduate or master's degree and wish to pursue their respective fields. This program is open to international undergraduate and master's degree holders.

**Curriculum**

A minimum of 48 semester credit hours of master's coursework is required or, in the absence of a master's degree, 36 semester credit hours beyond the bachelor's degree is required.

Courses are listed below for the program of study of the PhD in Biology. Elective options are provided in Appendix B.

BIOL859 Foundations of Biology (3 credits)

(3 credits)

(3 credits)

(3 credits)

ences (4 credits)

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**Dissertation Research:**

BIOL898 Research (18+ credits; 12 credits for Master's degree holding students)

BIOL899 Dissertation (3+ credits)

**Written and Oral Examinations**

The candidacy examinations (written and oral) must be completed by the end of the third year in the program. The examinations qualifying a student for candidacy for the degree of Doctor of Philosophy are comprehensive in nature and consist of both oral and written components (see below for descriptions). Before taking the candidacy examinations, the student must meet the program's requirements and have the recommendation of the Advisory Committee. The research

### **Dissertation Research**

Once the written and oral candidacy examinations have been passed, a dissertation committee will be formed to supervise dissertation research. This committee will be formed by the student in consultation with his or her advisor and approved by the Graduate Program Director. It will be comprised of the student's advisor as committee chair, at least one other faculty member active in the Biology program, and a third faculty member who is outside the Department. The third faculty member may be from Old Dominion University or external to the University. Additional committee members are permitted, but not required, with at least 2/3rds of the committee being from the Department of Biological Sciences.

In consultation with the dissertation committee, the student will prepare a dissertation prospectus for presentation to and approval by the committee. After approval of the dissertation prospectus, the chair of the dissertation committee shall recommend the student's admission to candidacy to the Graduate Program Director. Each student will complete a minimum of 3 credit hours of BIOL 899: Dissertation and 18 credit hours (12 for Master's degree holding students) of BIOL 898: Research, during which major work will result in development of a doctoral dissertation that represents original research efforts by the student. Upon completion of the dissertation, the student's dissertation committee will conduct a public examination and defense of the dissertation. Final approval is the responsibility of the dissertation committee chair, the Graduate Program Director, and ultimately the Dean of the College of Sciences, who together certify the candidate for graduation.

### **Time to Degree**

The University will attract a mix of students, with 10-16 enrolled full-time and 2-4 part-time. Full-time students will complete coursework in this proposed doctoral program over three full





per year. Faculty with expertise in Ecology (Eric Walters), Physiology (John Whiteman), Cellular and Molecular Biology (Pengwei Zhang), Computational Biology (Daniel Barshis), Geographic Information Systems and Modeling (Holly Gaff), Statistics (Eric Walters, Holly Gaff), Biogeography (Lisa Wallace), and Research Ethics (Wayne Hynes) will teach core courses. In addition to their participation in the core curriculum, the faculty listed will also teach a rotating Biology Graduate Seminar Course as well as mentor students and supervise student research.

### **Program Administration**

The proposed program will be housed in the Department of Biological Sciences within the College of Sciences. A full-time faculty member from the Department will serve as the Graduate serve as



**Research methods**

Collect, analyze, present, and defend original research data

BIOL857 Biometry  
Assessment: in class assignment, exam, independent research project, paper, and presentation

BIOL801 Practical Computing for Biologists  
Assessment: assignments, group presentation/hackathon

BIOL832 GIS in Life

<p><b>Oral Communication</b>  Present their research as primary author at national/international conferences</p>	<p>BIOL801 Practical Computing for Biologists  Assessment: group presentation/hackathon</p> <p>BIOL 847 Responsible Conduct of Research  Assessment: presentation</p> <p>BIOL 803 Advanced Genomics Data Analysis  Assessment: individual discussion presentation</p>	<p>Dissertation Defense</p>
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## **Employment Skills/Workplace Competencies**

Graduates of the proposed program will have the skills and expertise in biology relevant to several career opportunities.

Serving as faculty members, graduates will be able to:

- Develop and deliver effective instruction in an undergraduate or graduate college or university program. Such instruction would include topics in biology, evolution, ecology, physiology, and research methods in biology;
- Collaborate with colleagues in different but related fields for education, research and publications;
- Advise and mentor undergraduate and graduate students in their courses of study;
- Participate in professional service activities locally, state-wide, nationally and internationally; and
- Expand the body of knowledge in biology through research and dissemination of original scholarly work.

Working as a researcher in a non-academic institution, graduates will be able to:

- Develop original research related to biology;
- Publish findings related to research efforts;
- Apply knowledge and understanding of biology in research and development of laboratory diagnostics, assessment and evaluation of resource management/conservation policies and strategies, and for best-practice guidance in applications that bridge scientific knowledge with applied actions;
- Effectively communicate with other professionals, policy makers and the general public about topics in the biology.

## **Program Assessment**

The program will be assessed by faculty and administrators in the Department of Biological Sciences, the College of Sciences, the Graduate School, and Old Dominion University. The review will be completed annually in the fall of each year starting from the second year after the program is approved, and will consist of:

Analyzing retention and attrition rates in order to maximize the positive influences and ameliorate the negative ones that affect program completion

Analyzing the results of the Old Dominion University Graduate Student Satisfaction Survey for areas where additional student support is needed

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

Analyzing the dissemination of graduate student related works (dissertation, abstracts, case-studies, research manuscripts)

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 Old Dominion University's institutional mission. The program review may (a) result in strategic decisions about the program, (b) identify areas of i







on computational training at the M.S. level, with advanced level PhD training required for more



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

Occupation Title	Base Year Employment	Projected Employment	Total % Change	Annual Change #	Education
Microbiologist	389	407	4%	2	Bachelor's degree
Wildlife Biologist	271	281	4%	1	Bachelor's degree
Postsecondary Teachers, Biological Sciences	1814	2007	11%	19	Doctoral or professional degree
Biochemist and Biophysicists					

### **The University of Virginia (UVA)**

The University of Virginia offers a Ph.D. program in Biology. The 72 credit-hour program, with a 10-credit hour core, aims to train scientists and scholars to perceive fundamental biological problems and to investigate them successfully.

