



# Bachelor of Science in Computer Science Self-study Report

April 2024

The Beacom College of Computer and Cyber Sciences

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## **Part 1: Institutional History**

### **1.1 Heritage: 1881 to 1982**

Dakota State University (DSU) was established in 1881 as the first teacher education institution in Dakota Territory. Teacher education remained the primary mission of the institution through the 1950s. However, in response to the changing needs of South Dakota in the 1960s, the university began to expand its role to include degree programs in liberal arts and business. In 1980, South Dakota welcomed a major new industry into the state: the banking and credit card industry. The success and growth of this new industry, as well as the success of other information oriented, computer-based industries in the state, prompted the state's leadership to carefully examine the degree programs offered at the public institutions of higher education within the state.

Throughout its 143 years, Dakota State University has had a proud heritage of preparing graduates to meet the needs of a changing society. Since 1881, the university has provided challenging academic programs in one of the best educational environments in the state. The continuation of this tradition of service is of prime importance to the faculty, students, staff, and administration of DSU.

### **1.2 Mission Change: 1983 to 1984**

In 1984, the Legislature of the State of South Dakota (South Dakota Codified Law §13-59-2.2) assigned Dakota State University the role and mission of developing technology-based degree programs in information systems, business, teacher education, and allied health care services at both the undergraduate and graduate levels. The Legislature provided \$2.6 million in additional operating funds to support a three-year mission change at DSU.

During the initial phase of the transition, the academic programs of the institution were reviewed. Degree programs were phased out if they were duplicated at the other five regental institutions or if graduates would enter an over-supplied marketplace. The South Dakota Board of Regents (SDBOR) approved new information systems programs, computer equipment, and facilities for DSU. During the transition, special attention was given to ensure that all students in programs slated for phase out received a full opportunity to complete those programs. To ensure the continuation of education quality, when the number of students continuing in a program became exceedingly small, a special faculty mentoring program was developed.

The second phase of the transition began in August 1984, with the development of degree programs that integrated computers and information technologies into traditional academic subjects and added coursework specific to the computer and information systems areas. The University hired new faculty and retrained existing faculty.

Realizing that the innovative programs being developed at DSU were expensive, private industry and state government provided the University with additional financial resources. Consultants from state agencies and from national corporations also provided assistance and guidance that contributed greatly to the success of the mission change.



### ***1.2.1 Mission Statement by South Dakota Codified Law §13-59-2.2***

The primary purpose of Dakota State University in Madison is to provide instruction in computer management, computer information systems, electronic data processing, and other related undergraduate and graduate programs. The secondary purpose is to offer two-year, one-year and short courses for application and operator training in the areas authorized by this section.

This authorization includes the preparation of elementary and secondary teachers with emphasis in computer and information processing.

Except for degree programs in existence during the 1983-84 academic year, the unique baccalaureate programs authorized for Dakota State University shall not be duplicated by the Board of Regents.

### ***1.2.2 Mission Statement by South Dakota Board of Regents, Policy 1:10:5***

DSU is a special focus STEM university with an emphasis in computing information technologies and cybersecurity. The South Dakota Board of Regents regards the special focus universities of South Dakota as valuable contributors to the state's system of higher education. Special focus universities have a high concentration of degrees in a single field or set of related fields. Special focus universities offer master's and doctoral programs within their special focus area.

Universities operating within this sector are nationally recognized to promote research activities of their faculty, staff, and students. Dakota State University's research is propelling the workforce, economy, and student experience. The Board of Regents recognizes that special focus universities have unique characteristics and are critical to the success of the South Dakota system of higher education.

Students who attend Dakota State University pursue highly technical degrees with a broad focus in current and emerging computing and information technologies/cyber security that emphasize innovation, leadership, application, and research. DSU has the authority to credential certificates, associate degrees, baccalaureate degrees, master's degrees and doctoral degrees provided formal approval by the Board of Regents. The Board of Regents may authorize academic programs outside of the statutory mission as identified by the Regents due to workforce needs, strategic needs of the state, or other factors.

### ***1.2.3 DSU Institution Mission, Vision, & Values***

**Mission.** DSU's mission is to prepare cyber-savvy graduates who are lifelong learners, problem solvers, innovators, and leaders to live lives of positive purpose and consequence.

**Vision.** Innovative, entrepreneurial, and resilient since 1881, DSU will continue to rise through short - and long-term success of our students and graduates, increased strength in applied research and athletics, and deep engagement with our stakeholders, in an environment infused with quality improvement.

**Values.** DSU adheres to the following values:

- Distinguished and effective teaching
- Integrity
- Clear communication
- Innovation
- Inclusion
- Quality

#### ***1.2.4 Strategic Plan DSU ADVANCE 2027***

Dakota State University's strategic plan begins with its mission, vision, and values that create a framework for University strategic goals. The strategic plan is built on the University's strengths and focuses attention and commitment on the most pressing issues DSU is distinctively positioned to address while seeking to advance student success through highly engaged, high-impact educational practices.

The current Strategic Plan *DSU ADVANCE 2027*<sup>1</sup> began in 2022 and will continue to evolve through 2027 and beyond. The Strategic Plan outlines a path to more direct scholarship, research, intellectual property, and economic development through solutions to all varieties of cyber threats to computing and information devices, networks, and their users. Both foundational goals and the five Pillars further frame actions, resources, and measures.

Foundational goals support strategic goal success:

- Ensure Financial Stability
- Strengthen Regional and National Relevance
- Enhance Ability to Recruit and Retain Talent
- Increase Student Enrollment
- Enhance Student Success
- Maintain Higher Learning Commission Accreditation
- Ensure Responsible Stewardship of State Resources
- Strengthen Risk Management Process

Five Pillars frame the focus of strategic goals and milestones (benchmarks):

- Pillar 1: Increase Student Success
- Pillar 2: Improve Engagement, Governance, & Communication
- Pillar 3: Grow Scholarship, Research, Intellectual Property, & Economic Development
- Pillar 4: Elevate Athletics
- Pillar 5: Increase Sustainability & Resilience

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<sup>1</sup> [DSU ADVANCE Strategic Plan 2022-27](#)

Mission and strategic plan alignment gave DSU its first graduate degree programs when authority was received from the South Dakota Board of Regents to offer a Master of Science in Information Systems (1998). A year later, the Master of Science in Educational Technology was offered on campus (1999). In 2004, DSU received authorization for its first doctoral program, offered in Information Systems. DSU now offers four doctoral degrees, seven master's degrees, and ten graduate certificates. As the institution endeavors to articulate its mission in the fullest way, degree programs are scrutinized each year to ensure they remain on the forefront relative to technology to enhance and support instruction and address work force demands.

DSU currently holds three prestigious designations from the National Security Agency (NSA) and the Department of Homeland Security (DHS) as National Centers of Academic Excellence (CAE) in Cyber Defense, Research, and Cyber Operations. DSU received its first CAE distinction in Information Assurance Education in 2004, one of 50 programs recognized. DSU was named as a National Center of Academic Excellence in Cyber Operations (CAE-CO) in 2012, one of the first four schools to receive the CAE-CO designation for the 2012-2013 academic year. As of December 2023, there are currently 436 institutions with a designation, including CAE-CD, CAE-R, and CAE-CO, from the National Security Agency<sup>2</sup>. There are only 20 institutions which receive CAE-CO designations. DSU is one of only ten universities in the U.S. that holds all three National Security Agency Center for Academic Excellence in Cybersecurity Designations in Cyber Operations, Cyber Defense, and Cyber Research (CAE-CO, CAE-CD, and CAE-R).

### **1.3 DSU Initiatives**

#### ***1.3.1 DSU Rising Initiative***

In 2017, Dakota State University began a transformational five-year capital investment initiative called DSU Rising. The initiative was the result of a \$30 million donation from philanthropists Miles and Lisa Beacom and Denny T. Sanford. The donation allowed for the construction of an \$18 million, 40,000 square foot research and development building for the Madison Cyber Labs (MadLabs). The funds also provided for additional scholarships, new program development, hiring of more faculty and staff, and support the university's intent to bring 5G network capabilities to Madison, the region, state, and eventually the nation.

#### ***1.3.2 DSU Rising II***

The DSU Rising II project (2022) created a funding consortium to provide \$90 million to fund new components to the cyber research and education environment: a 100,000 square foot facility to house the expanded DSU Applied Research Lab (ARL) in Sioux Falls, S.D., the support required to double the DSU cyber graduates, authority to expand DSU ARL Management and Security, to expand merit based student scholarships in cyber education, and to launch the Governor's Cyber Academy (a statewide K-12 cyber education program).

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<sup>2</sup> [CAE Institution Map](#)

## **1.4 University Student Demographics**

The total headcount for Fall 2023 was 3,509, an 8.3% increase from 3,241 in Fall 2022. The number of graduate students for Fall 2023 was 558, an increase of over 15% from Fall 2022. Section 4.2 contains additional demographic information that contains a breakdown of students by gender and ethnicity for the BSCS program, The Beacom College, and the University.

## **1.5 Computing Environment Changes**

Students at DSU enjoy unique access to technology. In 2005, all students were provided fully functional portable computers (tablets) that included digital inking capabilities and voice-to-text translation. Currently, DSU provides students with the latest Lenovo ThinkPad X1 Yoga, a 2-in-1 Laptop configured specifically for DSU academic programs.

For degree programs emphasizing information assurance, security issues, and digital design, additional lab facilities featuring computers with high end functionality have been added to the campus technology infrastructure.

## **1.6 Accreditation History**

Dakota State University is accredited by the Higher Learning Commission (HLC), founded in 1895, and is one of several institutional accreditors in the United States. HLC accreditation indicates that DSU has the standards, processes, and assurance that it delivers quality educational experiences. DSU must meet 18 core components within the five HLC Criteria for Accreditation.

The University completes periodic reviews for reaffirmation of accreditation through HLC's Open Pathway, a ten-year cycle with an assurance review in year four and a comprehensive evaluation in year ten. The Open Pathway also includes an improvement component, the Quality Initiative, between years four and ten, that provides DSU the opportunity to pursue improvement projects that meet institutional needs.

The institution's most recent comprehensive visit, in October 2018, resulted in a positive review without any requirement for monitoring reports. In October 2022, DSU also met all 18 core components during its mid-cycle assurance review.

## **1.7 College Mission – The Beacom College of Computer and Cyber Sciences**

The mission of The Beacom College of Computer and Cyber Sciences is to educate and prepare students to be lifelong learners and professionals in Computer and Cyber Sciences. We seek to challenge students to develop skills in computer and cyber sciences, to think logically, and to make sound decisions through our five major academic programs: Artificial Intelligence, Computer Game Design, Computer Science, Cyber Operations, and Network and Security Administration.

Aligned with its mission, The Beacom College offers Ph.D.'s in Cyber Operations, Cyber Defense, and Computer Science; master's degrees in Computer Science and Cyber Defense; and baccalaureate degrees in Artificial Intelligence, Computer Game Design, Computer Science,

Cyber Operations and Network and Security Administration. Also, the college offers an Associate of Science degree in Network and Security Administration and Software Development which articulates with the related four-year degree.

In addition to course work in the academic setting, The Beacom College provides opportunities for students to learn through work and consulting experience. Internships and supervised professional practices are available in most programs.

### **1.8 History of the BS Computer Science Degree at DSU**

The Bachelor of Science in Computer Science (BSCS) program at Dakota State University (DSU) has been in existence since 1989.

- **1989:** The BSCS program began within the College of Business and Information Systems (BIS).
- **2015:** The South Dakota Board of Regents (SDBOR) approved to restructure the College of BIS under two colleges: College of BIS and College of Computing. The College of Computing offered degrees in Computer Science, Game Design, Cyber Operations, and Network and Security Administration.
- **2017:** The College of Computing was renamed the Beacom of Computer and Cyber Sciences (The Beacom College).

The following changes have been made or are in progress:

- In the AY2022-2023, an ABET Taskforce conducted an institutional self-study of the BSCS program. The Taskforce examined the BSCS program in accordance with ABET CAC accreditation criteria, developed, and documented formal processes for ABET CAC accreditation.
- An Assessment Committee was established in The Beacom College in August 2023. The Assessment Committee oversees program accreditation.
- The BSCS program is currently conducting a full cycle of assessment in AY2023-2024. The assessment data will be ready for review in our self-study report.
- The Beacom College is hiring multiple tenure-track and full-time (9 month) faculty positions for AY2023-2024 due to unprecedented growth.

### **1.9 Prior Institutional Review of the Computer Science Program**

The last institutional review for the Bachelor of Science in Computer Science (BSCS) was conducted in Spring 2016. The reviewer found that the overall quality of the BSCS was outstanding.

#### **2016 Strengths**

- the option for students to complete the BSCS degree on campus or online, with blended classes that allow all students to interact
- connections to industry with jobs, guest presentations, and career fairs

- deep and meaningful relationships between students and faculty
- outreach to K-12 students
- the strong national reputation of DSU programs in The Beacom College

## 2016 Opportunities for Improvement

Table 1 details issues that were identified in the last BSCS program review and actions taken to address those issues.

Issue to be Addressed	Action(s) to Address Issue
Unprecedented growth in The Beacom College has outpaced the capacity of faculty to deliver computer science and related program courses.	The Beacom College has hired and continues to seek to hire multiple tenure-track, term, and adjunct faculty each academic year.
The BSCS program at DSU should seek ABET accreditation.	A Program Readiness Review Report for ABET CAC Accreditation was submitted in Fall 2023.
Formalize the process for onboarding and guiding graduate assistants (GAs) and adjuncts as they teach computer science courses with standard curriculum	<ul style="list-style-type: none"> <li>• Faculty leads have been assigned to each course to provide mentors, objectives, and guidance to new faculty.</li> <li>• The DSU Center for Teaching and Learning (CTL) was created to help with onboarding and faculty development.</li> </ul>
Provide well-designed facilities to meet the growing needs of The Beacom College academic programs.	The new, 31,300 square foot, \$11.4 million Beacom Institute of Technology building was opened for classes in 2017 and was specifically designed to meet the needs of students in the tech-intensive programs in The Beacom College.
Work with the DSU Foundation to provide support for endowed scholarships and faculty positions.	The DSU Rising and DSU Rising II Initiatives provide funding for additional scholarships and faculty positions.
Revise the computer science program assessment process to align with ABET accreditation.	<ul style="list-style-type: none"> <li>• An Assessment Committee was formed within The Beacom College.</li> <li>• A Program Readiness Review Report for ABET CAC Accreditation was submitted in Fall 2023.</li> <li>• An official Assessment Coordinator for The Beacom College was designated in Fall 2023.</li> </ul>

*Table 1. Issues from the Previous Program Review with Corresponding Actions*

## Part 2: Trends in the Discipline

### 2.1 International Trends

International trends in computer science continue to evolve rapidly and impact a wide array of industries with new tools and innovations. International trends in computer science include but are not limited to:

- **Artificial Intelligence (AI) and Machine Learning (ML)** AI has already grown exponentially as more, highly specialized AI tools and platforms become available to users, companies, and researchers. The market size of AI was valued at \$196.63 billion USD globally in 2023 and current projections from Grand View Research indicate a compound annual growth rate (CAGR) of 37.3% through the year 2030<sup>3</sup>.
- **Quantum Computing** Quantum computing is capable of solving complex problems faster than what can be accomplished with traditional computers. The market size of enterprise quantum computing was estimated to be \$3.83 billion in 2023 and is expected to grow to over \$10 billion in 2028 with a CAGR of 29.7%<sup>4</sup>.
- **Cybersecurity** As more companies, organizations, and users continue to rely on technology, protecting data, systems and user credentials is essential. Cybersecurity is projected to grow from \$172 billion to \$425 billion from 2023 to 2030, which equates to a 13.8% CAGR<sup>5</sup>.
- **Cloud and Edge Computing** Organizations are increasingly turning to cloud computing to increase efficiency and scalability of IT systems. The market size of the global cloud computing is projected to increase in value from \$678 billion in 2023 to over \$2,432 billion by 2030. That is a CAGR of 20.0% over the seven-year period. North America accounted for slightly over 70% of the global market share of cloud computing<sup>6</sup>. Edge computing is a form of cloud computing that reduces latency by processing and storing data as close as geographically possible to IoT and other devices. Edge computing also has the benefit of minimizing bandwidth usage. The market size of edge computing is forecasted to grow from \$53.6 billion in 2023 to \$111.3 billion by 2028 with a CAGR of 15.7%<sup>7</sup>.

### 2.2 National and Regional Trends

The national and regional trends in computer science mirror the same major topics described in the section on international trends, including the increasing utilization of Artificial Intelligence and Machine Learning, enhancing Cybersecurity, and the expansion of Cloud and Edge

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<sup>3</sup> [Artificial Intelligence Market Size & Trends - Grand View Research](#)

<sup>4</sup> [Enterprise Quantum Computing Global Market Report 2024 - The Business Research Company](#)

<sup>5</sup> [Cyber Security Market Size, Share & Growth | Forecast - Fortune Business Insights](#)

<sup>6</sup> [Cloud Computing Market Size - Fortune Business Insights](#)

<sup>7</sup> [Edge Computing Market Size - MarketsandMarkets](#)

Computing. However, there are additional trends in the computer science discipline that are more specific to the country and the region:

- **Internet of Things (IoT) Connectivity** The number of sensors and devices that collect and analyze data for making decisions and automating tasks continues to expand and influence processes in business, health care, manufacturing, and many other industries.
- **Diversity and Inclusion Initiatives** Many companies, organizations, and universities have initiatives to increase diversity in computer science and related fields. Such initiatives are aimed at increasing the inclusion of females and racial minorities that have expertise and work in areas related to computer science.

### 2.3 University Response to Trends

In addition to curriculum implications described in the next section, DSU and The Beacom College strive to acknowledge and address the trends in the computer science discipline. Three trends and how the trends are being addressed are listed below:

- **Quantum Computing** The President of DSU, Dr. José-Marie Griffiths, testified on Senate Bill 45 (SB45) to the South Dakota Legislature Joint Committee on Appropriations in January 2024. SB45 allocates approximately \$6 million to establish a new Center for Quantum Information Science and Technology (C-QIST). The C-QIST will be a collaboration with DSU and three other public universities in South Dakota: South Dakota School of Mines & Technology, South Dakota State University, and the University of South Dakota. The funding will be used to hire faculty and graduate students, gain access to resources for quantum computing, and host an annual symposium to showcase research that can be conducted with quantum computing resources<sup>8</sup>. Governor Noem signed the bill into law on DSU's campus on March 13, 2024<sup>9</sup>
- **Diversity and Inclusion** CybHER® was created at DSU to empower, motivate, educate, and change the perception of girls and women in cybersecurity. It seeks to inspire females in middle school through higher education to pursue careers in cybersecurity and closely related technological academic programs. CybHER® primarily promotes STEM for females but is open to everyone<sup>10</sup>.

### 2.4 Curriculum Implications

The curriculum for the BSCS program changed significantly in response to global and national trends since the previous program review. To educate students about the growing trends in computer science, the optional Artificial Intelligence/Machine Learning and Software Engineering specializations were added in AY2019-2020. Additional information about the courses required for the specializations can be found in sections 3.6.4 and 3.6.5. Students who do

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<sup>8</sup> [South Dakota Proposes Center for Quantum Information Science & Technology - The Quantum Insider](#)

<sup>9</sup> [Gov. Noem Signs Bill to Fund Center for Quantum Information Science and Technology into Law](#)

<sup>10</sup> [Mission & Founders - CybHer®](#)



not pursue the optional AI/ML specialization can still learn about AI/ML by using any of the 9 credits of major electives to take courses related to AI.

To further address the rise of AI, The Beacom College began offering a BS in Artificial Intelligence in Fall 2021. The Learning Outcomes for the BS Artificial Intelligence degree program are to perform data analysis on various datasets, use well-known AI algorithms to develop software, identify appropriate use of different algorithms in AI, and to analyze ethical considerations that pertain to the use of AI<sup>11</sup>.

## **2.5 Program Limitations Relative to Trends**

Currently the major limitation of the BSCS program at DSU is the ability to grow and retain the computer science faculty and related faculty in the other programs in The Beacom College to match the growth in enrollment. As of February 2024, The Beacom College has hired ten new faculty positions to start in Fall 2024. More information about the newly hired faculty is presented in **Part 5: Faculty Credentials**.

