

Evaluation Report on the Request for Permanent Status for the Ph.D. in Bioinformatics Data Science

Objectives and focus of the program:

The Ph.D. degree program in Bioinformatics Data Science (originally as Bioinformatics and Computational Biology, BINF-PhD) strives to prepare and train next-generation of researchers and professionals who play a key role in multi- and interdisciplinary teams, bridging life sciences and computational sciences. The name change from BINF-PhD to BDS-PhD is to reflect the incorporation of data science- an emerging and rapidly expanding field where biological, computational, and quantitative disciplines converge. This was also catalyzed by the newly launched Data Science Institute (DSI) at UD which is expected to foster additional multidisciplinary research collaboration providing further synergy among data science research and academic programs. This program is housed and administered by the Center for Bioinformatics & Computational Biology (CBCB). This Ph.D. program builds upon the successful foundation of the Master's degree program in Bioinformatics and Computational Biology (BICB-MS), Professional Science Master's in Bioinformatics (BINF-PSM), and the Graduate Certificate in Bioinformatics (BINF-CERT).

Strength of the program:

This program builds upon the research strength, education resources, and bioinformatics infrastructure at UD, which has a larger footprint across several colleges and departments including Colleges of Arts & Sciences, Engineering, Agriculture & Natural Resources, Earth, Ocean & Environment, Business & Economics, and Education & Public Policy. The advanced state-of-the-art facilities at the Delaware Biotechnology Institute and the Center for Bioinformatics & Computational Biology (CBCB) were central to both establishing and fostering this program. The DBI and the Center for Bioinformatics & Computational Biology have sufficient analytical facilities, computers, and analytical software for the students. The required 6 credit internship in both concentrations and tailored courses for each concentration is highly beneficial for building an industry-academic relationship as well as to develop a good foundation for the graduates for their jumpstart in the career. Given that many affiliated faculty members in the program already have strong industry contacts, as does the DBI itself, identifying the company for an internship is not expected to be challenging for students.

The Ph.D. program is synergistic to the existing degree programs, providing a critical component to University's strategic priorities in energy, environment, and life and health sciences. The degree has three concentrations with specific core course requirements: i) Bioinformatics, ii) Systems Biology, and iii) Data Analytics. Just because the name change of the program and three concentrations are just approved but before the submission of self-study report for the permanent status of the program, that change is not included in the self-study report. The Program Director provides and assists each student with a Plan of Study (POS) template in order to develop a multi-year plan for meeting curriculum requirements. So the procedure and expectation of the program are known to students from the beginning. The curriculum of this program includes core and electives depending on the concentration and other requirements for the degree (number of credits, selection of advisor, dissertation committee, candidacy exam, and dissertation research) are quite typical to many other graduate programs within departments or interdisciplinary graduate programs.

Students in the programs received several fellowships and awards within the university during their degree. The job placement of students those who graduated appears to be solid and 100%. Among 6 students graduated so far (note discrepancy on the date of graduation on Table 3 and 4), some of them are gotten positions in highly regarded institutions such as Danforth Plant Center, Noble Foundation and Elsevier. The upward trajectory of student enrollment is definitely a positive sign that this program will grow in the future.

Weakness of the program:

There is no significant weakness of this program, so only a few minor points are included here. This program graduated 2 students in the first 5 years. Since then it appears to be on track to attract more application and establish a healthy size of ~15 students at any time of the year since 2015. Two students

dropped out of Ph.D. and transferred to MS or PSM program but the self-study provided a reasonable explanation of the transfer. In terms of student recruitment activities, it appears to be a general and does not have any particular and impressive activity. This could be due to the perception that the higher market demand would yield higher enrollment. Since that bioinformatics and computational biology may well be the single fastest-growing specialty in the life sciences, there might be most students interested if advertised proactively or opportunities to fund degree or generate fellowship from private institutions in the long run.

Conclusion

Given that the performance of the program during the 2-yr extension period (2017-18) was much higher and student graduated have attained jobs in reputed institutions, the panel expects growth of this program and recommends permanent status.