#### Similarities to ODU

One of the five required courses of the Ph.D. program in Biology at UVA is BIMS 7100, Research Ethics. The content of the course includes several areas covered in a core course in the proposed program, BIOL 847 Responsible Conduct of Research.

#### Differences from ODU

The UVA program requires 72 credit-hours with a 10 credit-hour core while the ODU program requires 78 credit-hours (or 48 with an existing MS) with a 13-14 credit-hour core. The UVA program does not have fundamental's, quantitative, or statistics core courses. The UVA program also requires laboratory rotations, while students would matriculate directly into the lab of their major advisor for the ODU program.

### **Virginia Tech (VT)**

The Virginia Polytechnic Institute and State University offers a Ph.D. program in Biological Sciences. The 90 credit-hour program, with a 1 credit-hour core, aims to teach both research skills and the ability to communicate effectively with professional colleagues and undergraduate students in an effort to foster individually tailored programs that lead to successful careers in research and education.

#### Similarities to ODU

The only required core course of Virginia Tech's program is a 1 credit orientation course BIOL 5174: Introduction to Graduate Studies in Biological Sciences. This course provides new students with critical information about the graduate program, requirements for degrees and the level of performance that constitutes normal progress, and required training. As this course is institution and program specific, there really are no similarities to the proposed program at ODU.

#### Differences from ODU

The Virginia Tech program requires 90 credit-hours with a 1 credit-hour core while the ODU program requires 78 credit-hours (or 48 with an existing MS) with a 13-14 credit-hour core. The Virginia Tech program does not have fundamental's, quantitative, or statistics core courses. As such, there is very little similarity between the VA Tech program and the proposed program at ODU.

The following data, supplied by SCHEV, show trends at these two institutions.

<b>Institution/Year</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
UVA Headcount	51	55	52	53	56
UVA Graduates	4	8	5	10	5



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

**Space**

No additional space is required to initiate and sustain the proposed program.

**Equipment (including computers)**

No new equipment resources are needed to initiate and sustain this proposed program.

**Other Resources**

No new resources will be required to launch or operate the proposed PhD in Biology.

**Funds to Initiate and Operate the Degree Program**

<b>Cost and Funding Sources to Initiate and Operate the Program</b>			
<b>Informational Category</b>		<b>Program Initiation Year 2023-2024</b>	<b>Program Full Enrollment Year 2027-2028</b>
1	Projected Enrollment (Headcount)	6	23
2	Projected Enrollment (FTE)	4.2	16



## **Appendix A—Sample Plans of Study**





TOTAL 6 credit All But

## **Appendix B—Course Descriptions**

**BIOL 801. Practical Computing for Biology. 3 Credits.**

This hands-on training course emphasizes the use of general computing tools to work more effectively in the biological sciences. It integrates a broad range of powerful and flexible tools that are applicable to ecologists, molecular biologists, physiologists, and anyone who has struggled analyzing large or complex data sets. Text file manipulation with regular expressions, basic shell scripting, programming in Python and R, interaction with remote devices, and basic graphical concepts will be reviewed.

**BIOL 803. Advanced Genomics Data Analysis. 3 Credits.**

This course is designed to teach students the various steps involved in analyzing next-generation sequencing data for gene expression profiling and polymorphism identification and analyses. The class will follow a workshop setting with a combination of lectures, paper discussions, and instructor and student led programming sessions.

**BIOL 804. Animal Ecophysiology. 3 Credits.**

This course integrates the physiological and biochemical function of wild animals with population-sc-

Emphasis on historical biogeography, utilizing both dispersal and vicariance models for explanations of the geographic distribution of organisms. Ecological explanations are also considered. Useful techniques for biogeographic analyses, such as comparison of area cladograms are discussed at length.

BIOL 857. Biometry. 4 Credits.

A first course, or a refresher course, in statistical methods and experimental design for graduate students in biology and the natural sciences. The focus is on application and hypothesis testing with examples drawn from the field of biology. The course requires a significant amount of work outside of class on homework exercises and an independent project. Prerequisite: course background in statistics.

BIOL 859. Foundations and Principles in Ecology. 3 Credits.





## **Appendix E - Journal Articles**

**Appendix F—Employment Demand**  
(To be filled in for final SCHEV proposal)



A

**What is the likelihood that you would enroll in the Biology PhD program at Old Dominion University described above?**

- Very likely
- Somewhat Likely
- Not very likely
- Not at all likely

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*Display This Question:*

*If What is your level of interest in the Biology PhD program described above? = Not very interested*

What is your class rank?

- Freshman
  - Sophomore
  - Junior
  - Senior
  - Other, please specify: \_\_\_\_\_
- 

**Which of the following would influence your decision to pursue a Biology PhD program at ODU?**

Opportunity to achieve professional goals

Opportunity to work in the film industry

Proximity of the campus to where I work/live

Reputation of faculty

Availability of night courses

Opportunity to expand working knowledge of film production/screenwriting/film studies

Other: \_\_\_\_\_

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**Could you please comment on how this PhD program in Biology would fit with current or future career goals?**

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**Thank you for your time.**

## APPENDIX H—LIBRARY HOLDINGS