There are still three open tenure-track positions and two open instructor positions, all of which are expected to be filled in Spring 2024.

The geographic location of DSU's campus presents challenges for attracting potential on-campus students from all over the country. Physical and other financial resources are adequate and reflect the mission of the university.

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<sup>11</sup> [Artificial Intelligence \(BS\) - Dakota State University](#)

## Part 3: Academic Programs and Curriculum

### 3.1 Mission Statement for the BSCS Program

Graduates with a Bachelor of Science in Computer Science have a strong background in both the theoretical and applied areas of computer science. This program stresses the technical and conceptual development of computer programs and systems.

Each graduate has an understanding of software development, operating systems, algorithms, data structures, as well as the opportunity to take advanced courses in various areas of computer science such as artificial intelligence and parallel programming. Students in this program may be eligible for the Fast Track (4+1) Program<sup>12</sup>.

### 3.2 Admission Requirements

For admission to baccalaureate degree programs at DSU, high school graduates must either meet the Smarter Balanced or Curriculum required outlined below:

#### 3.2.1 Smarter Balanced

- Achieve a Level 3 or higher on the English Language Arts and Mathematics Smarter Balanced Assessment.

#### 3.2.2 Curriculum Requirements for Admission

- Meet the minimum course requirements with an average grade of C (2.0 on a 4.0 scale); OR
- Demonstrate appropriate competencies in discipline areas where course requirements have not been met; AND
- Rank in the top 60% of their high school graduating class; OR
- Obtain an ACT composite score of 18 (Redesigned SAT score of 950, or concorded equivalent for older SAT scores) or above.
- Obtain a high school GPA of at least 2.6 on a 4.0 scale.

#### 3.2.3 Minimum Course Requirements

All baccalaureate or general studies students under twenty-four (24) years of age, including students transferring with fewer than twenty-four (24) credit hours, must meet the following minimum high school course requirements.

- Four (4) years of English - Courses with major emphasis upon grammar, composition, or literary analysis. One (1) year of debate instruction may be included to meet this requirement.

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<sup>12</sup> [Fast Track \(4+1\) Programs](#)

- Three (3) years of Advanced Mathematics - Algebra, geometry, trigonometry, or other advanced mathematics including accelerated or honors mathematics (algebra) provided at the 8th grade level; not included are arithmetic, business, consumer or general mathematics or other similar courses.
- Three (3) years of Laboratory Science - Courses in biology, chemistry, or physics in which at least one (1) regular laboratory period is scheduled each week. Accelerated or honors science (biology, physics, or chemistry) provided in the 8th grade shall be accepted. Qualifying physical science or earth science courses (with lab) shall be decided on a case-by-case basis.
- Three (3) years of Social Studies - History, economics, sociology, geography, government, including U.S. and South Dakota, American Problems, etc.
- One (1) year of Fine Arts - Art, Theatre, or music (appreciation, analysis, or performance.) Documented evidence of high school level non-credit fine arts activity will be accepted for students graduating from high schools in states that do not require completion of courses in fine arts for graduation.

### ***3.2.4 Alternative Criteria for Minimum Course Requirements***

Students who do not successfully complete four (4) years of English may meet minimum course requirements through one of the following:

- An ACT English sub test score of 18 or above.
- An Advanced Placement Language and Composition, or Literature and Composition score of 3 or above.

Students who do not successfully complete three (3) years of advanced mathematics may meet minimum course requirements through one of the following:

- An ACT mathematics sub test score of 20 or above.
- An Advanced Placement Calculus AB or Calculus BC score of 3 or above.

Students who do not successfully complete three (3) years of laboratory science may meet minimum course requirements through one of the following:

- An ACT science reasoning sub test score of 17 or above.
- An Advanced Placement Biology, Chemistry, or Physics B score of 3 or above.

Students who do not successfully complete three (3) years of social studies may meet minimum course requirements through one of the following:

- An ACT social studies/reading sub test score of 17 or above.
- An Advanced Placement Microeconomics, Macroeconomics, Comparative or United States Government and Policies, European or United States History, or Psychology score of 3 or above.
- An Advanced Placement History of Art, Studio Art drawing or general portfolio or Music Theory score of 3 or above.

### **3.2.5 Transfer Credits**

Dakota State University adheres to SD Board of Regents policies regarding transfer of credits and the determination of course equivalencies as they apply to the student's declared program of study:

- SDBOR Policy 2.2.2.1 Seamless Transfer of Credit<sup>13</sup>
- SDBOR Academic Affairs Council (AAC) Guideline 2.2.2.5.A<sup>14</sup> (Credit by Examination)
- SDBOR Academic Affairs Council (AAC) Guideline 2.2.1.A<sup>15</sup> (Mathematics Placement)
- SDBOR Academic Affairs Council (AAC) Guideline 2.2.1.B<sup>16</sup> (English Placement)
- SDBOR Academic Affairs Council (AAC) Guideline 2.2.2.5.A(3)<sup>17</sup> (Advanced Placement Guidelines)

#### **Students who transfer to Baccalaureate Programs.**

- Students who are under the age of twenty-four (24) at the start of the term and who are transferring into baccalaureate degree programs with fewer than 24 transfer credit hours must meet the baccalaureate degree admission requirements.
- Students with 24 or more transfer credit hours with a cumulative GPA of at least 2.0 may transfer into baccalaureate degree programs.
- Specific degree programs may include additional admissions requirements.

#### **Students from Non-Regental Accredited Colleges and Universities.**

- Students may be accepted by transfer from other non-Regental universities outside of the SD system. Preferential consideration shall be given to applicants from institutions which are accredited by their respective regional accrediting associations. Advanced standing shall be allowed within the framework of existing rules of each college.

#### **Students from Non-Accredited Colleges.**

- A university is not required to accept credits from a non-accredited college of university. The university may admit the applicant on a provisional basis and provide a means for the evaluation of some or all of the credits. Credits from colleges or universities which are not accredited by a regional accrediting association may be considered for transfer, subject to all other provisions in BOR Policy 2.5 and any conditions for validation which may be prescribed by the accrediting institution. The validation period for credit from a non-accredited

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<sup>13</sup> [SDBOR Policy 2.2.2.1 Seamless Transfer of Credit](#)

<sup>14</sup> [SDBOR AAC Guideline 2.2.2.5.A Credit by Examination](#)

<sup>15</sup> [SDBOR AAC Guideline 2.2.1.A Mathematics Placement](#)

<sup>16</sup> [SDBOR AAC Guideline 2.2.1.B English Placement](#)

<sup>17</sup> [SDBOR AAC Guideline 2.2.2.5.A\(3\) Advanced Placement Guidelines](#)

institution shall be no less than one (1) semester and no longer than one academic year.

In practice, students who express interest in DSU programs to the admissions staff may provide documentation of prior course work attempted to learn of course equivalencies and remaining degree requirements prior to their initial decision to apply to DSU. These evaluations are completed by the transfer evaluation staff in the Registrar's Office. For course work not previously evaluated and equated, the evaluation staff will share course descriptions with appropriate faculty and seek their guidance on course equivalencies. These decisions are then noted on the initial transfer course evaluation which is shared with the students and subsequently their advisors if the students decide to apply to DSU.

Once accepted, students are placed into appropriate math and English courses on the basis of prior course work completed, high school GPA and/or ACT scores. Students placed below the general education level are provided with remedial course work options or placement testing options. Students who have obtained background and/or knowledge that did not result in transferrable credit may seek options through College Level Examination Program, credit by exam at the department level or through prior learning credit.

### 3.3 Grading Policies

#### 3.3.1 Course Grades

Course grades are issued to BSCS students according to SDBOR Policy 2.8.1<sup>18</sup>. Undergraduate grades will be assigned to the undergraduate academic level and to all courses and sections with course numbers ranging from 001 to 499. Plus and minus grades are not used. Table 2 lists the letter symbols that indicate the quality of student academic achievement in courses at DSU and The Beacom College.

Letter	Grade Meaning	GPA Implication
A	Exceptional	4.00 grade points per semester hour
B	Above Average	3.00 grade points per semester hour
C	Average	2.00 grade points per semester hour
D	Lowest Passing Grade	1.00 grade points per semester hour
F	Failure	0.00 grade points per semester hour
S	Satisfactory	Does not calculate into any GPA
U	Unsatisfactory	Does not calculate into any GPA
RI	Incomplete (Remedial)	Does not calculate into any GPA
RS	Satisfactory (Remedial)	Does not calculate into any GPA
RU	Unsatisfactory (Remedial)	Does not calculate into any GPA
W	Withdrawal	Does not calculate into any GPA, no credit granted
WD	Withdrawal (First 6 courses)	Does not calculate into any GPA, no credit granted

<sup>18</sup> [SDBOR Policy 2.8.1 Grades and Use of Grade Point Averages \(GPA\)](#)

Letter	Grade Meaning	GPA Implication
WW	Withdrawal (all courses in a term)	Does not calculate into any GPA, no credit granted
WFL	Withdrawal (7th course or higher)	0.0 grade points per semester hour
SP	Satisfactory Progress	Does not calculate into any GPA
AU	Audit	Does not calculate into any GPA
I	Incomplete	Does not calculate into any GPA
IP	In Progress	Does not calculate into any GPA
EX	Credit by Exam	Does not calculate into any GPA
CR	Credit	Does not calculate into any GPA
TR	Transcripted	Does not calculate into any GPA, no credit granted
LR	Lab grade linked to Recitation Grade	0 credit course
NG	No grade - used for registration tracking courses	0 credit tracking course
NR	Grade not reported by instructor	Does not calculate into any GPA
*	Academic Amnesty	Does not calculate in any GPA, no credit given

*Table 2. Letter Grades Used at DSU and The Beacom College*

### **3.3.2 Grade Point Average Definition**

The following grade point averages are calculated each academic term (Fall, Spring, and Summer).

- **Institutional GPA** - based on credits earned at a specific Regental university. Utilized to determine if degree requirements have been met and to determine Honors Designation at graduation.
- **System Term GPA** - based on credits earned at any of the six Regental universities within a given academic term (Fall, Spring, Summer). Utilized to determine minimum progression status.
- **Transfer GPA** - based on credits earned and officially transferred from an accredited college or university outside the Regental system. When a letter grade that normally calculates into the grade point average exists for a non-academic course (e.g. credit earned via examination), it will be included in the transfer GPA.
- **Cumulative GPA** - based on all credits earned by the student (transfer credit plus system credit). Utilized to determine minimum progression status and to determine if degree requirements have been met and to determine Honors Designation at graduation.

When a course has been repeated for credit, all attempts will be entered on the transcript, but the last grade earned will be used in the calculation of the cumulative grade point average.

### **3.3.3 Grade Point Average Calculation**

Any course in which a grade of A, B, C, D, or F is earned is used to calculate the grade point average. Each grade is worth a specific number of honor points: A=4, B=3, C=2, D=1, F=0. The number of honor points earned for each class is computed by multiplying the points given for the letter grade by the hours of credit in the course. The total number of honor points earned is then

divided by the total number of credit hours attempted (includes only those classes in which grades of A, B, C, D, F were earned). The result is the cumulative grade point average.

### ***3.3.4 Academic Probation/Suspension***

**Minimum Progression Standards.** Minimum progression standards and related actions are based on the student's cumulative grade point average and system term grade point average.

- **Good Academic Standing:** A student who meets or exceeds the cumulative grade point average requirements as listed below is considered to be in good academic standing. The Academic Standing process is completed at the end of the Spring term. The required GPAs are based on credit hour completion. Students who have taken more credit hours are expected to meet a higher GPA standard.
  - 0 to 44.9 credits                      1.8 GPA needed for Good Academic Standing
  - 45 credits or more                      2.0 GPA needed for Good Academic Standing
- **Academic Probation:** If a student's cumulative grade point average falls below the GPA standard for his/her designated class rank as listed at the end of the Spring academic term, the student is placed on academic probation for the following term.

While on academic probation the student must earn a system grade point average that meets or exceeds the GPA standard required. During this period, the student's academic success team is expected to monitor and meet with the student to best position him or her for success.

When a student on academic probation achieves a cumulative grade point average that meets or exceeds the GPA standard, the student is returned to good academic standing.

- **Academic Suspension:** A student on academic probation who fails to maintain a term and/or cumulative grade point average that meets or exceeds the GPA standard required by the next Academic Standing process is placed on academic suspension for a minimum of two academic terms.

A student on academic suspension will not be allowed to enroll for any coursework at any Regental university except when an appeal has been approved by the Regental university from which the student is pursuing a degree. An approved appeal granted by one Regental university will be honored by all Regental universities. (Also refer to BOR Policy 2.2.1, Section C.9.7 Students on Probation/Suspension<sup>19</sup>)

Only academic suspension will be entered on the student's transcript. Academic probation will be noted in the internal academic record only.

Students enrolled in the Regental system for the first time with prior credit, including

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<sup>19</sup> [SDBOR Policy 2.2.1 System Undergraduate Admissions](#)

internal and external transfer students and dual credit students, shall not be placed on probation by their designated home institution until they have been enrolled at a Regental university for one (1) academic term.

- **Readmission:** A student placed on academic suspension may re-enroll only upon successful petition for readmission to the Academic Appeals Committee. The expectation of the university is that a student placed on academic suspension will sit out at least two academic terms. However, the Academic Appeals Committee is empowered to grant immediate reinstatement. Students readmitted from academic suspension enter on academic probation unless they have completed coursework, at another institution, which moves their cumulative GPA above the 2.0 minimum requirement. Students which the committee recommends for readmission must maintain 100 percent class attendance. Classes missed as a result of illness or emergency circumstances must be reported to his/her instructors at the first opportunity. Students who maintain less than regular class attendance will be administratively suspended. The committee may also specify the courses to be taken and the maximum number of credit hours to be carried by the student during the first semester of readmission.

When petitioning for readmission from academic suspension, the burden of proof rests with the student. The student will be given an appeal hearing if he or she can demonstrate extenuating circumstances that had significant, negative impact upon the student's ability to study, attend classes, and complete assignments. At the committee meeting, the student will be expected to 1) candidly discuss the circumstances that contributed to the academic suspension, 2) provide a plan for overcoming any obstacles to future academic success, 3) demonstrate a firm commitment to repairing your academic record, and 4) provide documentation in support of all claims of extenuation. The burden of proof rests upon the student, not with the committee. Therefore, the student should be prepared to answer any/all questions committee members might have at this meeting, and to offer documentation in support of all important claims of extenuation.

A student who has been readmitted on academic probation from academic suspension and who does not maintain good academic standing may not petition for immediate reinstatement.

## **3.4 Advising and Career Guidance**

### ***3.4.1 Academic Advising***

Each admitted undergraduate student at DSU is assigned to a professional advisor in the Academic Support Services for two academic years. If a student meets specific benchmarks, such as completing a minimum of 45 credits, maintaining a minimum 2.4 GPA, and being in good academic standing, the student will transition to faculty advisors at the end of two academic years.



Academic advisors serve as the primary point of contact for students during their time at DSU. Advisors work with each student on transitioning into and through the university, which includes, but is not limited to:

- establishing a strong academic foundation
- setting academic, career, and professional goals
- selecting courses for upcoming semesters
- creating a four-year graduation plan
- improving study skills
- offering referrals to campus resources
- fostering connections within the campus community

Online computer science students start and stay with an online professional advisor. TrojanConnect, a mobile and web application, is used to connect students with resources like advising, tutoring, and counseling available on campus.

### ***3.4.2 Career Guidance***

DSU Career & Professional Development offers a variety of services, events, and resources to elevate the student's opportunity for employment upon graduation.

- **Services:** resume building/reviews, internship search, mock interviews, full-time job search and more.
- **Events:** Career & Internship Fairs, Employer Information Sessions, On-campus, and Virtual Interviews, and Employer Lunch & Learns.
- **Resources:** Resumation – resume building tool, Cover letter contents, On-line Workshops, Dressing for Success, Salary Negotiations, Interview Guides, LinkedIn Learning, LinkedIn Profile Guide and more.

Handshake, an online career management system, is available for students and alumni to utilize when searching for jobs and internships. All students have Handshake profiles upon registering for classes at DSU.

Through utilization of the services, events, and many resources, DSU is fortunate to see students in its undergraduate and graduate programs find success when searching for full-time employment. The placement rates were 99.7% for students who graduated in 2022.

### **3.5 Graduation Requirements**

A student who successfully completes the computer science graduation requirements is awarded the degree of Bachelor of Science in Computer Science. DSU Registrar's Office conducts degree evaluation to ensure each graduate completes all graduation requirements for the computer science program.

### ***3.5.1 Application for Graduation***

Each candidate for graduation, including students completing course work off-campus, must apply formally to the Registrar by the deadline specified in the academic calendar. Failure to meet the required deadline results in the degree confirmation at a later graduation date. The graduation application process is completed online through the student's Self Service Banner account. (see SDBOR Policy 2.6.2 Awarding of Degrees, Graduation Dates, and Catalog of Graduation<sup>20</sup>)

### ***3.5.2 Minimum Graduation GPA Standards***

To be awarded a baccalaureate degree, an associate degree, or a certificate, a student must at a minimum have a cumulative GPA of 2.0 or higher. With Board approval, additional requirements, including more specific GPA requirements, may be established for some programmatic offerings and these must be met.

### ***3.5.3 Degree Residency Requirements***

Dakota State University has residency requirements for baccalaureate majors, minors, and associate degrees in order to assess, test, and observe students' learning and acquisition of academic skills. A credit in residence within the Board of Regents system is a course offered by any of the degree-granting Regental institutions at any approved site using any approved method of delivery. An institutional credit is a credit offered by the degree granting institution and includes credits that are part of a formal collaborative agreement between that institution and another Regental institution. Credit earned for college level courses by validation methods such as Credit by Exam, CLEP, AP, portfolio, etc. within the Regental system will not be considered "credits in residence."

### ***3.5.4 Institutional Credit Requirements for Degree-Seeking Students***

Minimum number of credit hours that must be earned from the institution granting the degree:

- a. Baccalaureate 30 hours
- b. Associate 15 hours

Number of the last credit hours earned preceding completion of the degree that must be earned from the institution granting the degree:

- a. Baccalaureate 15 of the last 30 hours
- b. Associate 8 of the last 15 hours

Minimum number of credit hours specified in the major or minor requirements that must be completed at the degree granting institution: 50 percent. However, this requirement may be

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<sup>20</sup> SDBOR Policy 2.6.2 Awarding of Degrees, Graduation Dates, and Catalog of Graduation

waived for students enrolled in the set of majors offered at the system's Centers which include the established programs of study common courses offered by one of the other Regental universities. In addition, the Vice President for Academic Affairs may make exceptions to this requirement for individuals based on the student's prior learning experiences.

Degree seeking students may complete requirements for a minor at any Regental university that has been approved to grant that minor. This minor will be recorded on the transcript in conjunction with a degree/major at that university or a degree/major at any other Regental university. A minor will only be recorded on the transcript in conjunction with a degree and major.

Student course loan status is based on the number of credit hours for which a student is enrolled.

- ½ Time status            6 credit hours minimum
- ¾ Time status            9 credit hours minimum
- Full Time Status        12 or more credit hours
- Overload Status        19 or more credit hours

To be eligible for overload status, a student must have a 2.70 cumulative grade point average and approval by the Dean of the student's division/college at the home institution.

### ***3.5.5 Program Requirements***

Students who are admitted to Dakota State University are required to declare a major in an academic discipline. Some degree programs require students to seek formal admission to the program.

Candidates for graduation must successfully fulfill all program requirements. A baccalaureate degree requires completing at least 120 semester hours of credit. An associate degree requires completion of the semester hours specified for that program.

A student must have earned both cumulative and major grade point averages of at least 2.00. Certain degree programs have higher grade point averages. Academic Skills (Pre-General Education) courses such as MATH 095 and ENGL 033 do not count toward graduation and are not calculated in hours completed or grade point average.

Returning DSU students, who did not graduate from DSU during their previous enrollment and who have interrupted their enrollment at any Regental university for more than two consecutive semesters, are assigned the catalog in effect at the time of their re-enrollment as their catalog of graduation.

### ***3.5.6 Degree Evaluation***

DSU utilizes Ellucian Degree Works<sup>21</sup> for degree evaluation. Degree Works checks a student's course work including:

- minimum total credits required
- minimum credits earned from DSU
- 15 of last 30 credits earned from DSU
- meeting the 2.0 minimum overall GPA requirement
- meeting the 2.0 minimum DSU institutional GPA requirement
- meeting the General Education requirements
- meeting major requirements as listed in the section that follows

The Degree Works evaluation will be reviewed by the DSU Registrar's Office to ensure that a graduate fulfills all the requirements.

