



March 12, 2019

Dear Dr. Perry,

Thank you for forwarding the results of the external review on DSU's proposal to offer a Ph.D. degree in Cyber Defense. The review, conducted by Dr. Rayford Vaughn on March 15, 2019, recognizes DSU's unique capacity to deliver this degree. We are pleased he acknowledges our record in producing cybersecurity graduates with strong technical backgrounds. His observation of our national reputation in the computing security field is consistent with our belief that the proposal complements our current degree portfolio while creating new paths for graduate students in the field.

The review offers some suggestions that help refine our new degree program and its implementation. Here I will describe how the university will address the recommendations made by Dr. Vaughn.

Clarifying Pathways to Program Entry

The review suggests clarifying language that would outline the path for both bachelor's- and master's-prepared students, as well as paths for the DSU-prepared student and those coming from other institutions.

Dakota State University invites highly motivated individuals with the appropriate educational and professional credentials to apply for our Ph.D. in Cyber Defense. However, we realize that they may arrive to us with some variety of computer or cyber science preparation and experience. Students applying to the program are expected to have established competencies in these five areas:

- Introduction to Cyber Security
- Identity Management
- Network Security
- Software Development
- Cryptography

The Program Admission Committee, comprised of faculty experts within the program, will review each application to determine program readiness. For those students accepted to the program, prerequisite course requirements will be made where necessary to satisfy these competencies. This strategy for requiring foundational courses as needed is also employed for students in several of our other graduate programs, both M.S. and Ph.D.

For applicants with bachelor's degrees, we will require that they complete the DSU M.S. degree in Cyber Defense coursework as they work towards the Ph.D. in Cyber Defense; this will expose them to the pre-requisites. Students applying from other programs and universities may also be required to take prerequisite coursework as recommended by the Program Admission Committee. Master's-prepared students from other institutions must follow SDBOR and DSU policies for transfer of required or elective credit. Students matriculating from a DSU computer or cyber sciences program (MSCD, MSCS) are likely to meet prerequisites to the program in full. While coursework background is a part of the acceptance criteria, it is only one of several criteria we apply in determining the potential and suitability of a student for entry into the program.

Define the "Residency" Requirement

DSU's current doctoral program in Cyber Operations invites students to the DSU campus each year for a four-day, on-campus experience. This 1-credit bearing event held in late March is part coursework, part seminar, part active research. There is heavy student-faculty and student-student interaction over these busy days, which also include a number of dissertation and proposal defenses. The residency event overlaps with DSU's annual Research Symposium and DakotaCon, a cyber-security professional conference which provides several days of the best DSU has to offer. For doctoral students working at a distance, the residency experience is a rich immersion in the DSU university culture, and the discipline of computer science.

Ph.D. students in Cyber Defense will have the same residency opportunity. It will be concurrent with our present residency schedule and involve students in similar ways. We recognize that some students will be unable to attend for genuine reasons, such as military service or family/work obligations. While we highly value and encourage this residency option, students will not be penalized by their inability to attend, and remote access to the residency activities will be available where possible.

Faculty Teaching and Advising Loads

The external review notes that teaching loads appear rather high for a Ph.D.-granting institution. The budget and budget narrative describe a progression of faculty support that adds a half faculty position to the program each year for each of the first four years of its delivery. The increase in faculty is commensurate with the increase in students for each of the first four years of the program's existence, at which time enrollment will stabilize.

As more doctoral students arrive on our campus, along with funded assistantships, some of the teaching load can be moved to young, energetic doctoral students. This leaves highly specialized and seasoned faculty to teach and supervise graduate students. The transition will be gradual, but one that we plan for our growing undergraduate and graduate programs in computing and cyber sciences.

It is important to note that while DSU has had remarkable success in developing and delivering our doctoral programs, we remain a primarily undergraduate STEM institution. We value the access of faculty expertise for the nearly 1,000 undergraduate majors in our computing related majors and consider it part of the value-added experience for DSU undergrads.

As for doctoral dissertations, they represent the best in scholarly work, but are time- and energy-intensive endeavors for both the student and the advising faculty. DSU has guidelines for recognizing dissertation supervision on faculty load, but those guidelines are not uniformly applied. Over the course of the spring and summer 2019, administration and faculty will work

together to refine and systemically implement those guidelines to acknowledge dissertation supervision by chairpersons. Other committee members will not receive similar load adjustments due to broad variations in their participation in the completion of a dissertation.

Courses of an Introductory Nature

We are admonished that any course in a doctoral program should likely not have the word “introductory” in the title. To that end, the so-named courses have been retitled. This change is also reflected in our program proposal.

Prefix	Number	Course Title	Credit Hours	New (yes, no)
INFA	710	Cybersecurity Program Design and Implementation	3	Yes
INFA	715	Data Privacy	3	No

We appreciate the insightful recommendations offered by the external review. We believe that adjustments to the program are appropriately addressed. We are pleased that Dr. Vaughn so highly regards our faculty, programs and institution as to enthusiastically endorse our proposed doctoral program in Cyber Defense. Should you have any additional questions, please feel free to contact me.

Sincerely,



Mark Hawkes, Ph.D.
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Dakota State University