UCONN

UNIVERSITY OF CONNECTICUT

Office of the Provost
Anne D'Alleva, Ph.D.
Provost and Executive Vice President
for Academic Affairs

December 7, 2022

TO:　　　　Members of the Board of Trustees

FROM:　　　Anne D'Alleva, Ph.D.
　　　　　　Provost and Executive Vice President for Academic Affairs

RE:　　　　Graduate Certificate in Genomic Data Analysis

<u>RECOMMENDATION</u>:

That the Board of Trustees approve a Graduate Certificate in Genomic Data Analysis.

<u>BACKGROUND</u>:

Genomics is a rapidly growing field and is characterized by the application of high throughput methodologies that produce very large datasets. Analysis of these datasets requires specialized skills and knowledge that are currently in high demand in a number of sectors. The availability of training in these skills, however, is generally restricted to those who can make large time commitments to M.S. or Ph.D. degrees. By contrast, this graduate certificate will offer specialized training that will prepare students for careers in government, industry, or academic research, without the multi-year full-time commitment required of a higher graduate degree. Burning Glass assessments of job market demand for skills that will be developed in the proposed certificate program (under CIP codes for Bioinformatics and Genomics) are strong and projected to increase at both the Bachelor's and Master's level of training. We anticipate that the certificate will provide skills in between these levels. The Computational Biology Core in the Institute for Systems Genomics, which will be responsible for developing and delivering course content, has been running a monthly workshop series online since June of 2020, at the onset of the pandemic. This series has been well-attended, with an average of around 12 participants, and we see the expansion of this workshop series into a certificate program as a natural way to offer more comprehensive training in this area.

The certificate program curriculum will introduce students to key concepts in genomics and provide active learning opportunities to develop technical skills through the analysis of high throughput genomic data. The goals of the program are to; 1) develop genomic data analysis skills to meet professional goals or in preparation for continuing graduate studies, 2) become familiar with common experimental design considerations in genomic studies; 3) practice communication of analysis results in multiple modalities, and 4) facilitate networking and engagement of students with professionals in the discipline.

In year one, we anticipate enrolling 15 students. In year two we will expand to 25. From year 3 onward, we will consider further expansion if demand and resources permit.

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Request for New UConn Academic Degree Program

General Information

Name of degree program: Graduate Certificate in Genomic Data Analysis
Name of sponsoring Department: Institute for Systems Genomics
Type of Proposal: New
Type of Program: Graduate Certificate
Location: Online
Anticipated Initiation Date: Fall 2023
Program Payment Type: Fee- based
CIP Code: 26.0807

Justification for the New Program

Genomics is a rapidly growing field and is characterized by the application of high throughput methodologies that produce very large datasets. Analysis of these datasets requires specialized skills and knowledge that are currently in high demand in a number of sectors. The availability of training in these skills, however, is generally restricted to those who can make large time commitments to M.S. or Ph.D. degrees. We see an opportunity to offer specialized training that will prepare students for careers in government, industry, or academic research, without the multi-year full-time commitment required of a higher graduate degree. Burning Glass assessments of job market demand for skills that will be developed in the proposed certificate program (under CIP codes for Bioinformatics and Genomics) are strong and projected to increase at both the Bachelor's and Master's level of training. We anticipate that the certificate will provide skills in between these levels. The Computational Biology Core in the Institute for Systems Genomics, which will be responsible for developing and delivering course content, has been running a monthly workshop series online since June of 2020, at the onset of the pandemic. This series has been well-attended, with an average of around 12 participants, and we see the expansion of this workshop series into a certificate program as a natural way to offer more comprehensive training in this area.

Are there similar programs in CT or elsewhere?