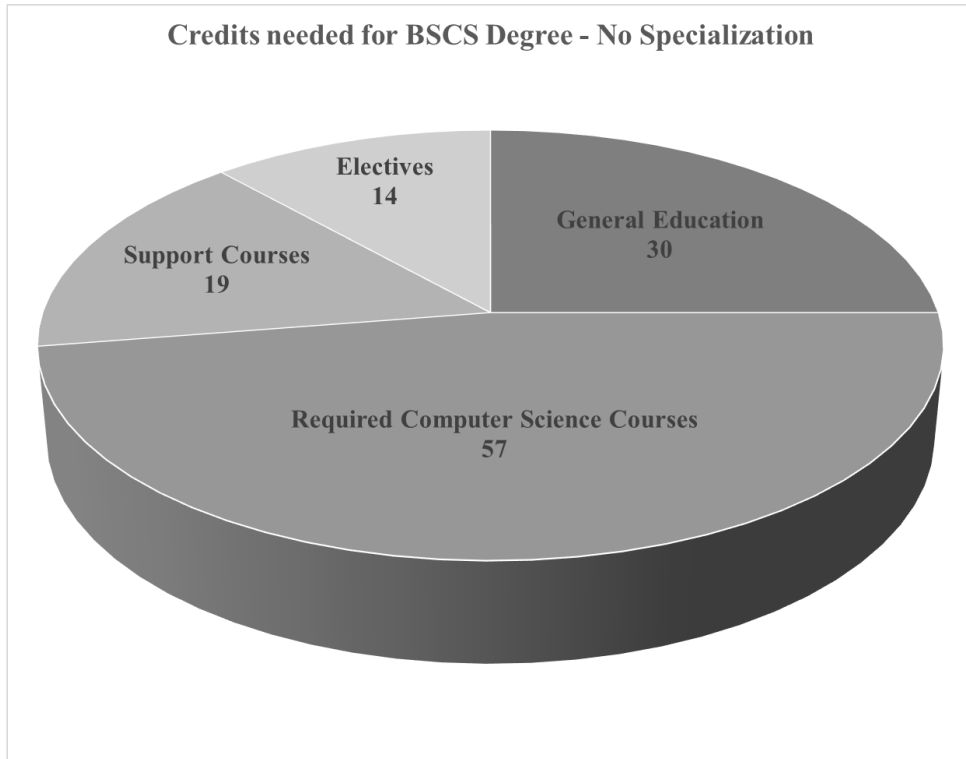
## **3.6 Curricular Options within the Academic Programs**

### ***3.6.1 Credits Needed for BSCS Degree***

The Bachelor of Science in Computer Science (BSCS) degree program requires 120 credit hours. The required 120 credits include 30 credits of system-wide general education, 57 credits of required courses, 19 credits of support course, and 2 to 14 credits of electives. The number of elective credits varies and is determined by whether a student decides to pursue one of two optional specializations. Figure 1 shows the composition of credits needed for BSCS students who are not pursuing a specialization.

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<sup>21</sup> Ellucian Degree Works Degree Audit and Planning Software



*Figure 1. Breakdown of Credits for a BSCS Degree without a Specialization*

Students in the BSCS program can pursue one of two optional specializations:

- Artificial Intelligence/Machine Learning Specialization
- Software Engineering Specialization

Students who pursue a specialization use 12 credits for a specialization, which reduces the elective credits from 14 to 2. Figure 2 shows the composition of credits needed for BSCS students who pursue one of the optional specializations.

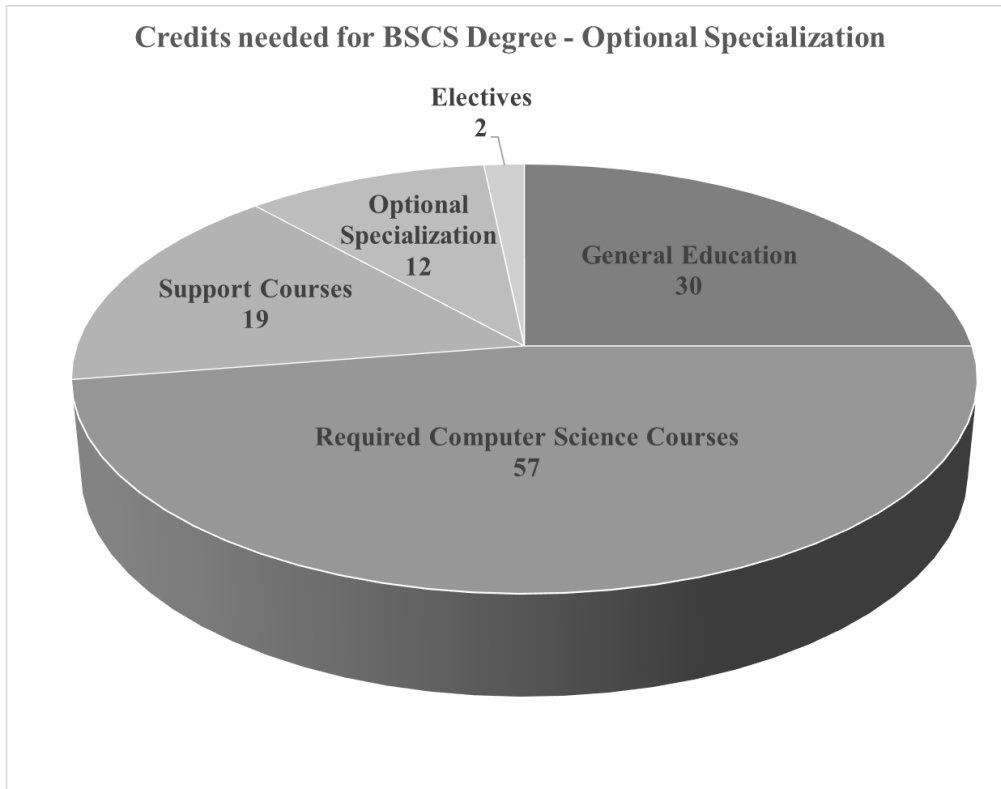


Figure 2. Breakdown of Credits for a BSCS Degree with an Optional Specialization

### 3.6.2 Required Computer Science Courses

The 57 credits needed for a BSCS degree are shown below in Table 3.

Course Prefix	Course #	Course Title	Credits
CSC	105	Introduction to Computers	3
CSC	150	Computer Science I	3
CSC	234	Software Security	3
CSC	250	Computer Science II	3
CSC	260	Object Oriented Design	3
CSC	285	Networking I	3
CSC	300	Data Structures	3
CSC	310	Advanced Data Structures	3
CSC	314	Assembly Language	3
		<b>Choose one course from the following:</b>	
CIS	332	Structured Systems Analysis and Design	3
CIS	424	Software Development with Agile Methodologies	3
CSC	321	Cyber Law and Policy	3
CSC	404	Foundation of Computation	3
CSC	410	Parallel Computing	3
CSC	456	Operating Systems	3
CSC	461	Programming Languages	3

Course Prefix	Course #	Course Title	Credits
CSC	470	Software Engineering	3
CSC	482	Algorithms and Optimization	3
		<b>Select three 300-400-level CIS/CSC courses</b>	9

Table 3. Required Courses in the BSCS Degree

### 3.6.3 Support Courses

The 19 credits of support courses for the BSCS degree are shown below in Table 4.

Course Prefix	Course #	Course Title	Credits
MATH	123	Calculus I	4
MATH	201	Introduction to Discrete Mathematics	3
		<b>Choose one course from the following:</b>	
MATH	281	Introduction to Statistics	3
MATH	381	Introduction to Probability and Statistics	3
MATH	316	Discrete Mathematics	3
		<b>Choose 6 credits from the following:</b>	
CSC	402	Mathematical Foundations of Artificial Intelligence	3
MATH	125	Calculus II	4 to 5
MATH	204	Mathematical Structures for Cyber Operations	5
MATH	225	Calculus III	4
MATH	282	Mathematics of Games	3
MATH	315	Linear Algebra	3 to 4
MATH	318	Advanced Discrete Mathematics	3
MATH	321	Differential Equations	3 to 4
MATH	361	Modern Geometry	3
MATH	381	Introduction to Probability and Statistics	3 to 4
MATH	413	Abstract Algebra I	3
MATH	418	Mathematical Modeling	3
MATH	436	Number Theory and Cryptography	3
MATH	437	Cryptography and Codes	3
MATH	471	Numerical Analysis I	3
MATH	475	Operations Research	3
MATH	492	Topics	1 to 6

Table 4. Support Courses for the BSCS Degree

### 3.6.4 Courses Needed for the Artificial Intelligence/Machine Learning Specialization

The 12 credits needed for the BSCS degree with the optional Artificial Intelligence/Machine Learning Specialization are shown below in Table 5.

Course Prefix	Course #	Course Title	Credits
CSC	247	Introduction to Artificial Intelligence	3
CSC	386	Applications of Deep Learning	3

Course Prefix	Course #	Course Title	Credits
CSC	447	Artificial Intelligence	3
		<b>Choose one course from the following:</b>	
CIS	368	Predictive Analytics	3
CIS	372	Programming for Analytics	3
CSC	402	Mathematical Foundations of Artificial Intelligence	3
CSC	478	Artificial Intelligence Tools and Frameworks	3

Table 5. Courses Needed for the BSCS AI/Machine Learning Specialization

### 3.6.5 Courses Needed for the Software Engineering Specialization

The 12 Credits needed for the BSCS degree with the optional Software Engineering Specialization are shown below in Table 6.

Course Prefix	Course #	Course Title	Credits
CSC	334	Web Development	3
		<b>Choose one course from the following:</b>	
CSC	494	Internship	3
CSC	498	Undergraduate Research/Scholarship	3
		<b>Choose two courses from the following:</b>	
CIS	338	Project Management	3
CIS	424	Software Development with Agile Methodologies	3
CSC	376	Web Development Environments	3
CSC	443	Scripting for Network Administration	3
CSC	451	Mobile Development Environments	3
CSC	455	Software Development Environment & Tools	3

Table 6. Courses Needed for the BSCS Software Engineering Specialization

### 3.6.6 Plan of Study

A sample schedule of how students can earn a BSCS degree at DSU is shown below in Table 7. Students are not limited to this plan but can use it as a guide to take courses in traditional Fall and Spring semesters to graduate in four years.

Course	Prerequisites / Comments	Credits	Offered
<b>First year, Fall semester</b>			
CSC 105 Intro to Computers		3	FA, SP, SU
CSC 150 Computer Science I		3	FA, SP, SU
ENGL 101 Composition I		3	FA, SP, SU
MATH 114 College Algebra		3	FA, SP, SU
CMST 101, 215, or 222	Oral Communication	3	FA, SP, SU
	<b>Total Credit Hours</b>	<b>15</b>	
<b>First year, Spring semester</b>			
CSC 250 Computer Science II	CSC 150	3	FA, SP, SU
Elective-MATH 120 Trig	MATH 114	3	FA, SP, SU



Course	Prerequisites / Comments	Credits	Offered
MATH 201 Intro to Discrete Math	MATH 114	3	FA, SP, SU
Arts and Humanities		3	FA, SP, SU
Natural Science		3	FA, SP, SU
	<b>Total Credit Hours</b>	<b>15</b>	
<b>Second year, Fall semester</b>			
CSC 234 Software Security	CSC 250	3	FA, SU
CSC 300 Data Structures	CSC 250	3	FA, SP, SU
CSC 314 Assembly Language	CSC 250	3	FA, SP, SU
MATH 123 Calculus I	MATH 120	4	FA, SP, SU
ENGL 201 Composition II	ENGL 101	3	FA, SP, SU
	<b>Total Credit Hours</b>	<b>16</b>	
<b>Second year, Spring semester</b>			
CSC 260 Object Oriented Design	CSC 250	3	FA, SP, SU
CSC 310 Adv Data Structures	CSC 300	3	SP
MATH 316 Discrete Math	MATH 201	3	FA, SP, SU
Arts and Humanities		3	FA, SP, SU
Social Science		3	FA, SP, SU
	<b>Total Credit Hours</b>	<b>15</b>	
<b>Third year, Fall semester</b>			
CSC 285 Networking I		3	FA, SP, SU
CSC 410 Parallel Computing	CSC 300	3	FA
CSC 461 Prog Languages	CSC 300	3	FA
MATH 281 Intro to Stats	MATH 114	3	FA, SP, SU
Social Science		3	FA, SP, SU
	<b>Total Credit Hours</b>	<b>15</b>	
<b>Third year, Spring semester</b>			
CIS 332 Sys Analysis and Design or CSC 321 Cyber Law and Policy or CIS 424 Soft Dev w/ Agile Meth	CSC 150  30 credits Completed  CIS 251 or CSC 250	3	FA, SP, SU
CIS/CSC 300-400 Elective (#1)		3	FA, SP, SU
CSC 456 Operating Systems	CSC 300 and CSC 314	3	SP, SU
Natural Science		3	FA, SP, SU
Elective/Specialization Course		3	FA, SP, SU
	<b>Total Credit Hours</b>	<b>15</b>	
<b>Fourth year, Fall semester</b>			
CSC 470 Software Engineering	CSC 300	3	FA
CSC 482 Algorithms & Optimization	CSC 300 and MATH 316 (Concurrent allowed w/ MATH 316)	3	FA
CIS/CSC 300-400 Elective (#2)		3	FA, SP, SU
MATH Elective (#1)		3	FA, SP, SU
Elective/Specialization Course		3	FA, SP, SU
	<b>Total Credit Hours</b>	<b>15</b>	

Course	Prerequisites / Comments	Credits	Offered
<b>Fourth year, Spring semester</b>			
CSC 404 Foundations of Computation	CSC 300 and MATH 201	3	SP
CIS/CSC 300-400 Elective (#3)		3	FA, SP, SU
MATH Elective (#2)		3	FA, SP, SU
Elective/Specialization Course		3	FA, SP, SU
Elective		2	FA, SP, SU
<b>Total Credit Hours</b>		<b>14</b>	

Table 7. BSCS Plan of Study

Figure 3 shows a flowchart of the courses needed for a BSCS degree, organized by year and prerequisites.

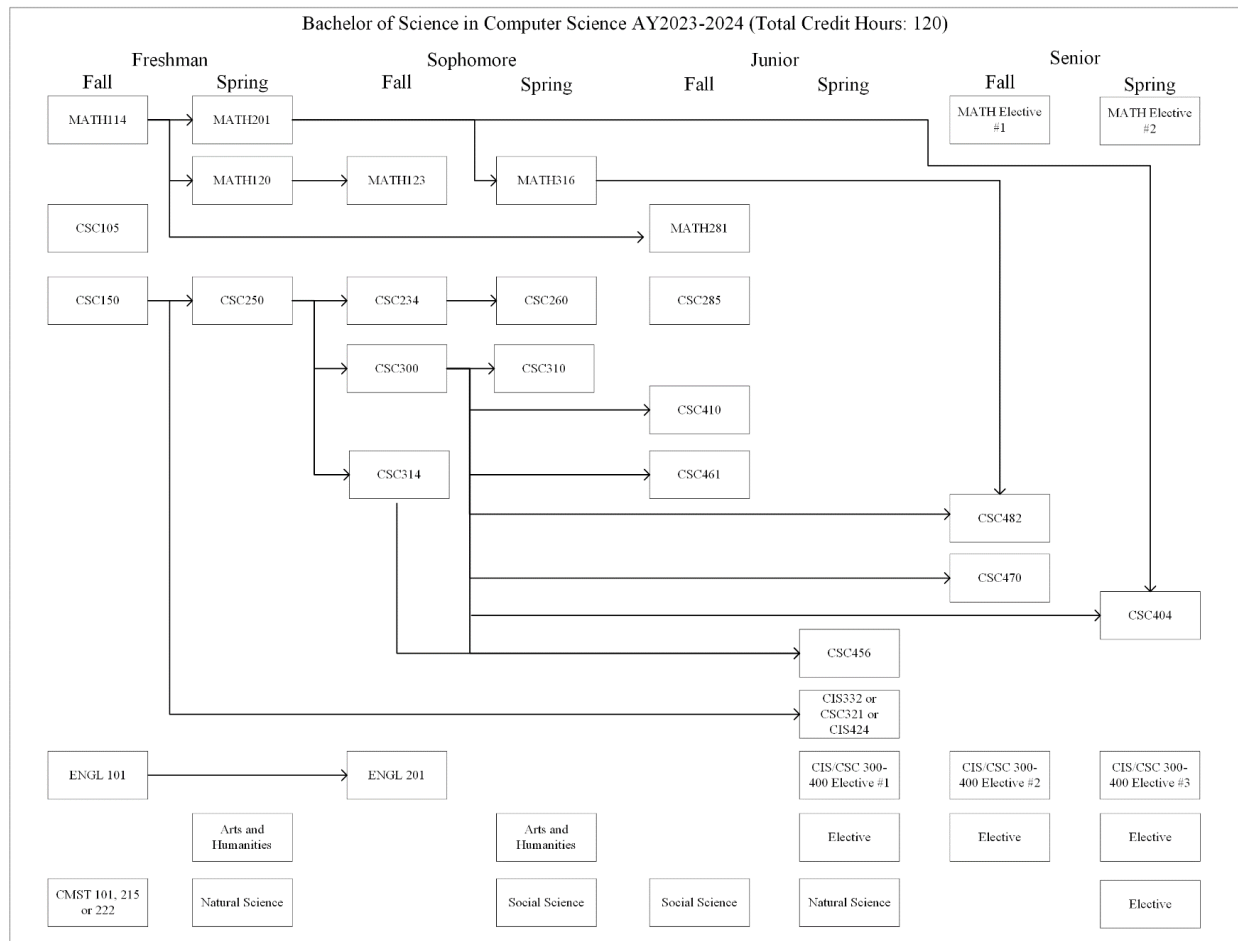


Figure 3. Flowchart of the Courses and Prerequisites of the BSCS Program

### 3.7 Curriculum Management

#### 3.7.1 Program Constituencies

The constituencies of the BSCS program encompass computer science students, alumni, employers, industry advisors, and faculty. These constituents play a crucial role in providing valuable input on the computer science curriculum, program educational objectives, and program modifications. The program's educational objectives are designed to meet the specific needs of these constituencies. Currently, The Beacom College Industry Board of Advisors consists of 16 members, as shown below in Table 8. This board convenes twice a year, in February and September.

Name	Organization
Andy Deinert	VantagePoint, Mitchell, SD 57301
Chris Kreul	First Bank & Trust, Dell Rapids, SD
Chris Raymond	Interstates, Sioux Falls, SD
Dave Geiver	First Premier Bank, Sioux Falls, SD
Dusty Schnabel	Solarity, Sioux Falls, SD
Eric Tijerina	Midco, Sioux Falls, SD
Eric Yunag	Convergint, Sioux Falls, SD
Jake VanDewater	SDN Communications, Sioux Falls, SD
Jesse Gauthier	Wealth Enhancement Group, Sioux Falls, SD
John Jorgensen	Black Hills Energy, Rapid City, SD
Jon Waldman	SBS CyberSecurity, Madison, SD
Mark Stanislav	Product Security & Security Compliance, FullStory, Atlanta, Georgia
Philip Egeberg	Brookings Municipal Utilities/Swiftel Communications, Brookings, SD
Rich Hintz	Daktronics, Brookings, SD
Vincent Wolterman	Cyber Security, Clear Ridge Defense, LLC, Baltimore, MD
Will Bushee	BrightPlanet, Sioux Falls, SD

*Table 8. The Beacom College Industry Board of Advisors*

#### 3.7.2 Program Modification

The program's educational objectives undergo an annual review by the faculty during an ABET meeting in the orientation week. In the spring, the Assessment Committee conducts a focus group with computer science graduates to gather feedback on these objectives. Any feedback and proposed changes to the program's educational objectives are subsequently reported to the Industry Board of Advisors during the fall meeting, which is held in person on campus. The program constituencies review and approve any modifications to the educational objectives during the fall meeting.

The program educational objectives were last reviewed in a meeting held on Feb 24, 2023, which included computer science students, alumni, employers, industry board of advisors, and faculty.

