SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS

Intent to Plan for a New Program

UNIVERSITY:	DSU and SDSU
DEGREE(S) AND TITLE OF PROGRAM:	M.S. in Software Engineering
INTENDED DATE OF IMPLEMENTATION:	Fall 2019

University Approval

To the Board of Regents and the Executive Director: I certify that I have read this intent to plan, that I believe it to be accurate, and that it has been evaluated and approved as provided by university policy.

President of the University, Dakota State University   8/20/2018
                                                                  Date

President of the University, South Dakota State University   1/10/2019
                                                                  Date

1. What is the general nature/purpose of the proposed program?

Software engineering is the systematic development and application of techniques leading to the creation of correct and reliable software.[1] It has also been defined as "The application of a systematic, disciplined, quantifiable approach to the development, operation and maintenance of software."[2]

To be sure, there are many layers of computer software, and each requires a specialist in languages specific to that layer. The computer science discipline and the market demand has shifted to include a much greater demand for software engineering.

Most software engineers specialize in a few areas of development, such as networks, operating systems, databases or applications, and each area requires fluency in its own set of computer languages and development environments. Also, most software engineers collaborate with other specialists in development groups all working together to create complex projects.

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[1] Software engineering description at University of Strathclyde, Glasgow, Scotland.
[2] IEEE Standard Gloassary of Software Engineering terminology

These benefits for students in adding the proposed degree pattern include (a) development of excellent analytical skills because they will be required to continually compare needs with software capabilities; (b) familiarity with computer languages in order to effectively work with computer programs, i.e., professional flexibility; (c) the development of formidable feedback and communication skills, avoiding error or miscommunications; (d) capacity to monitor project updates and reported defects in order to manage necessary modifications, i.e., a capacity to shift gears between assigned projects, deadlines and schedules; (e) software engineers must conduct experimental software runs to ensure quality and consistency; (f) in many ways, these graduates must develop an eye for perfection in order to properly direct repairs and revisions of programs; and some software developers will become the primary point of contact with clients and vendors. These are substantial and formidable advantages to students.

South Dakota currently does not produce software engineering graduates of this nature or at this level.

South Dakota will have a working-age population with advanced levels of education needed to support our democracy and the modern, knowledge-based economy; and South Dakota will be a recognized national leader in the use of information technology to enhance its educational, economic, social, scientific, and political development.

Increase the number of master's and doctoral level STEM programs.

Adding a collaborative software engineering M.S. degree at DSU and SDSU is consistent with the board-designated missions of the universities, supports system goals, and will contribute to the state's workforce and economic development as this program aligns nicely with existing and future state workforce needs.

5. **Do any related programs exist at other public universities in South Dakota? If a related program already exists, explain the key differences between the existing programs and the proposed program, as well as the perceived need for adding the proposed new program. Would approval of the proposed new program create opportunities to collaborate with other South Dakota public universities?**[8] *If there are no related programs within the Regental system enter "None."*

The University of South Dakota offers the M.S. (including an accelerated option) in Computer Science with an Informatics specialization. The South Dakota School of Mines and Technology offers the M.S. degree in Computational Science and Robotics (focus on software robotics).

The key differences between these programs and the proposed collaborative program in Software Engineering is that Software Engineering is focused on methodologies, techniques, and the tools used to manage the entire software life cycle. A typical Computer Science degree will focus on principles and use of computers that covers both theory and application.

6. **Do related programs exist at public colleges and universities in Minnesota, North Dakota, Montana, and/or Wyoming?** *If a related program exists, enter the name of the institution and*

Large online universities like Arizona State are reaching into South Dakota and offering more similar degrees than those listed above. Most online master's in software engineering programs are designed for people with an undergraduate degree in computer science, engineering, information technology, or a related field. Some will admit students without a computer degree if they have a programming background.

7. **Are students enrolling in this program expected to be new to the university or redirected from other existing programs at the university?**

The majority of students enrolling in this program are expected to be new to the universities, though some current students in related areas may decide to pursue this more specific major in software engineering. Due to the availability of associate and bachelor's level programs in software development and engineering in the SDBOR system, students will be well-prepared to enter the graduate program and to return to increase their level of education into the future.

8. **What   /estimates for enrollment in the program through the first five years   /estimates for the annual number of graduates from the program after the first five years? Provide an explanation of the methodology the university used in developing these estimates.**

Year 1 – 5: 50 -60 students in the combined program after year 5

	Development/ Start-up	Long-term Operation
Apply for external resources	Yes	Yes
Ask Board to seek new State resources[11]	No	No
Ask Board to approve a new or increased student fee	No	No

DSU has hired several faculty as part of the Sanford/Beacom gift and some of those faculty have the requisite expertise in software engineering to augment the expertise of existing faculty at DSU and SDSU. SDSU plans to fill a currently open position with a software engineer in order to augement existing software engineering personel.

11. **Curriculum Example: Provide (as Appendix A) the curriculum of a similar program at another college or university.** *The Appendix should include required and elective courses in the program. Catalog pages or web materials are acceptable for inclusion.* **Identify the college or university and explain why the selected program is a model for the program under development**.

The attached curriculum in Appendix A is for the Master of Science and Master of Software Engineering from North Dakota State University. The information may be found online at