At the University of Connecticut the two certificate programs closest in content are: An in-development certificate program in Data Science that will optionally incorporate some coursework in bioinformatics. We have discussed this with Peter Diplock and Jill Wegrzyn, developers of that certificate, and concluded it will not overlap with the proposed certificate and derivative program content. A certificate in Clinical Genetics and Genomics offered through the Institute for Systems Genomics. This focuses on the interpretation of genomic information in a clinical setting, but does not address the analysis and interpretation of underlying genomic data. There is no overlap in course content. In spite of the fact that job demand in this domain is high in the region (New York and Boston are major biotechnology hubs), there are few if any similar programs in Connecticut or elsewhere in New England. The University of St. Joseph offers a certificate in Integrative Genomics

What are the desired learning outcomes of the program?

Apply knowledge of genetic principles, sequencing technologies and genomic data analysis skills to advance research or make clinical diagnostic discoveries. Use best practice analysis methods for reproducibly analyzing, visualizing, and interpreting genomic data. Document and communicate analytic approaches and results to scientific and non-scientific audiences. Learn emerging techniques using skills and knowledge developed in the course as a foundation and complexity brought by the consideration of ethics, risks, and sustainability in global sourcing.

Program Description

Genomics is an explosively growing biological discipline aimed at understanding structural and functional features of genomes, and how they interact to shape biological processes. The skill to analyze genomic data is a prerequisite for many jobs in biotechnology, and necessary for the pursuit of postgraduate education in a wide variety of biological and biomedical fields. The certificate program curriculum will introduce students to key

concepts in genomics and provide active learning opportunities to develop technical skills through the analysis of high throughput genomic data. The goals of the program are to: Develop genomic data analysis skills to meet professional goals or in preparation for continuing graduate studies. Become familiar with common experimental design considerations in genomic studies. Practice communication of analysis results in multiple modalities. Facilitate networking and engagement of students with professionals in the discipline.

Proposed Graduate Catalogue Copy
The Certificate in Genomic Data Analysis is designed to develop skills in the analysis of high throughput genomic data. Genomics is a rapidly growing field with applications in government, industrial and academic settings, and this certificate trains students in practical skills useful to extract and communicate insight from large genomic datasets. Students must complete 12 credits over two semesters.

Required Courses: Semester 1: ISG 5301 and ISG 5311; Semester 2: ISG 5302 and ISG 5312.

This certificate is offered by The Graduate School.

Faculty Involvement
Assistant Research Professor Noah Reid, of the Institute for Systems Genomics and the Computational Biology Core, will be the primary instructor for all courses with input from members of the Computational Biology Core, including Director Jill Wegrzyn and Associate Director Vijender Singh.

Enrollment and graduate projections
In year one, we anticipate enrolling 15 students. In year two we will expand to 25. From year 3 onward, we will consider further expansion if demand and resources permit.

Program Evaluation
We will 1) collect course evaluations from students 2) Conduct exit interviews with students who withdraw from the program without completing it. 3) Survey program alumni to collect data on their experience and the usefulness of the program to them in their career or during further education.

Program Administration
Program Director/Administrator: Noah Reid
Programs Head: ISG Director, Dr. Rachel O'Neill

Funding and Financial Resources Needed
No new financial resources needed.

Other resource needs
Access to the UConn health Xanadu computer cluster, where students will conduct data analysis.

Consultation with other potentially affected units
We consulted with Peter Diplock and Jill Wegrzyn, developers of the new data science certificate program and Judy Brown, who teaches the Clinical Genetics and Genomics certificate. There is no significant overlap between these programs. In Spring 2022 we presented the proposal for the program to the Data Science faculty steering committee and they concluded that they have no concerns that there will be competition or overlap.

Who can apply to this program?
Internal applicants (current UConn students enrolled in another UConn degree or certificate program), External applicants (individuals who are not currently UConn students)

Anticipated term and year of first enrollment
Fall 2023

Admission Requirements
Baccalaureate degree in Biology or a related field. Minimum GPA of 3.0. Coursework in genetics recommended.

Term(s) to which students will be admitted
Fall

Program Director Name
Noah Reid, Research Assistant Professor, Molecular and Cell Biology