## Part 4: Program Enrollments and Student Placement

### 4.1 Program, College, and University Enrollment

Program enrollment is based on the number of students enrolled in at least one DSU class with an active program of Computer Science (BS), Computer Science – Artificial Intelligence/Machine Learning (BS), or Computer Science – Software Engineering (BS).

University and college enrollment is based on the number of students enrolled in at least one DSU class as of fall census. If a student is enrolled in multiple programs, that student is only counted once at the university level.

Table 9 shows enrollment data for the BSCS program, The Beacom College, and DSU from Fall 2016 to Fall 2023.

	<b>Fall 2016</b>	<b>Fall 2017</b>	<b>Fall 2018</b>	<b>Fall 2019</b>	<b>Fall 2020</b>	<b>Fall 2021</b>	<b>Fall 2022</b>	<b>Fall 2023</b>
<b>Computer Science</b>	348	339	349	367	353	300	295	275
<b>Computer Science - AI/ML</b>			1	8	19	18	14	14
<b>Computer Science – Soft Eng</b>					10	32	53	63
<b>BS Computer Science Total</b>	348	339	350	375	382	350	362	352
<b>The Beacom College</b>	1004	1080	1177	1251	1290	1239	1285	1323
<b>University Enrollment</b>	3190	3307	3382	3268	3186	3219	3241	3509

*Table 9. BSCS, The Beacom College, and University Enrollments*

### 4.2 Student Diversity

Table 10 shows the student diversity based on gender and ethnicity.

	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Fall 2022	Fall 2023
<b>Computer Science</b>								
<b>Gender</b>								
Female	42	50	54	53	59	49	45	37
Male	306	289	295	314	294	251	250	238
<b>Ethnicity</b>								
White	287	284	295	297	280	230	224	206
Other Races/Unknown	61	55	54	70	73	70	71	69
<b>Computer Science - AI/ML</b>								
<b>Gender</b>								
Female			1	1	1	3	1	3
Male			0	7	18	15	13	11
<b>Ethnicity</b>								
White			0	7	17	15	11	11
Other Races/Unknown			1	1	2	3	3	3
<b>Computer Science - SE</b>								
<b>Gender</b>								
Female					0	6	9	12
Male					10	26	44	51
<b>Ethnicity</b>								
White					7	23	40	36
Other Races/Unknown					3	9	13	27
<b>BSCS Total</b>								
<b>Gender</b>								
Female	42	50	55	54	60	58	55	52
Male	306	289	295	321	322	292	307	300
<b>Ethnicity</b>								
White	287	284	295	304	304	268	275	253
Other Races/Unknown	61	55	55	71	78	82	87	99
<b>The Beacom College</b>								
<b>Gender</b>								
Female	119	132	170	180	176	186	196	216
Male	885	948	1007	1071	1114	1053	1089	1107
<b>Ethnicity</b>								
White	808	884	968	999	1004	941	954	951
Other Races/Unknown	196	196	209	252	286	298	331	372
<b>Dakota State University</b>								
<b>Gender</b>								
Female	1355	1325	1340	1196	1139	1194	1156	1279
Male	1835	1982	2042	2072	2047	2025	2085	2230
<b>Ethnicity</b>								

	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Fall 2022	Fall 2023
<b>White</b>	2553	2674	2714	2592	2534	2541	2493	2619
<b>Other Races/Unknown</b>	637	633	668	676	652	678	748	890

Table 10. Student Diversity - Gender & Ethnicity

Other Races/Unknown includes all students who are not classified as "white" based on ethnicity, including students who identify themselves as Hispanic/Latino and those classified as a U.S. nonresident.

**4.3 Degrees Awarded**

Table 11 lists the number of degrees awarded each academic year since AY16-17. Degrees awarded at the college and university level is representative of all program completions at the associate, bachelors, masters, and doctoral level; for example, if a student received a bachelor's degree in both computer science and cyber operations, they would be counted twice at the college and university level. Certificates are not included.

	AY16-17	AY17-18	AY18-19	AY19-20	AY20-21	AY21-22	AY22-23
<b>Computer Science</b>	47	63	48	49	66	50	54
<b>Computer Science - AI/ML</b>					3	4	3
<b>Computer Science - SE</b>						1	3
<b>Computer Science Total</b>	47	63	48	49	69	55	60
<b>The Beacom College</b>	164	194	183	251	287	263	287
<b>University</b>	470	478	454	558	543	519	583

Table 11. Number of BSCS Degrees Awarded by Academic Year

**4.4 Persistence Rates**

The persistence rates for first-time, full-time, baccalaureate degree-seeking freshmen from Fall 2016 to Fall 2022 are shown in Table 12. The **% Returned in Spring** values represent the percentage of students who returned the semester immediately following the first fall semester in which the student was enrolled.

		Computer Science	Computer Science - AI/ML	Computer Science - Soft Eng	The Beacom College	University
<b>Fall 2016</b>	Number of Students	48			177	305
	% Returned in Spring	92%			90%	86%
<b>Fall 2017</b>	Number of Students	54			179	355
	% Returned in Spring	91%			91%	88%
<b>Fall 2018</b>	Number of Students	46			205	377
	% Returned in Spring	93%			89%	86%
<b>Fall 2019</b>	Number of Students	77	2		214	399
	% Returned in Spring	96%	100%		94%	89%
<b>Fall 2020</b>	Number of Students	69		2	190	355
	% Returned in Spring	84%		100%	88%	83%
<b>Fall 2021</b>	Number of Students	57	3	14	192	345
	% Returned in Spring	93%	100%	100%	94%	90%
<b>Fall 2022</b>	Number of Students	60	2	17	191	355
	% Returned in Spring	93%	100%	88%	91%	90%

Table 12. Persistence Rates for First-time, Full-time Students from Fall 2016 to Fall 2022

Table 13 shows the persistence rates for incoming degree-seeking transfer students from Fall 2016 to Fall 2022. The **Number of Students** in the year of the stated fall semester includes all students in the starting cohort of transfer students, including both part-time and full-time students. The **% Returned in Spring** values represent the percentage of students from the cohort who registered for at least one class from DSU in the subsequent spring semester.

		Computer Science	Computer Science - AI/ML	Computer Science - Soft Eng	The Beacom College	University
<b>Fall 2016</b>	Number of Students	54			140	272
	% Returned in Spring	80%			83%	79%
<b>Fall 2017</b>	Number of Students	49			141	289
	% Returned in Spring	94%			86%	82%
<b>Fall 2018</b>	Number of Students	46	1		131	251
	% Returned in Spring	80%	100%		77%	75%
<b>Fall 2019</b>	Number of Students	49	2		129	245
	% Returned in Spring	67%	100%		74%	78%
<b>Fall 2020</b>	Number of Students	34	4	4	11	207
	% Returned in Spring	79%	75%	75%	74%	77%
<b>Fall 2021</b>	Number of Students	17		5	85	183
	% Returned in Spring	94%		60%	86%	84%
<b>Fall 2022</b>	Number of Students	37		4	117	210
	% Returned in Spring	78%		75%	78%	80%

Table 13. Persistence Rates for Incoming Transfers from Fall 2016 to Fall 2022

#### 4.5 Retention Rates

The retention rates for first-time, full-time, baccalaureate degree-seeking freshmen from Fall 2016 to Fall 2022 are shown in Table 14. The **% Returned Next Fall** values represent the percentage of students who returned the following fall semester.

		<b>Computer Science</b>	<b>Computer Science - AI/ML</b>	<b>Computer Science - Soft Eng</b>	<b>The Beacom College</b>	<b>University</b>
<b>Fall 2016</b>	Number of Students	48			177	305
	% Returned Next Fall	71%			77%	72%
<b>Fall 2017</b>	Number of Students	54			178	354
	% Returned Next Fall	80%			76%	67%
<b>Fall 2018</b>	Number of Students	45*			204*	376*
	% Returned Next Fall	73%			66%	66%
<b>Fall 2019</b>	Number of Students	77	2		214	399
	% Returned Next Fall	84%	100%		81%	71%
<b>Fall 2020</b>	Number of Students	69		2	190	355
	% Returned Next Fall	78%		100%	78%	72%
<b>Fall 2021</b>	Number of Students	57	3	14	194	345
	% Returned Next Fall	84%	100%	86%	835	75%
<b>Fall 2022</b>	Number of Students	60	2	16	190	354
	% Returned Next Fall	82%	50%	82%	77%	75%

\* One student passed away in the Fall 2018 Cohort. The student is counted in the persistence table but excluded from the retention table.

Table 14. Retention Rates for First-time, Full-time Students from Fall 2016 to Fall 2022

Table 15 shows the retention rates for incoming degree-seeking transfer students from Fall 2016 to Fall 2022. The **Number of Students** values include all students in the starting cohort of transfer students, including both part-time and full-time students. The **% Returned Next Fall** values represent the percentage of students from the cohort who registered for at least one class from DSU in the fall semester of the following year.

		<b>Computer Science</b>	<b>Computer Science - AI/ML</b>	<b>Computer Science - Soft Eng</b>	<b>The Beacom College</b>	<b>University</b>
<b>Fall 2016</b>	Number of Students	54			140	272
	% Returned Next Fall	61%			68%	64%
<b>Fall 2017</b>	Number of Students	49			141	289
	% Returned Next Fall	69%			67%	62%
<b>Fall 2018</b>	Number of Students	46	1		131	251
	% Returned Next Fall	61%	0%		57%	56%
<b>Fall 2019</b>	Number of Students	49	3		129	245
	% Returned Next Fall	65%	67%		63%	62%
<b>Fall 2020</b>	Number of Students	34	4	4	111	207
	% Returned Next Fall	59%	75%	0%	52%	57%
<b>Fall 2021</b>	Number of Students	17		5	84	183
	% Returned Next Fall	65%		40%	59%	60%
<b>Fall 2022</b>	Number of Students	37		4	117	210
	% Returned Next Fall	68%		50%	65%	62%

Table 15. Retention Rates for Incoming Transfers from Fall 2016 to Fall 2022



## 4.6 Graduation Rates

Table 16 represents the graduation rates for the BSCS program, The Beacom College, and the University. The BSCS numbers represent the total number of BSCS graduates and does not include a breakdown by specializations since the BSCS Artificial Intelligence/Machine Learning and BSCS Software Engineering specializations were not created until the 2019-2020 Academic Year. Additionally, there is no data for The Beacom College until it came into existence in Fall 2015. Prior to that, the BSCS program was a part of the College of Business and Information Systems (BIS).

		BSCS	The Beacom College	University
<b>Fall 2011 Cohort</b>	Total Number of Students in Cohort	24		275
	Graduated within 5 years	50%		32%
	Graduated within 6 years	50%		35%
<b>Fall 2012 Cohort</b>	Total Number of Students in Cohort	37		283
	Graduated within 5 years	35%		37%
	Graduated within 6 years	41%		43%
<b>Fall 2013 Cohort</b>	Total Number of Students in Cohort	31		276
	Graduated within 5 years	58%		37%
	Graduated within 6 years	61%		38%
<b>Fall 2014 Cohort</b>	Total Number of Students in Cohort	25		263
	Graduated within 5 years	52%		43%
	Graduated within 6 years	52%		47%
<b>Fall 2015 Cohort</b>	Total Number of Students in Cohort	51	153	320
	Graduated within 5 years	43%	41%	42%
	Graduated within 6 years	47%	45%	45%
<b>Fall 2016 Cohort</b>	Total Number of Students in Cohort	48	177	305
	Graduated within 5 years	44%	46%	42%
	Graduated within 6 years	50%	52%	46%
<b>Fall 2017 Cohort</b>	Total Number of Students in Cohort	54	179	354
	Graduated within 5 years	61%	57%	47%
	Graduated within 6 years	61%	58%	48%

*Table 16. Graduation Rates for First-time, Full-time, Baccalaureate Freshmen*

## 4.7 Student Placement

Career Services was able to contact 44 of 52 BSCS graduates from 2022. Of the respondents, 31 were employed, 12 were continuing their education, and 1 was not seeking employment. For those who reported salary information, the average entry salary was \$74,865.19. There were 14 graduates employed in South Dakota, which represents 45.16% of respondents who were employed.

The following is a list of companies and positions filled by 2022 graduates of the BSCS program:

- Accelya – Software Engineer II
- Amazon Web Services – Cloud Support Associate

- Assetnote – Backend Engineer
- Black Hills Entergy – Integration Developer 1
- Blend Interactive - .Net Developer
- Caelus LLC – Software Developer
- CPSI – Associate Software Engineer
- Daktronics – Software Developer
- Digi-Key Electronics – Software Developer
- EMC Insurance Companies – Software Engineer I
- Emerson – Test Engineer (Wireless Systems)
- Entrust – Software Developer 2
- Epic – Client System Administrator
- Federated Insurance – Systems Engineer
- IBM – Entry Level ERP Developer
- Innovative Systems LLC – Software Developer
- Interstates – Apps Developer I
- LMS Project – Full-Stack Developer
- Medpace – Software Engineer
- Minnetronix Medical - Software Engineer I
- Northwestern Mutual – Principal Enterprise Architect
- Pipestone Systems – IT Technician/IT Developer
- Raven Aerostar – Software Engineer
- SkaleSafe - Software Engineer
- Tyson Fresh Meats – Controls Engineer
- University of South Dakota – Network Analyst
- Upfluence – Sales Development Representative

## Part 5: Faculty Credentials

### 5.1 Faculty Qualifications

In AY2023-2024, there are 29 full-time faculty members who teach computer science courses in The Beacom College:

- 14 tenured
- 4 tenure track
- 11 non-tenure track

All tenured faculty members in The Beacom College have earned Ph.D. degrees in Computer Science or a related area. Most faculty members teach at least one undergraduate course in computer science during an academic year, except for Dr. Yong Wang, who teaches graduate level computer science courses.

The Beacom College also has adjunct faculty members who teach computer science courses. All adjunct faculty members have a master's degree or a Ph.D. degree in computer science or related area.

Faculty in The Beacom College also participate in funded research projects from various sources including state, federal, and industry. Madison Cyber Labs (MadLabs®) is a research cluster of 16 labs<sup>22</sup>. Among the 16 labs in the MadLabs®, eight labs are led by computer science faculty in The Beacom College. Table 17 below lists the MadLabs® Labs with corresponding computer science faculty leads. Additional information about the MadLabs® is provided in Section 7.2 of Part 7: Facilities and Equipment.

<b>MadLab® Lab</b>	<b>Computer Science Faculty Lead(s)</b>
AI Lab	Jason Mixon
CybHER Security Institute	Kanthi Narukonda
Deep Red Lab	Tyler Flaagan
DEFEND Lab	Cody Welu
PATRIOT Lab	Varghese Vaidyan
Smart Home Lab	Tom Halverson
Success Lab	Tom Halverson and Shawn Zwach
VERONA Lab	Robert Richardson

*Table 17. MadLabs® Labs with Computer Science Leads*

Full-time faculty qualifications are summarized in Table 18, and resumes are provided in Appendix A.

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<sup>22</sup> [Madison Cyber Labs - Dakota State University](#)

Faculty Name	Highest Degree Earned - Field and Year	Academic Rank	Type of Academic Appointment
Aaron Ingalls	M.Sc. Computer Science, 2023	Instructor	Non-Tenure Track
Alexander Maxey	M.Sc. Computer Science, 2023	Instructor	Non-Tenure Track
Andrew Kramer	M.Sc. Computer Science, 2017	Assistant	Tenure Track
Austin O'Brien	Ph.D. Computer Science, 2017	Associate	Tenured
Brent Tulloss	M.Sc. Information Systems, 2001	Lecturer	Non-Tenure Track
Chris Olson	Ph.D. Business Admin. - Applied CS specialization, 2013	Associate	Tenured
Cody Welu	Ph.D. Cyber Operations, 2019	Assistant	Tenure Track
Edward Dennis	D.Sc. Enterprise Information Systems, 2015	Assistant	Tenure Track
Jason Mixon	M.Sc. Computer Science, 2022	Assistant	Tenure Track
Jason Jenkins	M.Sc. Information Assurance, 2010	Instructor	Non-Tenure Track
Jennifer Funke	M.Sc. Educational Technology, 2019	Instructor	Non-Tenure Track
Jenny Schulte	M.Sc. Computer Science, 2019; M.Sc. Analytics, 2019	Instructor	Non-Tenure Track
Jihene Kaabi	Ph.D. Computer Science, 2005	Associate	Tenured
John Hastings	Ph.D. Computer Science, 1996	Associate	Non-Tenure Track
Kanthi Narukonda	M.Sc. Information Assurance, 2016	Assistant	Tenure Track
Kathy Engbrecht	M.Sc. Information Systems, 2007	Instructor	Non-Tenure Track
Kyle Cronin	D.Sc. Information Assurance, 2014	Associate	Tenured
Kyle Korman	M.Sc. Computer Science, 2021	Assistant	Tenure Track
Mark Spanier	Ph.D. Mathematics, 2015	Associate	Tenured
Michael Ham	D.Sc. Cyber Operations, 2017	Associate	Tenured
Patrick Engebretson	D.Sc. Information Systems, 2009	Associate	Tenured
Rob Richardson	M.Sc. Information Assurance, 2016	Instructor	Non-Tenure Track
Shawn Zwach	M.Sc. Computer Science, 2016	Assistant	Tenured
Stephen Krebsbach	Ph.D. Computer Science, 2005	Professor	Tenured
Tom Halverson	Ph.D. Computer Science, 1999	Professor	Tenured
Tyler Flaagan	Ph.D. Cyber Operations, 2021	Assistant	Tenure Track
Varghese Vaidyan	Ph.D. Computer Engineering, 2022	Assistant	Tenure Track
Yong Wang	Ph.D. Computer Science, 2004	Professor	Tenured
Youssef Harrath	Ph.D. Computer Science, 2003	Assistant	Non-Tenure Track

*Table 18. Full-time Faculty Degrees, Ranks, and Types of Academic Appointments*

## 5.2 Faculty Workload

The current faculty workload document of Dakota State University was effective May 1, 2021. While the standard workload is 30 workload units per academic year, reasonable time is allocated to faculty members who hold professorial rank and who actively engage in research, scholarship, or creative artistic activity or who actively pursue professional service activities related to their disciplines. Ordinarily, reasonable allocated time is equivalent of six workload units of instruction, or its equivalent per academic year and, if assigned, the faculty member must be actively engaged in productive scholarship. The institution may adjust this workload requirement to ensure faculty members have adequate time for research and scholarship or service or as deemed necessary by the institution.

The typical full time teaching load for tenured or tenure track faculty is 24 semester credit hours for each academic year (fall and spring). Faculty whose teaching load exceeds that requirement (and who are actively engaged in research, scholarship, or creative artistic activity and who

actively pursue professional service activities related to their disciplines) may qualify for overload pay when the teaching load exceeds the 24-credit requirement in any given academic year. Faculty holding professorial rank but located off campus are required to provide service to the university, service to the discipline, and to actively engage in research, scholarship, or creative artistic activity.

Academic advising is recognized as part of a faculty member's teaching workload and generally will not exceed an assignment as primary adviser of more than 50 students for faculty members with professorial rank and more than 30 students for faculty members with lecturer rank. An unusually heavy advising load can be offset by a reduction in the faculty member's committee or other college assignments and/or a reduction in teaching load for faculty members holding lecturer rank.

Table 19 summarizes faculty workload in AY2023-2024. The **Teaching, Research or Scholarship**, and **Other** values represent the percentage of effort the faculty member devotes to each area. The **Other** category includes but is not limited to advising and service efforts.

