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| S:\Communications\Logos and photos\SDBORLogos\final_sdbor_webreadyBW_trans.gif | **SOUTH DAKOTA BOARD OF REGENTS**  ACADEMIC AFFAIRS FORMS |
| New Specialization |
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| --- | --- |
| **UNIVERSITY:** | **DSU** |
| **TITLE OF PROPOSED SPECIALIZATION:** | **Cryptography Specialization** |
| **NAME OF DEGREE PROGRAM IN WHICH SPECIALIZATION IS OFFERED:** | **B.S. in Mathematics** |
| **INTENDED DATE OF IMPLEMENTATION:** | **8/3/2018** |
| **PROPOSED CIP CODE:** | **27.0101** |
| **UNIVERSITY DEPARTMENT:** | **College of Arts and Sciences** |
| **UNIVERSITY DIVISION:** | **Mathematics** |

**University Approval**

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

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| C:\Users\slaughts\AppData\Local\Microsoft\Windows\INetCache\Content.Word\Dr. McKay Signature.jpg |  | 5/2/2018 |
| Institutional Approval Signature  *President or Chief Academic Officer of the University* |  | Date |

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1. **Level of the Specialization (*place an “X” in the appropriate box*):**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Baccalaureate |  | Master’s |  | Doctoral |  |

1. **What is the nature/purpose of the proposed specialization?**

Students that complete the Mathematics program with a Cryptography specialization will have the mathematical training and tools to understand and apply cryptographic methods (how to encode and decode private messages). All mathematics majors complete a technology minor and students that complete the Cryptography specialization receive both a Computer Science Minor and a Cyber Operations Minor. Students that wish to earn a double major in Mathematics with a specialization in Cryptography will only need to complete the mathematics component of the specialization (as it is currently in the University Catalog).

1. **Provide a justification for the specialization, including the potential benefits to students and potential workforce demand for those who graduate with the credential.**[[1]](#footnote-1)

The American Mathematical Society has shown that the “Intensity of math competencies in its purest form over time is increasing” ([http://www.ams.org/about-us/governance/committees/ Jaco.pdf](http://www.ams.org/about-us/governance/committees/%20Jaco.pdf)). The mathematics specializations are designed to provide the mathematics training to prepare students for the mathematical career path of their choice; career paths in education (intermediate level or secondary level) and technology (information systems or cryptography).

According to the U.S. Bureau of Labor Statistics there is a projected national job growth (2016 – 2024) for mathematicians of 33%.[[2]](#footnote-2) The Cryptography Specialization is an intensive mathematics program paired with Computer Science and Cyber Operations minors to provide students the analytics background to increase their employability in the competitive Cyber Security and Cryptography job market. According to *Forbes*, the cybersecurity market is expected to grow from $75 billion in 2015 to $170 billion by 2020.[[3]](#footnote-3) ).

1. **List the proposed curriculum for the specialization (including the requirements for completing the major – *highlight courses in the specialization*):**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Pref.** | **Num.** | **Title** | **Cr. Hrs.** | **New**  **(yes, no)** |
| **System Wide General Education Requirement**  (All students are required to take MATH 123 as part of the general education requirements) | | | **30** |  |
|  | | | |  |
| **Mathematics Core Requirements** | | | **12** |  |
| MATH | 201 | Introduction to Discrete Math | 3 | No |
| MATH | 281 | Introduction to Statistics | 3 | No |
| MATH | 315 | Linear Algebra | 3 | No |
| MATH | 316 | Discrete Mathematics | 3 | No |
|  |  |  |  |  |
| **Cryptography Specialization** | | |  |  |
| **Mathematics Component** | | | **25** |  |
| MATH | 125 | Calculus II | 4 | No |
| MATH | 381 | Intro to Probability and Stats | 3-4 | No |
| MATH | 413 | Abstract Algebra I | 3 | No |
| MATH | 436 | Number Theory and Cryptography | 3 | Yes |
| MATH | 437 | Cryptography and Codes | 3 | Yes |
| Choose 9 credits from the following | | | 9 |  |
| MATH | 225 | Calculus III | 4 | No |
| MATH | 318 | Adv. Discrete Mathematics | 3 | No |
| MATH | 321 | Differential Equations | 3-4 |  |
| MATH | 418 | Mathematical Modeling | 3 | No |
| MATH | 471 | Numerical Analysis I | 3 | No |
| MATH | 475 | Operations Research | 3 | No |
| MATH | 492 | Topics | 1-6\* | No |
| MATH | 498 | Undergrad Research/Scholarship | 1-6 | No |
| \*May be repeated provided student does not enroll in the same topics course. | | | |  |
|  | **Computer Science Minor** | | **18** |  |
|  | **Cyber Operations Minor** | | **18** |  |
|  | **Electives** | | **17** |  |
| Total number of hours required for completion of specialization | | | **25** |  |
| Total number of hours required for completion of major | | | **73** |  |
| Total number of hours required for completion of degree | | | **120** |  |

