Master of Science in Digital Forensics Sam Houston State University

Responses to the Graduate Program Review Report (Review Period: AY15 – 22)

Sam Houston State University Department of Computer Science

Prepared by The DF Self-Study Committee Chair: Dr. Min Kyung An Our MS in DF program was reviewed by the reviewers, Drs. Dampier and Zou, on March 8-9, 2023. The faculty and staff of the Department of Computer Science appreciate the time and effort that the reviewers dedicated to reviewing our program and are grateful for the insightful comments on and valuable improvements to our program. In the following, we address each of the issues and recommendations in the reviewers' report, received on April 24, 2023.

Identified issues by the review committee:

1. Low Student Enrollment in Program: The M.S. program started in 2006, and the number of students enrolled in the program in recent years seems to be low considering its long history. From 2017 to 2022, the number of enrollments stayed relatively unchanged, on average only about 20 students are active during the Spring/Fall semesters (according to Table 1 in program self-study report). When considering that a student normally takes 2 years to finish this Master program, such enrollment means there are only about 10 students entering the program in each academic year. This level of enrollment is not sustainable in the long run. It will be difficult to graduate enough students to maintain the visibility of the program and justify the faculty resource required.

Response 1: While the program has held steady enrollment numbers and acceptance rates with no drastic declines, the committee acknowledged the comment with respect, and has started discussions on strategies to attract new prospective students and convert them into leads for our program.

Our notable action taken was to land an opportunity to have the DF program featured in Newsweek. Our program was invited as one of twelve reputable institutions to be included in Newsweek.com editorial feature for leading cybersecurity programs in the USA. This will be a great opportunity to promote our program on Newsweek.com either nationally or locally. The invitation email from Newsweek is attached at the end of this response report.

Video marketing has a proven impact on admissions and enrollment numbers - 68% of prospective undergrads say that videos were an influence on their final decision [1, 2]. Our department is also in the process of creating marketing videos for our master programs with support from SHSU Online.

The committee will continue discussing the topic in its upcoming meetings in Fall 2023.

2. Low Student Degree Conferred: Because the enrollment is a bit low, in the past five years on average only about 7 students graduated from the M.S. program each year. As said above, this makes it difficult to justify enough faculty to maintain the program. For a mature program, the number of graduates should go up over time.

Response 2: The committee acknowledges the concern, and will explore reasons of low degree

conferrals, and discuss strategies further to increase the number in its upcoming meetings in Fall 2023.

Meantime, the committee was able to observe that majority of students who did not complete their degrees had paused the program of their studies in the process of completing their final course requirement, the master's projects. This is a notable finding, as the graduate curriculum committee has discussed adding a "**Professional Plan**" to the program. The majority demand for the DF program is from individuals who already have full-time jobs in Computing/Security/DF fields or who need master's degrees to expand their knowledge and experience, and to improve their chances of getting promoted or hired for their next career moves. For those students, the research component becomes less important. To meet their needs, the new Coursework plan (Professional plan) has been suggested and the graduate curriculum committee is in discussion for the process of development. No projects are required.

3. Low Course Enrollment: From Table 4 in the self-study report, we can see that many courses in the Master program have a relatively small number of students enrolled in each section. More than half of the courses continuously have less than 20 students enrolled. Although low enrollment can improve education quality by providing more one-by-one mentoring by instructors, it can also mean inefficient usage of teaching resources.

Response 3: According to the National Center for Educational Statistics, the faculty/student ratio 1:16 is recommended in the United States [3]. Also, the faculty/student ratio is one of many factors considered as part of the U.S. News Best Colleges ranking, and among the 1,222 *ranked* colleges/universities that provided their ratios to U.S. News in an annual survey, the average was nearly 1:14 in Fall 2022 [4]. Our program's average faculty/student ratio for the period between Fall 2016 and Spring 2022 is only **1:12.93**, where our students take advantage of the smaller class sizes [5]. Also, please note that our core courses are offered yearly, not by semesters while electives are sometimes offered every other year for efficient usage of teaching resources.