Faculty Name	Classes Taught - Fa23	Classes Taught - Sp24	Teaching	Research or Scholarship	Other	% of Time Devoted to the BSCS
Aaron Ingalls	CSC250, CSC334	CSC250, CSC 300, CSC334	100	0	0	100
Alexander Maxey	CSC150, CSC250	CSC150, CSC250	100	0	0	100
Andrew Kramer	CSC428	CSC 498	80	10	10	75
Austin O'Brien		CSC386, CSC479, CSC 498	70	20	10	75
Brent Tulloss	CSC285, CSC328	CSC285, CSC328, CSC385	95	0	5	100
Chris Olson	CSC105, CSC334	CSC334	75	5	20	100
Cody Welu	CSC430, CSC439	CSC438	70	20	10	75
Edward Dennis	CSC145, CSC285, CSC430	CSC285, CSC385	75	15	10	100
Jason Mixon	CSC447, CSC478	CIS424, CSC247, CSC498	80	10	10	100
Jason Jenkins	CSC234, CSC260, CSC470	CSC234, CSC260, CSC 455	80	5	15	100
Jennifer Funke	CSC105	CSC105	100	0	0	100
Jenny Schulte	CSC105, CSC134, CSC161	CSC134, CSC364, CSC404	100	0	0	100
Jihene Kaabi	CSC300, CSC314	CSC314	80	10	10	100
John Hastings	CSC376, CSC482	CSC310	80	10	10	75
Kanthi Narukonda	CSC105, CSC321	CSC321	70	0	30	100
Kathy Engbrecht	CSC105	CSC105	60	0	40	60
Kyle Cronin	CSC420	CSC437	55	5	45	100
Kyle Korman	CSC387, CSC439	CSC285, CSC407, CSC443	80	10	10	75
Mark Spanier	CSC402	CSC404, CSC498	70	15	15	50
Michael Ham		CSC428, CSC432	65	15	20	100
Patrick Engebretson	CSC387	CSC407	50	15	35	50
Rob Richardson	CSC163, CSC234	CSC163, CSC234, CSC431, CSC498	90	0	10	100

Faculty Name	Classes Taught - Fa23	Classes Taught - Sp24	Teaching	Research or Scholarship	Other	% of Time Devoted to the BSCS
Shawn Zwach	CSC420, CSC436	CSC234, CSC432	90	0	10	75
Stephen Krebsbach	CSC461	CSC456	70	10	20	100
Tom Halverson	CSC105, CSC150, CSC274, CSC300, CSC314, CSC410, CSC498	CSC134, CSC250, CSC300, CSC310, CSC374, CSC498	60	5	35	100
Tyler Flaagan	CSC436	CSC438	75	15	10	75
Varghese Vaidyan	CSC234		50	40	10	75
Youssef Harrath	CSC300, CSC482	CSC314, CSC404	80	10	10	100

*Table 19. Faculty Workload Information for AY2023-2024*

The Beacom College has hired ten tenure-track and full-time (9 month) faculty positions for AY2024-2025 due to unprecedented growth and reduction of current faculty workloads. As of this writing, ten faculty positions have been filled and three more open positions are in the process of being filled. The newly hired faculty will start in August 2024. Three of the new tenure-track positions were filled with current faculty on term contracts, resulting in a net gain of seven new positions.

As shown below in Table 20, four of the ten new hires to date are specifically for the BSCS program. Three of the new tenure-track

Name	Department	Academic Faculty Rank
John Hastings	Computer Science	Professor
Youssef Harrath	Computer Science	Associate Professor
Jennifer Schulte	Computer Science	Assistant Professor
Kruti Shah	Computer Science	Assistant Professor

*Table 20. New Faculty Hires for Computer Science in The Beacom College*

The remaining new hires in The Beacom College are in related academic programs and may teach BSCS students. Table 21 lists the other newly hired faculty in The Beacom College.

Name	Department	Academic Faculty Rank
Ahmad Al-Hammouri	Cyber Operations	Associate Professor
Abid Mehmood	Artificial Intelligence	Associate Professor
Chad Fenner	Cyber Defense	Assistant Professor
Jonathan Lancelot	Cyber Defense	Assistant Professor
Jared Soundy	Artificial Intelligence	Assistant Professor
Khandaker Ahmed	Artificial Intelligence	Assistant Professor

*Table 21. New Faculty Hires for Other Academic Programs in The Beacom College*

### 5.3 Faculty Size

The Beacom College currently has 28 faculty members who teach undergraduate computer science courses. Sections of classes are typically capped at 25 students. To maintain small class

sizes, The Beacom College also hires qualified adjunct faculty members teaching computer science courses.

All required computer science courses are offered every semester, except for the following:

- CSC310 – Advanced Data Structures → only offered in Spring semesters
- CSC456 – Operating Systems → only offered in Spring semesters
- CSC461 – Programming Languages → only offered in Fall semesters
- CSC470 – Software Engineering → only offered in Fall semesters
- CSC482 – Algorithms and Optimization → only offered in Fall semesters

A wide variety of elective courses is available each term for computer science students. Among 28 faculty members teaching undergraduate computer science courses, 16 have taught at DSU for more than 5 years.

### ***5.3.1 Student Interaction with Computer Science Faculty***

The faculty in the BSCS program interact with students through advising roles in registered student organizations, including:

- DSU ACM student Chapter
- AI Club
- Capture-The-Flag (CTF) Club
- Ethical Hacking Club
- CybHER®: Women & Girls in Cyber Security

Faculty also coach and lead students in competitions, including:

- ACM Programming Contest
- DigiKey Programming Competition
- Collegiate Cyber Defense Competition

### ***5.3.2 Advising for the Computer Science Program***

Students are advised by professional advisors for the first two academic years through Academic Support Services. Students are transitioned to faculty advisors in The Beacom College if specific benchmarks are met, including completing a minimum 45 credits, minimum 2.4 GPA, and being in good academic standing. Faculty members with professional rank will have a maximum student load of 50 advisees, while those with lecturer rank will be allotted no more than 30 advisees.

## **5.4 Professional Development**

### ***5.4.1 The Center for Teaching and Learning***

In July 2018 Dakota State University established its Center for Teaching and Learning (CTL) to serve as the university hub of teaching support and innovation. Prior to the establishment of the CTL, a single university committee was charged with identifying instructional development topics and implementing faculty workshops/events. That committee is now an advisory group to the CTL, which is directed by a senior faculty (1/2 time, by application) and includes an instructional design and technology specialist (full time) and clerical support. The CTL is also assisted by four faculty associates (one from each of the four colleges at DSU) who are among the university's most accomplished instructors with strengths in course development, learner engagement, and assessment. The CTL faculty associates provide mentoring and consultation with individual faculty when time permits. Additionally, the CTL identifies, coordinates, and provides professional and academic development activities for faculty and staff. The CTL works with academic administrators and faculty to identify instructional priorities and develop programming to address those priorities.

The CTL not only supports teaching and learning traditional classroom environments but is especially focused on providing pedagogical and technology development in online environments. This support has included the creation of instructional aids, materials, and media that are accessible online to assist faculty in improving teaching and student interaction skills. The CTL has also initiated peer review of all online courses using the state mandated Quality Assurance (rubric). For graduate students, the CTL provides expertise to support the goals of the university, including assisting in the production of quality thesis, dissertations, presentation, grant writing, and understanding of compliance issues. For undergraduates, engagement objectives include topics on mentored research, integrity (plagiarism, and copyright), and student service/government.

### ***5.4.2 Funding for Faculty Research and Travel***

Examples of funds available for faculty research and travel include:

- DSU supports a Faculty Research Initiative (FRI) intended to encourage and facilitate faculty research and creative activity. The competitive grants offer up to \$3,000 for individual faculty or up to \$5,000 for collaborative teams.
- The Supporting Talent for Research Trajectories (START) internal funding program was launched in 2018. This seed fund offers faculty support for preliminary work on research that will result in proposals for externally funded research grants.
- DSU also routinely sets aside significant funding for instructional and professional travel and for faculty training. Individual faculty can qualify for up to \$1,200 for travel and training at qualifying events.



### ***5.4.3 Faculty Sabbaticals***

In 2023, DSU issued a new policy on Faculty Sabbaticals<sup>23</sup>. A faculty member may apply for sabbatical leave after six or more consecutive years of full-time teaching at DSU. With approval from the Dean, faculty can apply for a one semester research sabbatical. Applications are reviewed by the university Promotion and Tenure Committee.

### **5.5 Authority and Responsibility of Faculty**

Faculty members can propose a new course and course modifications by submitting either a new course request or a course modification request. The proposal is evaluated and voted on by The Beacom College Undergraduate Curriculum Committee which includes a representative from the Beacom Access Committee. The Undergraduate Curriculum Committee presents the proposal to the entire faculty in the college for approval or disapproval. Upon approval of the faculty, modifications are sent through the Dean, the Provost, and the South Dakota Board of Regents for approval.

The Program Educational Objectives (PEOs) are reviewed each year by the faculty during the orientation week. The Assessment Committee collects the feedback, makes modifications, and submits the modifications to the program constituencies for approval. Additionally, a survey is conducted for each course at the end of each term through Campus Labs (<https://sdbor.campuslabs.com/>). The evaluation results are shared with each faculty within a week after the survey is closed. Course evaluation results are included as part of each faculty member's annual evaluation exhibit.

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<sup>23</sup> [DSU Policy 1.19 Faculty Sabbaticals](#)

## Part 6: Academic and Financial Support

### 6.1 Beacom College of Computer and Cyber Sciences

The Beacom College of Computer and Cyber Sciences office is the central point of support for all undergraduate and graduate students with majors within this college. The central office is located in the Beacom Institute of Technology Building. The office is also provided with several work study positions that are tasked with helping faculty whenever help is requested. Table 22 includes the administration and staff who work in The Beacom College.

Name	Title
Dr. Mary Bell	Dean
Dr. Tom Halverson	Associate Dean of Beacom Undergraduate Programs
Dr. Yong Wang	Associate Dean of Beacom Graduate Programs
Erin Kahler	Administrative Assistant II
Kathy Engbrecht	Retention Specialist
Eric Holm	Systems Architect (IA Lab)

*Table 22. The Beacom College Administration and Support Staff*

### 6.2 Graduate Programs and Research Support Services

The Office of Graduate Studies was established to promote and support graduate education at DSU. The Dean of Graduate Studies collaborates with and supports the functions and responsibilities of the Graduate Council and the graduate program committees within each college and serves as the advocate for graduate education and graduate student support at DSU. The Office of Graduate Studies administration and staff is included in Table 23 below. The day-to-day operations and services provided by the Office of Graduate Studies are client centered. The office offers guidance and help to students from the first inquiry to graduation. This includes providing accurate and timely program information and maintaining the graduate programs website with current information for degree seeking students (<https://dsu.edu/admissions/graduate/>). The office also facilitates the recruitment of prospective students, the application process, assisting in setting up interactive audio/video for remote sites in South Dakota and online for distance students. Other services provided by the Office of Graduate Studies include:

- assisting with course scheduling and course rotations
- making students aware of changes in schedules, rotations, and graduate policies
- assisting with registration
- supporting the assistantship committees
- monitoring student progress toward graduation
- serving as a liaison among other support staff, faculty, and administrators

- processing Fast Track (4+1) Program<sup>24</sup> applications, which many BSCS students take advantage of to take courses towards an MS Computer Science degree

<b>Name</b>	<b>Title</b>
Dr. Mark Hawkes	Dean
Erin Blankespoor	Administrative Assistant
Abby Chowing	Graduate Enrollment Specialist
Brianna Mae Feldhaus	Graduate Enrollment Specialist

*Table 23. The Office of Graduate Studies Administration and Support Staff*

On July 1, 2018, the new role of Vice President of Research and Economic Development was developed at DSU. This position was created to address unprecedented growth in student numbers, employee numbers, academic programs, research activity, to further formalize the research processes campus wide, and coordinate efforts between faculty and campus departments for increased efficiency. The university's awarded grant monies have been increasing substantially since 2018. The award total increased \$2,396,866 in 2018 to \$6,493,257 in 2019 and \$5,923,216 in 2020. With the CyberHealth Strategic Alliance with Sanford Heath and the \$90 million initiative to expand DSU's Applied Research Lab, these numbers will likely continue to grow. Table 24 includes the administration and staff in the Research and Economic Development Office.

<b>Name</b>	<b>Title</b>
Dr. Ashley Podhradsky	Vice President for Research and Economic Development
Dr. Peter Hoelsing	Associate Vice President for Research & Economic Development
Dr. Stacey Berry	Coordinator of Undergraduate Research/ IRB Chair
Katherine Cota	Director of Economic Development
Teresa Maier	Sponsored Program Analyst
Beth Delzer	Administrative Assistant

*Table 24. Research and Economic Development Administration and Support Staff*

### **6.3 Library Resources and Services**

Since Dakota State University received its current focused mission in the 1980s, the Karl E. Mundt Library's mission has been to expand its collection of materials on computers, technology, and information systems. To that end, the library has subscribed to an ever-widening number of databases and eBooks that support this emphasis. The physical and electronic collections continue to be built through faculty recommendations and requests, as well as from librarian selection based upon their knowledge of the curriculum and its needs. The journal collection is also based on faculty requests and is fine-tuned by means of an annual analysis of journal use. This analysis helps the library focus its expenditures (and finite budget) on those journals that are regularly needed and used by the institution's students. The collections have been enriched with digital information. The library subscribes to numerous online databases including the Association for Computing Machinery (ACM) Digital Library, ProQuest Research Library, ABI-

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<sup>24</sup> [Fast Track \(4+1\) Programs](#)

Inform, IEEE, Lexis Nexis and over 100 others. Most of the material indexed in these databases includes direct access to the full text of the articles indexed. For those articles not available in full text, the library provides speedy interlibrary loan service at no extra cost to all DSU students, faculty, and staff.

The library holds an extensive collection of electronic books on computer security and information assurance, which are discoverable via the library catalog. In addition, the library subscribes to Safari Tech Books Online, which provides access to 150 titles that provide hands-on training in many areas of technology. The library also provides access to LyndaCampus.com, which provides digital tutorials in almost every area of technology, marketing, education, and career planning. The Karl E. Mundt Library is also a member of several library consortiums and maintains borrowing and lending agreements with academic libraries across the country and around the world. As such, the library can attain materials in digital and/or physical formats for any scholarly need. The professional library administration and staff are listed in Table 25 below.

<b>Name</b>	<b>Title</b>
Dr. Mary Francis	Director of the Library
Abbie Steuhm	Reference and Scholarship Librarian
Ellen Hoff	Librarian
Taylor Cline	Library Associate

*Table 25. Karl E. Mundt Library Administration and Support Staff*

#### **6.4 Online@DSU Support Services**

The Office of Online Education is responsible for program planning, marketing, program implementation and overall management of courses and programs offered by alternative delivery at Dakota State University. Working in partnership with the colleges and the institution's academic support areas, the Office of Online Education works to design and develop active and collaborative degree programs at a distance.

The Office of Online Education is staffed with the Director of Online Education and the State Authorization Coordinator shown in Table 26 below. This team serves the needs of students who are enrolled in the online and videoconferencing courses at DSU. The office is the mainstay of distance services to students, working with the administrative offices of DSU to provide these services. The staff also serves the website needs of faculty, staff, and students at DSU. The office staff assists faculty in the design and implementation of courses delivered by various forms of technology.

<b>Name</b>	<b>Title</b>
Sarah Rasmussen	Director of Online Education
Annette Miller	State Authorization Coordinator

*Table 26. Online@DSU Administration and Support Staff*

## 6.5 Information Technology Services

DSU has a comprehensive technology infrastructure supporting universal (on and off campus) access to computing resources. The Information Technology Services administration and staff listed in Table 27 below provide technology support to faculty, staff, and students.

<b>Name</b>	<b>Title</b>
Shawn Jaacks	Chief Information Officer
Brent Van Aartsen	Chief Technology Officer
Stephanie Baatz	Director of Support Services
Bryon Olson	Director of Technical Operations
Pat Huntimer	Assistant Chief Information Officer, Director of Business Intelligence
Tyler Steele	System Administration Manager
Brett McKeown	System Administration Manager
Marie Millage	IT Procurement & Asset Management Administrator
Kim Wermers	Card Services Administrator
Scott Allbee	Systems Integration Engineer
Coby Cochran	Web Applications Developer
AJ DeGroot	Cybersecurity Analyst
Tess Eflin	Support Services Technician
Eric Holm	Systems Architect
Britney Jencks	Associate Integrations and Web Developer
Joelle Johnson	Senior Web Applications Analyst
Drew Jones	System Engineer
Kip Kinnunen	Network Architect
Braden Madison	Cybersecurity Analyst
Steve Millage	Systems Engineer
Nolan Moser	Multimedia Support Service Analyst
Amy Olson	Software Engineer
David Turner	IT Developer

*Table 27. Information Technology Services Administration and Staff*

## 6.6 Administrative Support

Current administrative staff will provide the academic support services to deliver academic programs at DSU. The administrative support personnel who are particularly critical to the delivery of the academic programs are included in Table 28 below.

<b>Name</b>	<b>Title</b>
Corey Braskamp	Director of Facilities Management
Kathy Callies	Registrar
Amy Crissinger	Vice President for Student Affairs and Enrollment Management
Amy Dockendorf	Controller
Denise Grayson	Director of Financial Aid
Sara Hare	Director of Budget & Grants Administration
Jeanette McGreevy	Director of Institutional Effectiveness, Assessment, and Policy
Laura Cross	Director of Institutional Research
Deb Roach	Vice President for Human Resources
Kelly Greene	Director of Career and Professional Development
Sarah Olson	Course Materials Specialist

<b>Name</b>	<b>Title</b>
Donna Fawbush	Director of the Trojan Zone and University Events
Nicole Claussen	Director of International Programs

*Table 28. Administrative Support*

## **6.7 Financial Support for Students**

Financial aid opportunities are expected to come from institutional and private sources. Financial aid policies and procedures for application, award, and distribution have already been developed to support academic programs at DSU. DSU has also certified alternative loan eligibility for enrolled students (based on their educational costs) to regional and national lenders. Table 29 lists the administrator and support staff in DSU's Financial Aid Office.

<b>Name</b>	<b>Title</b>
Denise Grayson	Director of Financial Aid
Melinda Fedeler	Assistant Director of Financial Aid
Jill Corbin	Scholarship Coordinator
Laura Reed	Financial Aid and Scholarship Advisor
Amy Townsend	Administrative Assistant I

*Table 29. Financial Aid Administrator and Support Staff*

The DSU Financial Aid Office, as a member of the National Association of Student Financial Aid Administrators (NASFAA), complies with the NASFAA Ethical Principles and Code of Conduct for Institutional Financial Aid Professionals.

## Part 7: Facilities and Equipment

With DSUs 1:1 portable computing environment requiring students to have a Windows or Mac laptop and its expansive secure wireless network, the need for dedicated computer labs is not as prevalent as it has been in the past. Classroom space on campus was significantly increased with the Fall 2017 opening of the Beacom College of Computer and Cyber Sciences, the first LEED version 4 building in South Dakota, and the renovations of East Hall in 2019 and 2021. Dedicated research facilities are available in the Madison Cyber Labs (MadLabs®). Students at DSU are given access to industry standard software and a virtual Information Assurance Lab to meet all their computing needs.

### 7.1 Information Assurance Lab

DSU's Information Assurance (IA) Lab is a cloud-based solution to the problems of technology education. The IA Lab was designed and implemented in 2009 and its use has continually grown ever since with the additions of new classes plus growing enrollment. The IA Lab allows an instructor to focus their time on creating and testing their lab. Once the lab is finalized, the lab administrator can copy unique instances of the lab to all students within the class. This process takes approximately 20 minutes total, depending on the size of the class. The lab can run any platform (Windows, MacOS, FreeBSD, or Linux), in addition to popular firewall and router distributions. These labs are all safely contained so that students are safe when practicing any cybersecurity concepts. Due to the self-service nature of lab implementation, it can be used for projects far beyond the classroom. The IA Lab hosts research projects for undergraduate and graduate students, in addition to housing research projects for faculty members. Due to the safe/secure nature of the lab, it also houses DSU's High Performance Computing/Hadoop environment. The lab users vary from semester to semester, but largely include students from programs including Information Systems, Cyber Operations, Computer Science, Network Security Administration, etc.

### 7.2 MadLabs®

On Jan. 31, 2018, Governor Dennis Daugaard signed House Bill 1057 into legislation which permitted the demolition of DSU's Lowry Hall and construction of the Madison Cyber Labs, or MadLabs®. The Madison Cyber Labs build on DSU's expanding capabilities and strengths to establish a hub of cybersecurity and cyber operations expertise, research, and economic development in South Dakota. As of December 2023, DSU faculty has established 16 MadLabs. Construction of the \$18 million, 40,000 square foot MadLabs building, located on the southwestern edge of campus, was completed in Fall 2019. It is the first research facility of its kind in the Upper Great Plains region.

