

Doctor of Philosophy with a Major in Computer Science

**Assessment Committee: Dr. Robert Reynolds, Dr. Thayer Jayyousi, Dr. Loren Schwiebert,
Stephanie Chastain, and Olubukola Akintoroye**

Dear Computer Science Ph.D. students and Supporters:

In our mission to continuously improve the Computer Science Ph.D. program over the past year, the Department of Computer Science Assessment Committee Faculty collected information about the ongoing educational activities in our Department. The period over which the data used in this report was collected spanned from 9/1/2015 to 8/31/2016. Further data collection activities for Fall 2016 and Winter 2017 are currently underway. This task could only have been done with the full cooperation of Faculty, Lecturers, Part-Time Instructors, Graduate Teaching Assistants, Students, and Staff. In particular, Stephanie Chastain (Academic Advisor) and Olubukola Akintoroye (Student Assistant) provided us with excellent support and assistance.

The data was collected in regards to four important Program Learning Outcomes (PLO) that were identified by our Faculty. They are:

1. (PLO 1) Students will be able to apply the principles of Computer Science, Mathematics, and Scientific Investigation to solve real-world problems appropriate to the discipline.
2. (PLO 2) Students must demonstrate the ability to understand the major research questions and fundamental tools needed to solve problems in a given sub-field of Computer Science.
3. (PLO3) Students must produce original scholarly research that contributes to one or more of the sub-fields of Computer Science.
4. (PLO4) Students are expected to make a significant contribution to research in their sub-field and as a result to become integrated into their various professional communities. They will then be in a position to address large scale issues of both National and Global concern.

The information used to assess the accomplishments of the Ph.D. program come from the following examinations that all Ph.D. students need to take as they progress toward their degree. The analysis of the resultant data produced the following observations with regard to each of the PLOs mentioned above:

1. (PLO 1) This outcome was assessed using the Proficiency exams given in Fall 2015 and Winter 2016. The Proficiency exam is the instrument through which the student's skills in the area of software design and development, including data structures, advanced programming skills, and fundamental mathematical constructs are examined. The exam consists of three parts: data structures and algorithms; discrete mathematics; and object-oriented programming skills. While students did well on each of the three parts individually 59% of the students in the Fall 2015 passed all three parts, and only 48% in the Winter 2016. These results both fell below expectations. Our objective for this exam was a 70% passing rate. The results failed to meet our expectations in both semesters.

As a result a three-fold action plan was put in place in the Winter of 2016. Firstly, the Graduate Committee began to use information about the quality of the programs from which a student applicant came from to aid in the student selection process. Secondly, the Graduate Committee assigned a default field and associated Faculty mentor for each incoming student based upon the student's interests. Thirdly, Faculty were asked to contact specific institutions that specialized in producing students with skills that would match their research needs.

It was felt that more careful scrutiny of the incoming class will decrease the attrition in the first year and improve overall Ph.D. graduation rates for the Department. Currently the graduation rate for Ph.D.'s (10-12) for a Faculty of (approximately 22).

2. (PLO 2) This outcome was assessed using the Qualifying exam. The Qualifying exam measures the student's knowledge about the state of the art of their specific sub-discipline. The exam has three parts: a written part; an oral part; and an interactive part where the student fields questions from the Faculty. Each of the sections was graded on a scale from 1 to 5, with 5 representing the highest score. It was expected that students taking the exam must score a 4 or more on the average for each of the three parts. The average score each part in the Fall of 2015 was 4.4, 4.8, and 4.3 respectively while the average score in the Winter 2016 was 4.7, 4.7, and 4.6 respectively.

Not only were our expectations met in both cases, but there was an improvement in performance in the Winter term even though twice as many students took the exam. As a result, no specific action was taken for PLO 2 at this time. However, a joint action was taken regarding PLO 2 and PLO3 as discussed next.

3. (PLO 3) This PLO was assessed using the Ph.D. Prospectus exam. That exam measured the ability of the student to identify problems in their field of interest, and produce a plan in order to solve those problems. The document was assessed based upon 10 criteria. Our expectation was that the average score of the students taking the exam in

any given term will be at least 80%. No students took the exam in the Fall. In the Winter term all of the students taking the exam scored on the average over 80% on all 10 parts. Therefore, our expectation was met and exceeded for this PLO.

As a result, no specific program action was taken as a direct result at that time. What was clear is that students who are able to exhibit the basic skills required for the Ph.D. program at the Proficiency level, continue to do well at later stages in the program. The problem is the Proficiency exam acts more as a barrier to entering the program than a bridge at this time. So while no specific action plan was taken for PLO 2 and PLO 3 the Graduate Committee was asked to monitor the rate of movement of students from one phase to the other in order to collect data that might be used to improve the graduation rate down the road.

4. (PLO 4) This PLO was measured in terms of the Ph.D. Thesis defense. As with the Prospectus exam, there were 10 categories that were used to assess the Thesis and the presentation by the student's committee. The target score for this PLO was again set to 80%. No Ph.D. defenses were held in the Fall terms. However, in the Winter term all of the students scored above 80%, with the lowest score an 86%.

As with PLO 2 and 3, no specific action was taken. However, the fact that few students took the Qualifying, Prospectus, and Defense examinations in terms other than the Winter term suggested some possible lag in student progress once they are in the program. Again, such lags could contribute to the reduced graduation rate for Ph.D.s in the Department.

Therefore, in the Fall of 2016 the Graduate Committee began to closely monitor the time taken by students between exams. The Department has strict limits on the timing in order to encourage graduation in 6 years and steps are being taken to identify those who are not able to meet those expectations. Students who fall behind are contacted by the Department in order to rectify the situation.

In summary, the key issue that was identified during the observation period, from Fall 2015 through Spring/Summer 2016, is that the current graduation rate of Ph.D.s is below expectations for a Full Time Faculty of over 20. Our approach to improve the graduation rate is two-fold. Firstly, we need to better assess the capacity of applicants to succeed in the program on the one hand. As a result the Proficiency exam will be more of a **Bridge** into the program as opposed to a **Barrier**. Secondly, it is important to make sure that those who have the abilities are given the proper guidance and mentorship once they are in the program. This will allow them to graduate within the anticipated period of time, 6 years as suggested by the Graduate School. Actions to support both of these directions have been taken by the Department this past Winter and Fall and their impact will be assessed in the following period, Fall 2016 through Spring/Summer 2017.

With great appreciation for all of our students, and program supporters,

Dr. Robert G. Reynolds, Thaer Jayyousi, Loren Schwiebert (Interim Chair), Stephanie Chastain (advising staff), and Olubukola Akintoroye (student assistant).