4. No Thesis Option: The Master program does not provide a thesis option for students. Some students may want to pursue research, which should be encouraged. Even online students can do research remotely under the supervision of the program faculty. The addition of a thesis option would enable students to pursue research hours for 20 percent of their program of study, thus enabling fewer sections of courses overall, but also adding the ability for faculty to publish with students based on thesis research results.

Response 4: The committee acknowledges the comment with respect. As stated in the selfstudy report, while the current non-thesis plan requires students to conduct projects, the new Thesis plan has been suggested for those who seek to enter a PhD program. The graduate curriculum committee is currently in the discussion for the process of development. The degree plan with the thesis option will require a more intensive large research project than the current non-thesis (project) plan.

5. Separation between Master and Ph.D. programs: From the Self-study report and program interview, our impression is that the two Master programs (DFSC and IAC) and the Ph.D. program (DCFS) are somewhat separated. In the DCFS Ph.D. program, among 27 regular courses, only 6 courses are 5000-level or 6000-level courses. The other 21 courses are 7000-level courses or dissertation credits, which cannot be taken by students in the Master programs according to the university policy. This course separation will unnecessarily increase the department's teaching load, and also discourage M.S. graduated students from pursuing Ph.D. further. This is exacerbated by the inability of students graduating with the M.S. degree to transfer the full number of hours into the Ph.D. program. This will be explained in more detail in the assessment report for the Ph.D. program.

Response 5: This is responded in the Response Report of DFSC PhD Program Review. The response is re-stated in this report for the reader's convenience: The department has envisioned this concern in the past and is a valid criticism. Here, we present a few issues we have encountered in cross-listing M.S. and Ph.D. courses:

- Our M.S. programs are offered online, and the doctoral program is entirely on campus, which presents an initial hurdle in terms of teaching modalities online, and face-to-face instruction.
- Teaching the same course online and on campus leads to undue burden on the faculty with additional scheduling challenges and teaching load distribution issues.
- The third issue is one of *workload policy*. Doctoral courses are awarded twice the workload as that of a master's course. Enrollment of M.S. students in a doctoral course negates that increased 2x courseload for the doctoral course. This discourages faculty from cross listing these courses.
- There may be an issue of too much cost to offset this problem the department plans to work with the Dean's office, and VPAA, to figure out a solution in the long term for this concern.
- This topic is something the department has put in its 3-year plan and hope to resolve it with time.

Recommendation and next steps

6. Pursue of NSF SFS Scholarship Grant: Since SHSU has obtained CAE-CDE accreditation, we would highly recommend the department and faculty to apply for NSF CyberCorps Scholarship-for-Service grant. This scholarship program allows for students to be given two-year or up to three years full ride scholarships, internships, and full-time jobs upon graduation. This scholarship should enable the program to attract more students and also talented students to apply and enroll.

Response 6: This is responded in the Response Report of DFSC PhD Program Review. The response is re-stated in this report for the reader's convenience: We are pleased to note that the Department of Computer Science has indeed secured the coveted NSF SFS award. The details for the grant is shown below. One Ph.D. student and several M.S. and undergraduate students are starting Fall 2023 thanks to this award.

NSF SFS

Bing Zhou, Cihan Varol, Qingzhong Liu, Narasimha Shashidhar, Min Kyung An Award Number: 2234710 Award Date: 12/14/2022 Award Period of Performance: Start Date: 01/01/2023, End Date: 12/31/2027 Project Title: CyberCorps Scholarship for Service: Interdisciplinary Cybersecurity and Cyber Forensics Education at SHSU. Funding Opportunity: NSF 21-580 CyberCorps (R) Scholarship for Service Total Intended Award Amount: \$2,792,651

7. Increasing Program Student Enrollment: As a long-lasting M.S. program, the program needs to improve its low student enrollment problem, especially in the pure online M.S. program. Possible solutions: get help from university-wide online program office for marketing; contact some educational websites (such as bestcolleges.com, bestvalueschools.org, cybersecuritydegrees.com, cyberdegrees.org, intelligent.com) to include SHSU's M.S. in Digital Forensics in their database by showing its high US News' ranking; contacting alumni to get feedback and brainstorm ideas. We might also recommend engaging with eCAS from Liaison. Marshall University has done this, and our applications for the online MSCS program have increased dramatically.