There are five components to MadLabs® game-changing plan to reshape the cyber field in South Dakota, including:

- 1) **Resources:** a winning combination of laboratory research space, state-of-the-art hardware and software, faculty expertise, and growing institutional relationships with a wide variety of public and private agencies

- 2) **People:** undergraduate and graduate students, faculty, researchers, interns, and other collaborators
- 3) **Programs:** nationally recognized cyber degrees from the associate to doctoral level, along with other professional development opportunities
- 4) **Research areas and institutes:** focus areas in defined interdisciplinary and multidisciplinary regions, that draw from every college on campus
- 5) **REED Connection:** DSU is connected to the South Dakota Research, Education, and Economic Development Network (REED) via a 100 Gbps connection. Providing the campus with connectivity to Internet2, the Great Plains Network, and other research networks.

MadLabs® drives innovation and ideas from DSU into the South Dakota economy, the Great Plains, and the nation. At the same time, it draws new talent to the state and the region. The facility and its programs attract elite scholars, researchers, professionals, and partnerships with government, businesses, nonprofits, and other higher education institutions.

Researchers within MadLabs® primarily focus on projects exploring and advancing technology application, information and quality assurance, business adverse event planning, economic growth, and policy improvement across multiple disciplines and fields. MadLabs® focus areas include cybersecurity, digital forensics, cyber defense, Artificial Intelligence (AI) and machine learning, reverse engineering, and malicious digital artifacts. MadLabs® also fosters partnerships with the public and private sectors to cultivate ideas and transform their research to make a difference in the world.

MadLabs® currently includes 16 labs<sup>25</sup>:

- AdapT Lab
- AI Lab
- CAHIT
- CBAR Lab
- CLASSICS Institute
- Cyber Education and Professional Development Lab
- CybHER® Security Institute
- Deep Red Lab
- DigForCE Lab
- IT Living Lab
- MADRID Lab
- PATRIOT Lab
- Pri Lab
- Smart Home Lab
- Success Lab

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<sup>25</sup> [Madison Cyber Labs - Dakota State University](#)



- VERONA Lab



*Figure 4. Madison Cyber Labs*

### **7.3 MadLabs Research Environment and Network**

The computing resources are available through the MadLabs Research Environment and Network (MADREN) at DSU. MADREN is an extensive technology infrastructure dedicated to cybersecurity research. The MADREN includes 10 Lenovo SR630s servers, each with dual Intel Xeon Gold 5118 Processors, for a total of 240 cores @ 2.3 GHz. This is supported by 2.56TB of TruDDR4 @ 2666MHz RAM available and a 126TB HPE Nimble Storage Adaptive Flash Array. These resources are accessible through virtualization via VMware Director. The MADREN also contains a large GPU cluster accessible through VMware View. It includes 5 Lenovo SR670s servers, each with dual Intel Xeon Gold 6242 Processors, for a total of 160 Cores @ 2.8 GHz each, and 1.92TB of TruDDR4 Performance+ RAM @ 2933MHz. The cluster has 40 NVIDIA Tesla T4 16GB cards, with 12,800 Turing Tensor Cores and 102,400 CUDA Cores. The total GPU capacity represents 324 Teraflops, 2.6 Petaflops, 5,200 TOPS (INT8), or 10,400 TOPS (INT4). All MADREN resources have access to Internet2, with a max data transfer of 100 Gbps.

## Part 8: Assessment and Strategic Plans

### 8.1 BSCS Program Educational Objectives and Student Outcomes

#### 8.1.1 Program Educational Objectives

The Program Educational Objectives (PEOs) are listed in Table 30. Recent graduates of the BS in Computer Science program at DSU will:

PEO Identifier	Program Educational Outcome
PEO#1	Attain employment or pursue advanced degrees in computing and use software development best practices to promote growth and prosperity at local, national, and global levels.
PEO#2	Utilize both formal and informal education to adapt to a rapidly changing technological landscape and continue to advance their technical knowledge while fostering personal and organizational growth.
PEO#3	Recognize professional responsibility for safeguarding users, systems, and information, as well as using data and tools in an ethical manner and understand that the decisions they make impact their organization, community, and society.

*Table 30. Program Educational Outcomes*

#### 8.1.2 Student Outcomes

The Student Outcomes (SOs) are listed in Table 31. The first five SOs align with the ABET Criteria for Accrediting Computing Programs, 2023 - 2024<sup>26</sup> and the last SO is specific to the BSCS Program at DSU.

SO Identifier	Student Outcome
SO#1	Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
SO#2	Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
SO#3	Communicate effectively in a variety of professional contexts.
SO#4	Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
SO#5	Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
SO#6	Apply computer science theory and software development fundamentals to produce computing-based solutions.

*Table 31. Student Outcomes for the BSCS Program at DSU*

The mapping of Program Educational Objectives and Student Outcomes is shown in Table 32.

	SO#1	SO#2	SO#3	SO#4	SO#5	SO#6
PEO#1	X	X				X
PEO#2			X		X	

<sup>26</sup> [Criteria for Accrediting Computing Programs, 2023 - 2024](#)

	SO#1	SO#2	SO#3	SO#4	SO#5	SO#6
PEO#3			X	X		X

*Table 32. Mapping of Program Educational Objectives with Student Outcomes*

Table 33 includes a list of BSCS courses which are used to assess the Student Outcomes, along with the mapping of courses with Student Outcomes.

No	Course	SO#1	SO#2	SO#3	SO#4	SO#5	SO#6
1	CSC 105 - Introduction to Computers			X	X		
2	CSC 150 - Computer Science I		X				
3	CSC 234 - Software Security	X		X	X		
4	CSC 247 - Introduction to Artificial Intelligence	X					
5	CSC 250 - Computer Science II	X	X				
6	CSC 260 - Object Oriented Design	X					
7	CSC 285 - Networking I	X					
8	CSC 300 - Data Structures	X	X				
9	CSC 310 - Advanced Data Structures	X	X				X
10	CSC 314 - Assembly Language	X					
11	CSC 321 - Cyber Law and Policy	X	X	X	X		X
12	CSC 334 - Web Development	X					X
13	CSC 386 - Applications of Deep Learning	X					X
14	CSC 404 - Foundation of Computation	X					
15	CSC 410 - Parallel Computing	X	X				X
16	CSC 447 - Artificial Intelligence	X					X
17	CSC 456 - Operating Systems	X					
18	CSC 461 - Programming Languages	X					
19	CSC 470 - Software Engineering		X	X	X	X	X
20	CSC 482 - Algorithms and Optimization	X	X				X
21	CIS 332 - Structured Systems Analysis and Design	X	X	X	X		X
22	CIS 424 - Software Dev w/ Agile Methodologies	X	X	X	X		X
23	CSC 494 - Internship 1-8 credits			X	X	X	
24	CSC 498 - Undergraduate Research/Scholarship	X	X				

*Table 33. BSCS Courses Mapped to Student Outcomes*

### **8.1.3 Performance Indicators**

Performance Indicators (PIs) are identified for each Student Outcome. The seven PIs are listed in Table 34.

<b>PI Identifier</b>	<b>Performance Indicator</b>
<b>PI#1</b>	Remember
<b>PI#2</b>	Understand
<b>PI#3</b>	Apply
<b>PI#4</b>	Analyze
<b>PI#5</b>	Evaluate
<b>PI#6</b>	Create
<b>PI#7</b>	Interpersonal

*Table 34. Performance Indicators Used in Assessment*

Table 35 displays the mapping of Student Outcomes with the Performance Indicators.

	<b>PI#1</b>	<b>PI#2</b>	<b>PI#3</b>	<b>PI#4</b>	<b>PI#5</b>	<b>PI#6</b>	<b>PI#7</b>
<b>SO#1</b>		X	X	X			
<b>SO#2</b>			X		X	X	
<b>SO#3</b>		X					X
<b>SO#4</b>	X		X		X		
<b>SO#5</b>		X	X	X	X	X	X
<b>SO#6</b>			X			X	

*Table 35. Mapping of Student Outcomes with Performance Indicators*

#### **8.1.4 Assessment and Evaluation Process within the BSCS Program**

A flowchart depicting the assessment and evaluation process within the BSCS program at DSU is shown in Figure 5.

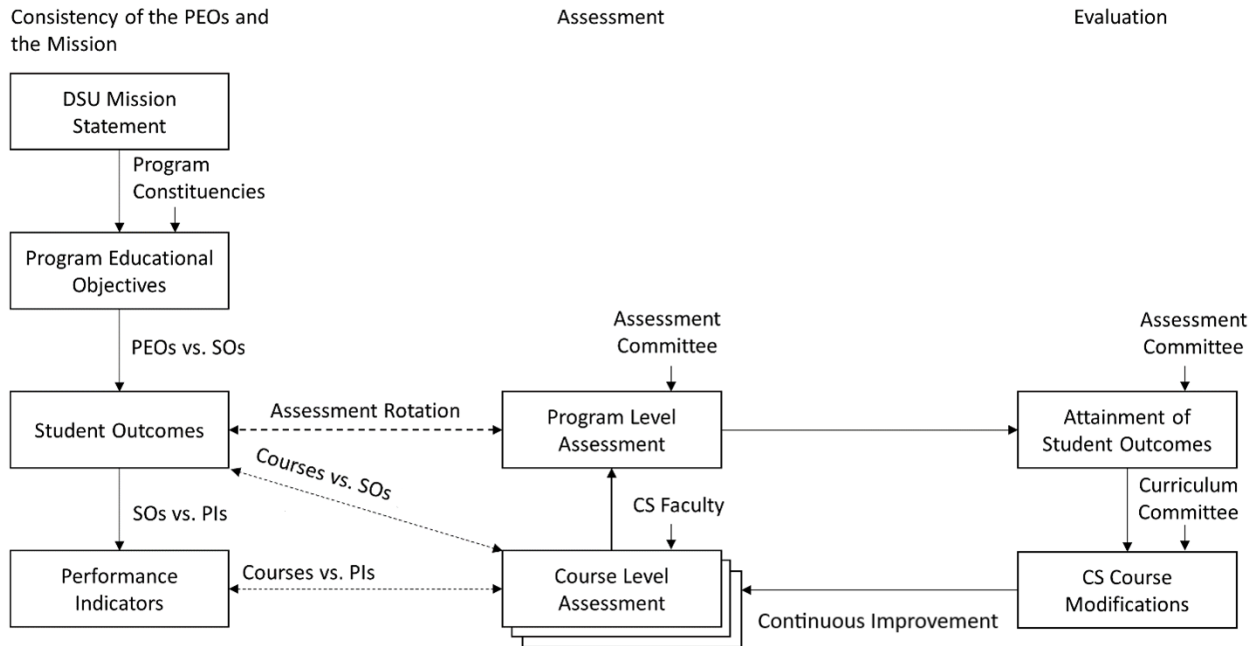


Figure 5. Assessment and Evaluation Process Flowchart

## 8.2 Exit Exam

All BSCS graduates are required to take the Major Field Test (MFT) in Computer Science. The MFT exam given to students was created by Educational Testing Services (ETS)<sup>27</sup> The test is structured around several key categories, including discrete structures, programming, algorithms and complexity, systems, software engineering, information management, and other topics. The BSCS program has been using the Major Field Test as an assessment tool for a long time. The administration of the exit exam was postponed due to pandemic-related restrictions. However, the exit exam requirement was reinstated once the pandemic-related restrictions were lifted. During the examination, on campus students gather in a classroom to take the test. Online proctoring services are available for students who require it.

The MFT's total scaled score spans from 120 to 200. Table 36 provides an overview of the scaled scores achieved by BSCS graduates. As shown in the table, no students answered less than 50% of the questions on these tests.

<sup>27</sup> [ETS Major Field Tests: Computer Science](#)

	Fall 2021	Spring 2022	Fall 2022	Spring 2023
Students Tested	24	37	21	40
Mean	151	149	145	146
Standard Deviation	14	16	12	13
Students responding to less than 50% of the questions	0	0	0	0

*Table 36. MFT in Computer Science: Test Summary*

The MFT also categorizes the test scores into three groups: Programming and Software Engineering, Discrete Structures and Algorithms, and Systems (Architecture, Operating Systems, Networking, and Database). Table 37 provides a summary of assessment indicators from the MFT for BSCS graduates in comparison to national data. As shown in Table 37, BSCS students exhibit proficiency in Programming and Software Engineering as well as in Discrete Structures and Algorithms. There were 61 students who completed the exam from Fall 2021 to Spring 2022, and an additional 61 students who completed it from Fall 2022 to Spring 2023.

Assessment Indicator Number	Assessment Indicator Title	Institution Mean % Correct - FA21-SP22	National Mean % Correct - FA21-SP22	Institution Mean % Correct - FA22-SP23	National Mean % Correct - FA22-SP23
1	Programming and Software Engineering	55	49.0	50	49.0
2	Discrete Structures and Algorithms	47	40.0	44	40.0
3	Systems: Architecture/Operating Systems/Networking/Database	40	39.9	36	39.9

*Table 37. MFT in Computer Science: Summary of Assessment Indicators*

The BSCS program has traditionally evaluated its performance based on learning outcomes using the Trojan Assessment Profile (TAP). In the AY2022-2023, a comprehensive assessment and evaluation process was established in preparation for ABET CAC accreditation. A comprehensive assessment cycle for all 24 courses during the AY2023-2024 is currently in progress and the assessment data and evaluation results are anticipated to be available in May 2024 after the Spring 2024 semester has concluded.

A planned ABET self-study report, which will be submitted by July 1, 2024, will incorporate summaries of the evaluation outcomes. It will also include an analysis illustrating the degree to which each student outcome is being achieved.

## APPENDIX A: Faculty Resumes

### Aaron Ingalls

#### *Education*

M.S., Computer Science, Dakota State University, 2023

B.S., Mathematics for Information Systems, Dakota State University, 2021

B.S., Computer Science, Dakota State University, 2021

#### *Academic experience*

Dakota State University, Instructor, 2023-Present, full time

Dakota State University, Frontend Developer, 2021-Present, full time

#### *Non-academic experience*

Adee Honey Farms, Lead Frontend Developer, 2022-2023, full time

QRd Fitness, Lead App Developer, 2022-Present, full time

#### *Certifications or professional registrations*

None

#### *Current membership in professional organizations*

None

#### *Honors and awards*

None

#### *Service activities (within and outside of the institution)*

None

#### *Publications and presentations (selected, from the past five years)*

None

#### *Professional development activities*

None

## **Alexander Maxey**

### ***Education***

M.S., Computer Science, Dakota State University, 2022 - 2023

B.S., Computer Science & Game Design, Dakota State University, 2018 - 2022

### ***Academic experience***

Dakota State University, Instructor, 2023 – Present, full time

Carnegie Mellon University Software Engineering Institute, SSD Intern, 2021, full time

Dakota State University, Adjunct Instructor, 2022-2023, full time

DSU - Teacher's Assistant, Supplemental Instructor: 2019-2022

### ***Non-academic experience***

Knights of the Kitchen Table, Team Lead, 2021 – 2022, part time

Mi Scusi, Lead Programmer, 2020 – 2021, part time

Insight Intern, Summer, 2020, part time

Rserving, Programmer, 2020-2023, part time

Personal Computer Science/Game Design Projects, part time

Collegiate Football, 2017-2021, part time

Indie Game Developer – Maxeymus Games, 2017 – present, part time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

None

### ***Honors and awards***

Cyber Corps SFS Scholarship Recipient

### ***Service activities (within and outside of the institution)***

None

### ***Publications and presentations (selected, from the past five years)***

None

### ***Professional development activities***

None



## **Andrew Kramer**

### ***Education***

Ph.D., ABD, Computer Science, Dakota State University, 2024 (expected)  
MS., Applied Computer Science, Dakota State University, 2017  
BS., Cyber Operations, Dakota State University, 2015  
AA., Liberal Arts and Sciences, College of the Redwoods, 2011

### ***Academic experience***

Dakota State University, Assistant Professor, 2022 – Present, full time  
Dakota State University, Instructor of Computer Science, 2017-2022, full time  
Madison Cyber Labs (MadLabs), Deep Red Lab Director, 2018- 2021, full time

### ***Non-academic experience***

Johns Hopkins Applied Physics Lab, Cyber Security Internship, 2015-2016, part time  
Secure Banking Solutions, Penetration Test Engineer, 2014-2014, part time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

None

### ***Honors and awards***

DEFCON OpenSOC CTF 2020 - 1st Place Team  
Wild West Hackin' Fest CTF 2019 - 1st Place Team

### ***Service activities (within and outside of the institution)***

Served as a co-PI on DSU's CyberCorps Scholarship for Service grant from the National Science Foundation.

Teach summer crash-courses for other CAE university faculty, including topics such as stack and heap overflow exploitation, ROP, ALSR bypasses, browser exploitation, kernel exploitation, debugging and fuzzing.

Regularly assist with summer GenCyber camps at DSU, including GenCyber Coed, GenCyber Girls, and GenCyber Teachers camps. Teach a variety of topics, including networking, wireless security, C programming, and electronics

### ***Publications and presentations (selected, from the past five years)***

None

### ***Professional development activities***

None

## **Austin F. O'Brien**

### ***Education***

Ph.D., Computational Statistics, South Dakota State University, 2017  
M.S., Computer Science, South Dakota State University, 2009  
B.Sc., Computer Science, South Dakota State University, 2007

### ***Academic experience***

Dakota State University, Associate Professor, Program Coordinator for M.S. in Computer Science, 2021-Present, full time  
Dakota State University, Assistant Professor, 2015-2021, full time  
South Dakota State University, Research Assistant, Department of Statistics, 2012 – 2015, full time  
South Dakota State University, Teaching Assistant/Instructor, Department of Statistics, 2010 – 2015, full time  
South Dakota State University, Instructor, Department of Computer Science, 2009, full time  
South Dakota State University, Teaching Assistant, Department of Computer Science, 2007 – 2009, full time

### ***Non-academic experience***

The Mitre Corporation, Statistical Research/Programmer, 2013, full time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

None

### ***Honors and awards***

Ernest M. Teagarden Award for Excellence in Teaching. Dakota State University. 2020

### ***Service activities (within and outside of the institution)***

DSU Committees  
Faculty Hiring Committees  
K/12 & Teacher Camps  
Clubs – Coaching  
Recruiting  
Research Mentor

### ***Publications and presentations (selected, from the past five years)***

Nelson, T. O'Brien, A. Noteboom, C. (2023). Machine Learning Applications in Malware Classification: A Meta-analysis Literature Review. International Journal on Cybernetics & Informatics, Vol. 12, No. 1, February 2023.  
Ofori, M., El-Gayar, O., O'Brien, A. and Noteboom, C., (2022). A deep learning model compression and ensemble approach for weed detection. Hawaii International Conference on System Sciences.

Stroschein, J., Tools, I.A.U.O.S., Garnet, J., Kulm, A., Nelson, T.J., O'Brien, A., Pauli, W.E., Miller, M., Cybercrime, T.P.P., Opoku-Boateng, F. and Jones, T., (2020). CLEAR CONFERENCE COMPUTER SCIENCE ACADEMIC PAPERS. South Dakota Law Review, 65(3).

Chadhary, S., O'Brien, A., Xu, S. (2020) Automated Post-Breach Penetration Testing through Reinforcement Learning. 2020 IEEE Conference on Communications and Network Security, Avignon, France, pp. 1-2.

Dangi, B., Gamet, J., Kulm, A., Nelson, T., O'Brien, A., Pauli, W. (2019). Alert Prioritization and Strengthening: Towards an Industry Standard Priority Scoring System for IDS Analysts Using Open Source Tools and Models of Machine Learning. South Dakota Law Review Journal.

***Professional development activities***

Bachelor of Science in Artificial Intelligence. Dakota State University. 2021.

NCAE-C Cyber Workforce Development and Curriculum; Artificial Intelligence. 2020-2021.

Minor in Artificial Intelligence. Dakota State University. 2020.

Course development for CTE CyberNet Summer Academy. 2020-2021.

Course development for NSF CyberTraining Summer Course. 2020.