Students obtaining a degree in Computer Science or Cyber Operations need only complete the Mathematics Core (12 cr.) and the Mathematics Component (25 cr.) of the Cryptography Specialization to earn math as a second major.

1. **Delivery Location[[4]](#footnote-4)**

**A. Complete the following charts to indicate if the university seeks authorization to deliver the entire program on campus, at any off-campus location (e.g., UC Sioux Falls, Capital University Center, Black Hills State University-Rapid City, etc.) or deliver the entire program through distance technology (e.g., as an on-line program)?**

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| --- | --- | --- |
|  | **Yes/No** | ***Intended Start Date*** |
| **On campus** | Yes | **Fall 2018** |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Yes/No** | ***If Yes, list location(s)*** | ***Intended Start Date*** |
| **Off campus** | No |  | Choose an item.Choose an item. |

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|  | **Yes/No** | ***If Yes, identify delivery methods[[5]](#footnote-5)*** | ***Intended Start Date*** |
| **Distance Delivery (online/other distance delivery methods)** | No |  |  |

**B. Complete the following chart to indicate if the university seeks authorization to deliver more than 50% but less than 100% of the certificate through distance learning (e.g., as an on-line program)? [[6]](#footnote-6)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Yes/No** | ***If Yes, identify delivery methods*** | ***Intended Start Date*** |
| **Distance Delivery (online/other distance delivery methods)** | No |  | Choose an item.Choose an item. |

1. For workforce related information, please provide data and examples; data sources may include but are not limited to the South Dakota Department of Labor, the US Bureau of Labor Statistics, Regental system dashboards, etc. [↑](#footnote-ref-1)
2. Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Mathematicians and Statisticians, on the Internet at <https://www.bls.gov/ooh/math/mathematicians-and-statisticians.htm> (visited June 6, 2018). [↑](#footnote-ref-2)
3. Steve Morgan, “Cybersecurity Market Reaches $75 Billion in 2015; Expected to Reach $170 Billion by 2020,” *Forbes* (December 20, 2015), on the Internet at <https://www.forbes.com/sites/stevemorgan/2015/12/20/cybersecurity%E2%80%8B-%E2%80%8Bmarket-reaches-75-billion-in-2015%E2%80%8B%E2%80%8B-%E2%80%8Bexpected-to-reach-170-billion-by-2020/#434234fd30d6>) (visited June 6, 2018). [↑](#footnote-ref-3)
4. The Higher Learning Commission (HLC) and Board of Regents policy requires approval for a university to offer programs off-campus and through distance delivery. [↑](#footnote-ref-4)
5. Delivery methods are defined in [AAC Guideline 5.5](https://www.sdbor.edu/administrative-offices/academics/academic-affairs-guidelines/Documents/5_Guidelines/5_5_Guideline.pdf). [↑](#footnote-ref-5)
6. This question responds to HLC definitions for distance delivery. [↑](#footnote-ref-6)