Response 7: The committee acknowledged the comment with respect and started developing an effective graduate marketing and recruitment plan. Our program will be publicized in Newsweek.com and its marketing videos are being generated with support from SHSU Online (see **Response 1** for more details). The committee will also discuss the potential partnership with eCAS [6] with relevant departments in Fall 2023. The committee continues the discussion on further strategies to increase the number in its upcoming meetings in Fall 2023.

8. Thesis Option: The current MSDF program does not have a thesis option, which is not common among graduate programs in US universities. We strongly recommend adding a thesis option to the program. The thesis option is also a good way to make a student who might want to pursue the Ph.D. after the M.S. have a smooth transition to the Ph.D. program. It will also encourage a master's student to conduct academic research with SHSU faculty, which helps both students and faculty. For a student taking the thesis option, the master's Project course, DFSC6347, can be substituted and expanded to have 6 credit hours to become the thesis course. In other words, a thesis-option student does not need to take DFSC6347 but is required to take

the 6-credit thesis course with the other 8 regular courses to complete the degree requirement.

Response 8: See Response 4.

9. GRE Requirement: Admission to the DFSC master's program requires GRE test scores for most applicants. To improve the number of applications and enrollment, SHSU could consider making the GRE requirement optional. Our experience is that many domestic undergraduate students do not want to take the trouble to participate in GRE test in their senior year. This GRE requirement could prevent those students from applying to the master's program. Many universities are now going GRE test optional.

Response 9: The GRE has been waived since Fall 2020. As it is not a permanent decision to waive, the GRE requirement is still listed in Graduate and Professional Catalog which may have made our program less attractive. The committee will request deletion of the requirement from the catalog.

10. Comprehensive Exam: Make the comprehensive exam required only for students with below B grade in classes. The university's graduate satisfactory GPA grade is B or above, thus there is no real need to make a higher and additional requirement in this master's program for students with B grades.

Response 10: The committee acknowledges the comment with respect. This topic requires feedback from Graduate Curriculum Committee (GCC). We plan to make a final decision in the first GCC meeting in the Fall 2023.

11. More Resource Sharing Among M.S. and Ph.D. Programs: Some similar courses in the M.S. and Ph.D. programs could be merged and be eligible to be taken by both M.S. and Ph.D. students. All courses in the Ph.D. program, like those 7000-level courses, should allow master's students to take and be used as electives to satisfy M.S. program need. This will greatly increase the freedom for M.S. students to choose elective courses they want to take.

Response 11: This is responded in the Response Report of DFSC PhD Program Review. The response is re-stated in this report for the reader's convenience: There are some systemic challenges that prevent us from implementing this suggestion immediately. However, as outlined earlier, we are working on this.

12. Minor Recommended Changes: Change the 'DFSC5317: digital security' course title to be more precise such as 'introduction to cybersecurity', or 'introduction to digital forensics'.

Response 12: The committee acknowledges the comment with respect and will discuss the topic to change the title with the instructors of the course in Fall 2023.

References

[1] International Higher Education Report, <u>https://www.educations.com/read-student-trends-</u> 2019-15494, Accessed: July 12, 2023

[2] Video Marketing Strategies for Higher Education, <u>https://marketing.sfgate.com/blog/video-marketing-strategies-for-higher-education</u>, Accessed: July 12, 2023

[3] College Cliffs, <u>https://collegecliffs.com/frequently-asked-questions/student-faculty-ratio-college-university/</u>, Accessed: July 12, 2023

[4] US News, <u>https://www.usnews.com/education/best-colleges/the-short-list-college/articles/16-colleges-with-the-lowest-student-faculty-ratios</u>, Accessed: July 12, 2023

[5] US News, <u>https://www.usnews.com/news/education-news/articles/2018-11-05/review-of-research-finds-small-benefits-to-small-classes</u>, Accessed: July 12, 2023

[6] EngineeringCAS by LAISON, https://engineeringcas.liaisoncas.org/, Accessed: July 12, 2013

Attachment: Invitation email from Newsweek.com



I look forward to your feedback and any questions you may have.