## **Brent L. Tulloss**

### ***Education***

Master of Science., Information Systems, Dakota State University, 2001  
Bachelor of Science., Computer Science, Dakota State University, 1997  
Minors in Physics, Mathematics

### ***Academic experience***

Dakota State University, Lecturer, 2019–Present, full time  
Dakota State University, Instructor 2001–2019, full time

### ***Non-academic experience***

Rosco Manufacturing Company, Management Information Systems (MIS) Manager, 1999–2001, full time  
Rosco Manufacturing Company, Information Technology (IT) Administrator, 1995–1998, full time  
Dakota State University, Veterans' Affairs Representative, 1994–1996, part time  
United States Air Force, Communications-Computer Systems Operator, 1988–1994, full time

### ***Certifications or professional registrations***

Certified Information Systems Security Professional (CISSP)

### ***Current membership in professional organizations***

International Information Systems Security Certification Consortium (ISC)<sup>2</sup>  
Institute of Electrical and Electronics Engineers (IEEE) Computer Society

### ***Honors and awards***

2023 – True Trojan (Faculty Outstanding Contributor) nominee  
2016 – Dr. Ernest Teagarden Award for Excellence in Teaching nominee  
2015 – Lasting Impact Through Education (LITE) Award recipient  
2010 – Campus Technology Innovators Award (Teaching and Learning category) nominee  
2010 – WCET Outstanding Work (WOW) Award nominee  
2006 – Excellence in Distance Education Award recipient

### ***Service activities (within and outside of the institution)***

Meet one-on-one with prospective students and aid with new and current student registration, Ongoing  
Provided comprehensive lab and course materials to new faculty  
2022 – Kyle Korman, CSC 285 Networking I  
2021 – Scott Paulsen, CSC 285 Networking I  
2020 – Tyler Flaagan, CSC 328 Operating Environments  
2020 – Scott Paulsen, CSC 285 Networking I  
2018 - Andrew Kramer, CSC 431 UNIX/Linux Administration,  
2018 – Dr. Edward Dennis, CSC 385 Networking II  
2017 – Dr. Edward Dennis, CSC 383 Networking I  
2017 – Dr. Sulabh Bhattarai, CSC 383 Networking I

2017 – Jessica Kemp, CIS 462 UNIX/Linux Administration  
2015 – Michael Ham, CIS 383 Networking I  
2007 – Pat Engebretson, CIS 414 Computer Security Fundamentals  
2006 – Chris Olson, CIS 328 Operating Environments  
National Center of Academic Excellence (CAE) Re-Designation Team, 2022, 2017  
Cyber Defense Education  
Cyber Defense Research  
Cyber Operations  
BIS Advising Center, 2014-2015  
National Security Agency (NSA) Center of Academic Excellence in Cyber Operations Team,  
2012

***Publications and presentations (selected, from the past five years)***

None

***Professional development activities***

2019 – CompTIA Security+ SY0-501 (8.5 CPEs)  
2017 – CSC 840 Cyber Operations I (3.0 CR)  
2017 – CompTIA Advanced Security Practitioner (ASP) CAS-002 (13.5 CPEs), CompTIA  
Network+ N10-006: (9.25 CPEs), CompTIA Security+ SY0-401 (12.5 CPEs), 2016 – CSC 890  
Seminar (1.0 CR)  
2015 – CSC 803 Intro to Cyber Security Research (3.0 CR), INFA 725 Advanced Network  
Hacking (3.0 CR), CSC 842 Security Tool Development (3.0 CR)  
IT Security for End Users (3.25 CPEs)  
2014 – 20.25 CPEs in Linux Administration, topics related to computer networking and security  
2013 – 22.25 CPEs in CompTIA Security+ 2011, CompTIA Network+ 2012

## **Christopher J. Olson**

### ***Education***

Ph.D., Business Administration - Applied Computer Science specialization, NorthCentral University, 2013

MS., Information Systems, Dakota State University, 2004

BS., Information Systems, Dakota State University, 2001

### ***Academic experience***

Dakota State University, Associate Professor of Beacom College of Computer and Cyber Sciences, 2022-present, full time

Dakota State University, Coordinator of MS Cyber Defense, Beacom College of Computer and Cyber Sciences, 2021-2023, full time

Dakota State University, Associate Professor, College of Business & Information Systems, 2017 to 2021, full time

Dakota State University, Coordinator of Computer Info Systems, College of Business & Information Systems, 2016 to 2021, full time

College of Computing, Department Chair - Computer Science & Game Design, 2015 to 2016, full time

Dakota State University, Assistant Professor, College of Business & Information Systems, 2013 to 2017, full time

Dakota State University, Instructor, College of Business & Information Systems, 2006 to 2013, full time

### ***Non-academic experience***

None

### ***Certifications or professional registrations***

Certificate in Accessible Information Technology: University of Southern Maine and EASI (Equal Access to Software and Information) - 2008

CITI Collaborative Institution Training Initiative: Export Compliance (EC) - 2022

CITI Collaborative Institution Training Initiative: Research without Human Subjects (RCR) - 2022

### ***Current membership in professional organizations***

None

### ***Honors and awards***

2023, Alexander "Sandy" Davidson Award for Excellence in Advising & Mentorship at Dakota State University.

2019, Knowlton Excellence in Quality Award, Dakota State University.

2010, Dr. Ernest Teagarden Award for Excellence in Teaching, Dakota State University.

2010, Outstanding Young Alumnus, Dakota State University.

2007, Ten Outstanding Young South Dakotans, South Dakota.

1996, Congressional Nominations to West Point and US Naval Academy

***Service activities (within and outside of the institution)***

Appointment from Governor Noem, South Dakota, South Dakota Board of Vocational Rehabilitation, 2021 to present

Appointments from Governor Rounds, South Dakota, South Dakota Spinal Cord and Traumatic Brain Injury Research Council, 2004-2009.

South Dakota Board of Vocational Rehabilitation, 2008-2010.

Dakota State University Service:

Barrier Free Learning Committee, 2008; Admissions Committee, 2015; Academic Integrity Board, 2013-2016; Assessment Committee, 2014-2016; Dean's Council, 2015-2016; Academic Council, 2015-2016; Planning Council, 2015-2016.

***Publications and presentations (selected, from the past five years)***

Blessinger, J., Olson C., Bundy, K. (2021) "Assistive Technology & Document Accessibility: Tips, Tricks, and Compliance". South Dakota Society for Technology in Education (SDSTE) Annual Conference, Madison, SD.

***Professional development activities***

None

## **Cody Welu**

### ***Education***

Ph.D., Cyber Operations, Dakota State University, 2019

M.S., Applied Computer Science, Dakota State University, 2015

B.Sc., Computer and Network Security, Dakota State University, 2014

### ***Academic experience***

Dakota State University, Assistant Professor, Computer and Cyber Sciences, 2018-Present, full time

Dakota State University, Instructor of Computer and Cyber Sciences, 2017-2018, full time

Dakota State University, Adjunct Instructor, 2014-2017, part time

### ***Non-academic experience***

National Security Agency, Computer Network Defense Analyst, 2015 – 2017, full time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

ISCAP

### ***Honors and awards***

None

### ***Service activities (within and outside of the institution)***

Admissions reviewer for Ph.D. Cyber Operations and M.S. Cyber Defense

DSU Alumni Board, 2020-Present

General Activities Fee Fund Allocation Committee, 2018-Present

Athletic Committee, 2022-Present

Student Admissions Committee Alternate, 2022-Present

Defensive Security Club Advisor, 2017 – Present

DSU Athletics Photography, 2012-2014, 2017-Present

Beacom College Faculty Search Committee, 2019, 2021, 2022, 2023

Faculty Awards Committee, 2020

ISSO/SSO Search Committee, 2020

GRI Committee, 2019

### ***Publications and presentations (selected, from the past five years)***

C. Welu "Preparing for Success in CCDC: Observations by a Competitor Turned Coach"

Submitted to the 2023 Information Systems & Computing Academic Professionals Conference (ISCAP 2023), Albuquerque, NM

C. Welu, M. Ham, K. Cronin. "Verifying X.509 Certificate Extensions" Presented at the 20th International Conference on Information Technology: New Generations (ITNG 2023), Virtual



C. Welu, K. Korman. "A Reproducible Applied Threat Hunting and Incident Response Lab Environment" Presented at EDSIG Conference on Computing Education (EDSIGCON 2022), Clearwater, FL

***Professional development activities***

"Advanced APT Threat Hunting & Incident Response," Black Hat USA, August 2023

"Digital Forensics and Incident Response: Tactical Edition," Black Hat USA, August 2022

New Computer Science Faculty Workshop, UCSD, August 2018

Serve as doctoral dissertation chair and committee member

Technology outreach to regional K-12 institutions and local businesses

Provide training and development opportunities for faculty and industry

## **Edward Michael Dennis**

### ***Education***

Doctor of Computer Science, in Enterprise Information Systems, Colorado Technical University, 2015

Master of Science, Systems Engineering (MSSE), Colorado Technical University, 2011

Master of Science, Information Assurance and Computer Security (MSIA), Dakota State University, 2006

Bachelor of Arts, Management (BA), University of Sioux Falls, 2004

### ***Academic experience***

Dakota State University, Assistant Professor, 2017 – present, full time

Bellevue University, Adjunct Professor, 2014 – 2017, part time

Colorado Technical University, Adjunct Professor, 2009 – 2015, part time

Southeast Technical Institute, instructor, 1996 – 2006, full time

### ***Non-academic experience***

Contractor with SGT and KBR, Systems Architect and Information System Security Officer, 2005 - present, part time

Contractor with SGT and SAIC at EROS – USGS, Senior Systems Engineer and Information Security Analyst, 2017 - present, part time

Southeast Technical Institute, Network/System Administration, 1996 to 2001, part time

Bell Atlantic Business Systems Services, Senior Field Engineer, 1990 – 1996, full time

Control Data Corporation, Senior Field Engineer, 1979 – 1990, full time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

Member InfraGard

Nebraska IT Leadership Forum

### ***Honors and awards***

KBROne Award 2020

### ***Service activities (within and outside of the institution)***

Attend and presented at conferences in South Dakota and Nebraska

Member and participate with Nebraska IT Leadership Forum

Advisory Board Southeast Technical College

### ***Publications and presentations (selected, from the past five years)***

Presented at the Nebraska IT Symposium 5/19/2022, Nebraska IT Symposium, on the subject of Zero trust and Air-gapping Networks.

Assisted in writing White Papers published by Department of Transportation on subject of Cybersecurity, Compliance, Incident Response, and EVCS security, 2022.

### ***Professional development activities***

Security issues with the Internet of Things (IoT) – Implementing storage of sensitive IoT data in a High Security Cloud Environment. Moving data from the IoT sensors to the cloud, ensuring Integrity and non-repudiation of data and its source.

Research in Model Based system Engineering (MBSE) – Using System Modeling language (SysML) for systems engineers to perform the same lifecycle activities described in the INCOSE Systems Engineering Handbook. MBSE is used for system design and problem solving for Information System Architectures.

Research in Air-Gapping networked systems – In Industrial control Systems (ICS) and supervisory control and Data Acquisition systems it has been a long-time practice of isolating these systems from other networks and the Internet. Considering systems both on the federal and Business environment continue to be compromised, can Air gapped concepts be used within government and business to protect organizational data? Considering that systems in the ICS and SCADA environments cannot be updated due to their isolation, are there recent technological advances that can keep isolated networks updated?

Research on Zero trust Networks - Everyone that connects their network to the internet is under constant attack, and it is doubtful that this will change in our lifetime. Zero Trust is a much-used buzzword today. Organizations would like to air gap themselves from the Internet or to set up Zero Trust on their organization's network. Isolating your network using some air-gapping and Zero Trust methodologies to accomplish that end.

## **Jason Mixon**

### ***Education***

PhD, Computer Science, Dakota State University, (In Progress/ABD), 2022  
M.S., Computer Science, Dakota State University, 2022  
M.B.A., General Business, West Texas A&M University, 2013  
B.B.A., Computer Information Systems, West Texas A&M University, 2010

### ***Academic experience***

Dakota State University, Assistant Professor of Computer and Cyber Sciences, 2023 – Present, full time  
Dakota State University, Instructor of Computer and Cyber Sciences, 2021 – 2023, full time

### ***Non-academic experience***

Avanade/Accenture, Data Architect (contractor), 2020 –2021, full time  
Capco, Principal Consultant, 2019 – 2020, full time  
Clarity Insights, Sr. Consultant, 2019 – 2019, full time  
Accenture, Associate Manager/Sr. Data Architect, 2016 – 2019, full time  
General Motors, Sr. Data Architect, 2015 – 2016, full time  
Sense Corp, Management Consultant Technical Architect, 2014 – 2015, full time  
General Motors, Sr. Data Integration Developer, 2013 – 2014, full time  
B & W Pantex, Data Architect, 2011 – 2013, full time  
CA Technologies, Associate Software Engineer, 2011 – 2011, full time  
B & W Pantex, Programmer/Analyst, 2010 – 2011, full time  
Booker Transportation, IT Manager, 2005 – 2010, full time

### ***Certifications or professional registrations***

MIT Professional Education - Data Architecture Certification  
Coursera - University of Colorado - Data Warehousing for Business Intelligence Specialization

### ***Current membership in professional organizations***

Association for the Advancement of Artificial Intelligence  
Association for Computing Machinery

### ***Honors and awards***

None

### ***Service activities (within and outside of the institution)***

Beacom ABET Committee – Member  
Antigua Ministry of Education STEM Camp – Instructor  
Gen-Cyber Teachers Camp – Instructor  
Gen-Cyber STEM Camp – Instructor

### ***Publications and presentations (selected, from the past five years)***

None

***Professional development activities***

Research – Mitigating data poisoning in Federated Learning models

Research – Expanding image datasets with Generative AI

Creative AI Across Modalities – 37th AAAI Conference on Artificial Intelligence, 2023,  
Workshop

2023 ABET Symposium – Accreditation Track

## **Jason Scott Jenkins**

### ***Education***

Ph.D., Cyber Defense, Dakota State University, January 2024 (ABD expected)  
M.S. Information Assurance, Dakota State University, May 2010  
B.S. Computer Science, Dakota State University, May 2008  
B.S. Math for Information Systems, Dakota State University, May 2008

### ***Academic experience***

Computer Science, Dakota State University, Instructor, August 2016 – Present, full time  
Computer Science, Dakota State University, Instructor, Jan 2015 - May 2016, part time

### ***Non-academic experience***

Secure Banking Solutions (SBS) Software Project Lead, February 2016 - May 2016, full time  
Secure Banking Solutions (SBS), VP - Product Development, July 2014 - February 2016, full time  
Secure Banking Solutions (SBS), Lead Developer, November 2010 - July 2014, full time  
Secure Banking Solutions (SBS), Software Developer, January 2008 - November 2010, full time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

None

### ***Honors and awards***

None

### ***Service activities (within and outside of the institution)***

Committees (current and recent) - Member of: Assessment Coordinating Committee, Continuous Quality Improvement (CQI), Academic Integrity Board, University Club Funding, Barrier-Free Learning, and Intellectual Property Committee. I have served on several faculty hiring committees.

Clubs - I have been Faculty Advisor to Games Club and KDSU Student Radio since 2019 and advocate for student involvement in campus club activities.

Career Services - As a forming hiring manager, I consistently advocate for students to take part in career-focused activities, such as Career Fair and Interview Days.

Prospective Student Visits and New Student Registrations - I have regularly participated in these typical 1-on-1 activities to help new students.

Active Learning - I was invited to speak to new faculty and share strategies on active learning strategies in the classroom in Fall 2023.

### ***Publications and presentations (selected, from the past five years)***

August 2023 - Major Contributor to the Chapter on Privacy Assessments for the Book "Data Privacy Management", ISBN 13: 978-1-60797-696-7 by Dr. Kevin Streff and Dr. Lisa McKee.

Acknowledged for my work on papers by Dr. Arash Abbasi and Dr. Huaping Liu presented at "IEEE 11th Annual Computing and Communication Workshop and Conference (CCWC)" - January 2021: "Novel Cascade CNN Algorithm for UWB Signal Denoising, Compressing, and ToA Estimation" and "Novel CNN and Hybrid CNN-LSTM Algorithms for UWB SNR Estimation".

***Professional development activities***

Influence the Influencer: Preparing Students for Software Engineering - March 2017

NIST Cybersecurity Framework - Overview & Update - May 2017

Tweak the Recipe for Agile Development - December 2017

The Five Dysfunctions of a Team by Patrick Lencioni - January 2018

Building Great Scrum Masters Webinar - September 2018

Special Interest Group on Computer Science Education (ACM SIGCSE) 2019 - February 2019 - In-person Conference in Minneapolis (50th Anniversary)

Twin Cities Code Camp #21 - April 2017, #23 April 2019

CITI Program Research Courses - February 2020, February 2022

Secret Sauce for Securing the Development Lifecycle - June 2021

How Supply Chain Attacks Work: And What You Can Do to Stop Them - April 2023

**Jennifer Funke**

***Education***

M.S., Educational Technology, Dakota State University, 2019

B.S., Computer Science, Dakota State University, 2013

***Academic experience***

Dakota State University, instructor, 2023-Present, full time

Brandon Valley Middle School, Computer Science Teacher, 2021-2023, full time.

Harrisburg North Middle School, Technology Education Teacher, 2017- 2021, full time

Flandreau School District, Technology Teacher, 2015 - 2017, full time

Wolf Creek Colony, Freeman School District, Classroom Teacher, 2014-2015, full time

***Non-academic experience***

None

***Certifications or professional registrations***

None

***Current membership in professional organizations***

None

***Honors and awards***

None

***Service activities (within and outside of the institution)***

None

***Publications and presentations (selected, from the past five years)***

None

***Professional development activities***

South Dakota Association of Career and Technical Educators, September 2015-August 2020, To provide leadership and assistance to educators in developing a prepared and competitive workforce.



## **Jennifer Schulte**

### ***Education***

Ph.D., Computer Science, Dakota State University, 2022 - present  
M.S., Information Systems, Dakota State University, 2022  
M.S., Analytics, Dakota State University, 2019  
M.S., Computer Science, Dakota State University, 2019  
Bachelor of Science., Cyber Operations, Dakota State University, 2016

### ***Academic experience***

Dakota State University, Instructor, 2022-Present, full time  
Dakota State University, Adjunct Instructor, 2017 – 2018, 2019 – 2020, part time  
Mitchell Technical College, Adjunct Instructor, 2019 – 2020, part time

### ***Non-academic experience***

None

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

None

### ***Honors and awards***

None

### ***Service activities (within and outside of the institution)***

None

### ***Publications and presentations (selected, from the past five years)***

None

### ***Professional development activities***

None

## **Jihene Kaabi**

### ***Education***

Ph.D., Computer Science, University of Franche-Comté, Besancon-France, 2004  
M.Sc., Computer Science, University of Franche-Comté, Besancon- France, 2001  
M.Sc., Operational Research, Polytechnic National Institute: Grenoble-France, 2000  
BSc in Applied Mathematics, University of Science, Monastir-Tunisia, 1999  
Secondary School, High school Certificate in Mathematics, Sfax-Tunisia, 1994

### ***Academic experience***

Dakota State University, Associate Professor, Beacom College of Computer and Cyber Sciences, 2023-Present, full time  
Kingdom University-Bahrain, Associate Professor, Computer Science (Chair of the department of Computer Science), 2023-2023, full time  
University of Bahrain, Associate Professor, Computer Science, (Operations Research), 2021-2022, full time  
University of Bahrain, Associate Professor, Computer Science, (Operations Research), 2010-2020, full time  
University of Hail-KSA, Assistant Professor, Computer Science, 2007-2010, full time  
University of Hail-KSA, Lecturer in Mathematics Department, 2006-2007, full time  
Arab Open University, Assistant Professor in Computer Science and Applied mathematics, 2005-2006, full time  
Polytechnic National Institute, Nancy-France, Assistant Professor in Operational Research, 2004-2005, full time  
University of Science & Technique, Besancon-France, Teaching Assistant in Computer Science, 2002-2003, full time  
University of Science & Technique, Besancon-France, Teaching Assistant in Computer Science, 2001-2002, full time

### ***Non-academic experience***

None

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

Society member, Bahraini Academician, 2019 – Present  
Society member, INFORMS Optimization, 2019 – Present  
IEEE member, 2017 – Present  
IEEE Senior member, 2019 – Present

### ***Honors and awards***

Best student GPA in master's degree, University of Science & Technique, Besancon-France, 2001  
Ph.D. scholarship from the Ministry of Higher Education of France for getting the best Master GPA, 2001 – 2004

University of H'ail (Saudi Arabia) award for serving the university as a coordinator of the Computer Science department (Girl's branch), 2008 – 2009

***Service activities (within and outside of the institution)***

Member of the Technical Program Committee of the 8th International Conference on Modeling Simulation and Applied Optimization (ICMSAO'19), <http://icmsao.uob.edu.bh/>, Kingdom of Bahrain, April 15-17, 2019.

Member of the Public Relations Committee of the 1st International Conference on Information Systems and Applications, ICISA2016, <http://icisa.uob.edu.bh/>, University of Bahrain, Kingdom of Bahrain

Member of the scientific committee of the Palestinian International Conference on Information and Communication Technology, PICICT 2013, <http://fit.iugaza.edu.ps/picict/ie/index.html>, Gaza –Palestine.

Member of the organizing committee of the French-Japanese international congress, MECASTRONICS2001, Besançon – France

***Publications and presentations (selected, from the past five years)***

Jihene Kaabi, Youssef Harrath, Amine Mahjoub, Nabil Hewahi, Khadija Abdulsattar, A 2-phase approach for planning of hazardous waste collection using an Unmanned Aerial Vehicle, 4OR - A Quarterly Journal of Operation Research, DOI: <https://doi.org/10.1007/s10288-022-00526-0>, 2022

Zahra Mohammed, Riadh Ksantini, Jihene Kaabi, Convolutional dynamic auto-encoder: a clustering method for semantic images, Neural Computing and Applications 34.19 (2022): 17087-17105

Mahjoub, Amine, Jihene Kaabi, and Youssef Harrath. Absolute bounds of list algorithms for parallel machines scheduling with unavailability periods." International Transactions in Operational Research 28.3 (2021): 1594-1610

Jihene Kaabi, Modeling and Solving a Scheduling Problem with m Uniform Parallel Machines Subject to Unavailability Constraints, Algorithms. Vol. 12, No. 12, doi: 10.3390/a12120247, 2019

Jihene Kaabi, Youssef Harrath, Permutation Rules and Genetic Algorithm to solve the Traveling Salesman Problem, Arab Journal of Basic and Applied Sciences. Vol. 26, No. 1, pp. 283-291, 2019

Youssef Harrath, Amine Mahjoub, Jihene Kaabi, A multi-objective genetic algorithm to solve a scheduling problem on a single machine with setup-times, International Journal of Services and Operations Management. Vol. 33, No. 4, pp. 494-511, 2019.

Jihene Kaabi, Youssef Harrath, Scheduling of uniform parallel machines under availability constraints, International Journal of Production Research, Vol. 57, No. 1, pp. 216-227, 2019.

Youssef Harrath, Jihene Kaabi, New Method to Generate an Initial Basic Feasible Solution to the Balanced Transportation Problem, International Journal of Industrial and Systems Engineering, Vol. 30, No. 2 pp. 193-204, 2018.

***Professional development activities***

None

## **John D Hastings**

### ***Education***

Ph.D., Computer Science, University of Wyoming, 1996

M.S., Computer Science, University of Wyoming, 1991

B.S. with Honors, Computer Science, University of Wyoming, 1989

### ***Academic experience***

Dakota State University, Visiting Associate Professor, The Beacom College of Computer and Cyber Sciences, 2023 - Present, full time.

University of Nebraska at Kearney (UNK), Professor, Department of Computer Science & Information Systems (CSIS), 2011 – 2023, full time.

UNK, Associate Professor, Department of CSIS, 2006 – 2011, full time.

UNK Associate Professor, Department of CSIS, 2001 – 2006, full time.

DSU, Asst. Professor, College of Business & Information Systems, 2000 - 2001, full time.

South Dakota State University, Asst. Professor, Dept. of Computer Science, 1998 – 2000, full time.

### ***Non-academic experience***

21st Century Systems Inc, Researcher (AI/ML), 2009 – 2009, full time.

USDA-APHIS, Contract, AI/ML Engineer 2007 – 2009, part time.

USDA-APHIS, Contract, AI/ML Engineer, 2003 – 2005, part time.

Hastings Consulting Services, Business Owner, AI/ML Consultant, 1999 – 2001, part time.

Berkley Information Services, Software Engineer (AI), 1997 – 1998, full time.

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

Association for Computing Machinery (ACM) (2000–2007, 2010–present).

### ***Honors and awards***

International IPM (Integrated Pest Management) Award for Excellence, 2012.

Best Paper Award, 42nd Hawaii International Conference on System Sciences, 2009.

Faculty Mentoring of Undergraduate Student Research Award, 2004.

Innovative Applications of Artificial Intelligence (IAAI) award, 2001.

### ***Service activities (within and outside of the institution)***

Nebraska Hall of Computing Awards Selection Committee, 2014 – 2023.

Member, Dean's Advisory Committee, CBT, UNK, 2022 -2023.

Member, UNK General Studies Committee, 2022 - 2022.

Member, Faculty Affairs Committee (Promotion & Tenure), CBT, UNK, 2018 - 2022.

Chair, Search Committee, Asst Professor, Dept of Cyber Security, UNK, 2020 - May 2021.

Chair, Search Committee, Asst Professor, Dept of Cyber Security, UNK, 2020 – 2020.

Member, CBT/CNSS Adhoc Promotion/Tenure Committee, UNK, 2019 - 2020.

Chair, CSIS Writing Assessment Coordinator, UNK, 2018 - 2019.

Member, Search Committee, Dept Chair, Dept of Cyber Security, UNK, 2018 - 2019.  
Member, UNK Assessment Committee, 2018 - 2019.  
Member, Cyber Systems Merger Committee, UNK, 2017 - 2019.  
Graduate Faculty, University of Nebraska, 2005 – 2023.

***Publications and presentations (selected, from the past five years)***

S. Weitzl-Harms, A. Spanier, John Hastings, and M. Rokusek, Framing Gamification in Undergraduate Cyber Security Education, *Journal of the Colloquium on Information Systems Security Education (CISSE)*, 10(1):1–7 (2023).  
S. Weitzl-Harms, A. Spanier, John Hastings, and M. Rokusek, A Systematic Mapping Study on Gamification for Undergraduate Cyber Security Education, *Journal of Cybersecurity Education, Research and Practice (CCERP)* (2023).  
S. Weitzl-Harms, A. Spanier, John Hastings, and M. Rokusek, Assessing User Experiences with ZORQ: A Gamification Framework for Computer Science Education, 56th Hawaii International Conference on System Sciences (HICSS-56), 2023.  
John Hastings, S. Weitzl-Harms, A. Spanier, M. Rokusek, and R. Hensey, ZORQ: A Gamification Framework for Computer Science Education, IEEE 2022 Frontiers in Education Conference (FIE-22), Sweden, 2022, IEEE Computer Society.  
A. Spanier, S. Weitzl-Harms & John Hastings, A Classification Scheme for Gamification in Computer Science Education: Discovery of Foundational Gamification Genres in Data Structures Courses, Proceedings of the 2021 Frontiers in Education Conference (FIE-21), Lincoln, NE, USA, October 13–16, 2021, IEEE Computer Society.

***Professional development activities***

Webinar, Programming with Generative AI, Aug 10, 2023.  
Webinar, Use Gen AI to Build AI Systems at Scale, Aug 8, 2023.  
Webinar, Exploring the Impact of AI on Student Connection & Belonging, Aug 2, 2023.  
3rd Annual Great Plains Interoperability Conference: Interoperating with AI: How to Manage Data Standards in the 21st Century, Aug 1, 2023.  
Webinar, ML Monitoring: Data Drift, Quality, Bias & Explainability, Aug 1, 2023.  
Webinar, Cracking the Code: Addressing Bias in AI, July 28, 2023.  
Webinar, What startups need to know about AI, July 28, 2023.  
Webinar, The impact of generative AI on creative entrepreneurs, July 27, 2023.  
Webinar, Understanding Generative AI & the Biggest Disruptions in the Next 3-5 Years, July 27, 2023.  
Webinar, Revolutionizing Knowledge with Generative AI, July 26, 2023.  
Webinar, ChatGPT & the Future of Generative AI, July 26, 2023.

## **Kanthi Narukonda**

### ***Education***

Ph.D., Doctor of Philosophy in Cyber Defense, Dakota State University (current student)  
M.S., Information Systems, Dakota State University  
M.S., Information Assurance, Dakota State University  
Master of Technology., Embedded Systems, Gandhi Institute of Technology and Management University  
Bachelor of Technology., Computer Science, Jawaharlal Nehru Technological University

### ***Academic experience***

Dakota State University, Assistant Professor, 2023 – Present, full time  
Dakota State University, Director CybHER Institute, 2022, full time  
Dakota State University, Instructor, 2022-2023, full time  
Dakota State University, Chief of Operations - Director CybHER Institute, 2020 - 2022, part time  
Dakota State University, Graduate Assistant, 2017-2022, part time

### ***Non-academic experience***

LLC, SBS Cyber Security, Information Security Consulting / Digital Forensics Incident Response Intern, 2020- 2020 & 2019 – 2019, part time  
LLC, SBS CyberSecurity, Network Security Intern, 2018 – 2018, part time  
Defense Research and Development Organization, Intern, 2013 – 2014, part time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

None

### ***Honors and awards***

Awarded an SBS/Gamewell scholarship in Spring 2019, Spring 2021, and Fall 2021  
Awarded scholarships to attend the WiCyS conference in Spring 2018, Spring 2019, and Fall 2021  
Awarded a \$5000 scholarship from Peraton in Fall of 2022

### ***Service activities (within and outside of the institution)***

None

### ***Publications and presentations (selected, from the past five years)***

None

### ***Professional development activities***

Developed a malware analysis testing environment – cuckoo sandbox  
Developed tutorials for Windows registry forensics

## **Kathy Engbrecht**

### ***Education***

Master of Science., Information Systems, Dakota State University, 2007

### ***Academic experience***

Dakota State University, Instructor, 2009 – present, full time

Dakota State University, Assistant Registrar, 1998 – 2008, full time

Dakota State University, Acting Director of Admissions, 1994 - 1997

### ***Non-academic experience***

None

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

None

### ***Honors and awards***

The Alexander "Sandy" Davidson Award for Excellence in Advising Student Success Award

### ***Service activities (within and outside of the institution)***

Retention Specialist – Meet with all incoming transfer students, develop advising resources

Monitor progress of Beacom College students towards graduation

Curriculum Committee

Financial Aid Appeal Committee

Barrier Free Learning Committee

Banner Integration Team – transition to new student information database

Newman Club Co-Adviser

Trojan Pride

Numerous Search and Screens

### ***Publications and presentations (selected, from the past five years)***

None

### ***Professional development activities***

None

## **Kyle Cronin**

### ***Education***

D.Sc., Information Assurance, Capitol Technology University, 2014

Master of Science, Information System, Dakota State University, 2011

Bachelor of Science, Information System, Dakota State University, 2009

### ***Academic experience***

Dakota State University, Associate Professor of Computer & Cyber Science, 2021-Present, full time

Dakota State University, Assistant Professor of Information Assurance, 2015-2021, full time

Dakota State University, Lecturer of Information Assurance, 2014-2015, full time

Dakota State University, Instructor of Information Assurance, 2011-2014, full time

Dakota State University, Graduate Teaching & Research Assistant, 2009-2011, full time

### ***Non-academic experience***

Fishback Financial Corporation, Internship Program Coordinator, full time

Daktronics, Inc, Application Engineer/ Datacenter Operations, 2008-2010, full time

American Bank & Trust, Information Security Specialist, 2007-2008, full time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

None

### ***Honors and awards***

None

### ***Service activities (within and outside of the institution)***

Served as General Faculty Vice President for AY2021

Serve as DSU's VMware Cloud Provider Program & VMware Academy administrator

Serve as dissertation chair

### ***Publications and presentations (selected, from the past five years)***

C. Welu, K. Cronin, and M. Ham. "Verifying X.509 Certificate Extension." International Conference on Information Technology (ITNG). April 2023, Virtual Conference

K. Cronin, M. Ham. (2022). Teaching Introductory Routing Concepts. Paper presented at the Education Special Interest Group Conference in Clearwater, FL

M. Ham, K. Cronin. (2022). Electronic Cyber Badge: An Experiential Teaching Platform for Cybersecurity Concepts. Paper presented at the Education Special Interest Group Conference in Clearwater, FL

K. Cronin, M. Ham. (2022). Internet of Strings: Introducing Routing Concepts to Kids. Paper presented at the Midwest Instruction and Computing Symposium in Milwaukee, WI



M. Ham, K. Cronin (2022). Wireless Security: Learning by Hacking with Software Defined Radios. Paper presented at the Midwest Instruction and Computing Symposium in Milwaukee, WI

K. Cronin, M. Ham. (2021). A python tool for rogue 802.11 teaching. Paper presented at the Education Special Interest Group Conference in Washington, DC

M. Ham, K. Cronin. (2021). IPv6 RPKI Implementation Validator: A Security Utility for BGP Administrators. Paper presented at the Education Special Interest Group Conference in Washington, DC

K. Cronin, M. Ham. (2020). Open Source Capture and Analysis of 802.11 Management Frames. Paper presented at the Information Technology Next Generation in Las Vegas, NV

K. Cronin, M. Ham. (2020). Educating on 802.11 Using Open Source Capture Tools. Paper presented at the Central Area Networking and Security Workshop in Ames, IA

J. Wulf-Plimpton, K. Cronin, Y. Wang, "Comparative Study of Healthcare Administrative Employees's Comprehension and Use of Data Protection Application of Cell Phones" DSU Research Day, March 2019

K. Cronin, B. Van Aartsen, "Quick Methods for Evaluation of Security Posture" Educause Annual Security Conference, April 2018

***Professional development activities***

Technology outreach/support to regional K12 institutions for complex networking

Beacom Academic Server Room Design & Construction which allows remote students to be assigned physical hardware need or virtualization curriculum

Clear Cyber Leaders Conference Session Chair

Developed relationship with the Air Force 333rd Training squadron

NSA Center of Academic Excellence Cyber Operations mentorship to new universities

NSA Consultative Regional Resource Center Co- Director

Cyber Operations PhD Program

Cyber Defense & Cyber Operation PI/Co-PI

## **Kyle Korman**

### ***Education***

Ph.D., ABD, Doctor of Philosophy in Computer Science, Dakota State University, 2024 (expected)

Masters, Computer Science, Dakota State University, 2021

Bachelor, Science in Cyber Operations, Dakota State University, 2020

### ***Academic experience***

Dakota State University, Assistant Professor, 2023-Present, full time

Dakota State University, Adjunct Instructor, 2021-2022, part time

Dakota State University, Curriculum Developer, 2021-2021, part time

### ***Non-academic experience***

Dakota State University, Research Engineer II, 2021-2023, full time

MITRE Corporation, Cyber Operations Grad Intern, 2020-2020, full time

Department of Defense, Summer Internship, 2019-2019, full time

Howard School District, Interim IT Coordinator, 2019 – 2019, part time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

None

### ***Honors and awards***

None

### ***Service activities (within and outside of the institution)***

None

### ***Publications and presentations (selected, from the past five years)***

C. Welu, K. Korman. "A Reproducible Applied Threat Hunting and Incident Response Lab Environment." EDSIG Conference on Computing Education (EDSIGCON) 2022.

### ***Professional development activities***

Centers for Academic Excellence Faculty Development, Threat Hunting and Incident Response, Las Vegas, NV, August 7-8, 2023

## **Mark Spanier**

### ***Education***

Ph.D., Mathematics, North Dakota State University, 2015

College Teaching Certificate, North Dakota State University, 2015

B.Sc., Mathematics, North Dakota State University, 2010

### ***Academic experience***

Dakota State University, Interim Dean, College of Arts and Sciences, 2023-Present, full time

Dakota State University, Associate Professor, Beacom College of Computer and Cyber Sciences, 2022 - present, full time

Dakota State University, Assistant Professor, 2017 - 2022, full time

Dakota State University, Instructor, 2015 – 2017, full time

North Dakota State University, Mathematics Department Teaching Fellow, 2014 – 2015, full time

West Fargo Public School District, Curriculum Consultant, 2014 – 2015, full time

North Dakota State University, College of Science and Mathematics Research Fellow, 2013 – 2014, full time

West Fargo Public School District, GraSUS K-12 Teaching Fellow, 2012 – 2014, full time

West Fargo Public School District, GraSUS K-12 Teaching Fellow, 2011 – 2012, full time

North Dakota State University, Graduate Mathematics Instructor, 2011 – 2014, full time

Carnegie Mellon University, Teaching Assistant, 2010, full time

North Dakota State University, Teaching Assistant, 2007 – 2010, full time

### ***Non-academic experience***

None

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

Mathematical Association of America Communication Co-Officer (Nebraska/SE South Dakota Section). Elected position charged with updating section website and sending section information, 2022 – present.

Section Chair (Nebraska/SE South Dakota Section). Elected position charged with hosting, planning, and running the spring sectional meeting, 2021 - 2022

Section Chair Elect (Nebraska/SE South Dakota Section). Elected position charged with assisting the Section Chair to plan and run sectional meeting, 2019 – 2022

Communication Officer. Elected position charged with updating section website and sending section information, 2022 – present

Leader. Elected position charged with planning and developing SINE COMMIT events, 2021 – present

SINE COMMIT: South Dakota, Iowa, and NEbraska (SINE) COMmunity for Mathematics Inquiry in Teaching (COMMIT)

### ***Honors and awards***

2023, Dr. Ernest Teagarden Award for Excellence in Teaching  
2015, NDSU Mathematics Department Graduate Student Teaching Award  
2015, NDSU College of Science and Mathematics Graduate Student Travel Grant  
2014, NDSU Mathematics Department Graduate Student Research Award  
2014, NDSU College of Science and Mathematics Graduate Student Travel Grant

### ***Service activities (within and outside of the institution)***

2022 – Present, Artificial Intelligence (AI) Club Advisor  
2019 – Present, Honors Committee  
2019 – Present, Gaming Club Advisor  
2019 – Present, Title IX Investigator  
2018 – Present, Faculty Development Committee  
2022 – 2023, Shared Governance Committee  
2022 – 2023, General Faculty President  
2022 – 2023, Faculty Advisory Committee  
2022 – 2023, Implementation Council  
2022, Faculty Search Committee, Assistant Professor(s) of Computer Science (AI Focused)  
2021 – 2022, Faculty Search Committee, Assistant Professor of Mathematics  
2021, Faculty Search Committee, Assistant Professor(s) of Computer Science  
2021, Faculty Search Committee, Instructor(s) of Computer Science  
2021, Faculty Search Committee, Assistant Professor of Mathematics  
2020, Faculty Search Committee, Assistant Professor(s) of Computer Science  
2020, Faculty Search Committee, Instructor(s) of Computer Science  
2016 – 2020, Student Success Committee  
2019 – 2020, Faculty Game Producer, Expedition  
2018 – 2020, Organizer for Mathematics Seminar and Speaker Series  
2018 – 2019, Faculty Game Producer, Kingdom Cleanup  
2017 – 2019, Curriculum Committee  
2019, Faculty Search Committee, Assistant Professor of Mathematics  
2018, Quality Assurance (Online) Reviewer  
2018, Faculty Search Committee, Visiting Assistant Professor of Biology  
2018, General Education Math Summit

### ***Publications and presentations (selected, from the past five years)***

Weighted Uniform Convergence of Entire Grunwald Operators on the Real Line. *Comput. Methods Funct. Theory* (2021). <https://doi.org/10.1007/s40315-021-00408-2>  
Extremal Signatures, with F. Littmann, *Constr. Approx.* 47, no. 2 (2018), 339–356.  
<https://doi.org/10.1007/s00365-017-9373-7>

### ***Professional development activities***

AI and Cybersecurity Workshop, Lead Facilitator, May 2023  
AI and Cybersecurity Workshop, Lead Facilitator, May 2023  
AI and Cybersecurity Workshop, Lead Facilitator, August 2023

## **Michael J. Ham**

### ***Education***

D.Sc., Cyber Security, Dakota State University, 2017  
M.S., Applied Computer Science, Dakota State University, 2015  
M.S., Information Assurance, Dakota State University, 2012  
B.S., Computer and Network Security, Dakota State University, 2010

### ***Academic experience***

Dakota State University, Associate Professor of Computer and Cyber Sciences, 2022, full time  
Dakota State University, Assistant Professor of Computer and Cyber Sciences, 2016-2022, full time  
Dakota State University, Instructor of Information Security, 2013-2016, full time

### ***Non-academic experience***

Madison, Independent Security Consultant, 2013-Present, full time  
Eide Bailly, Security Consultant, 2011-2013, full time  
South Dakota K-12 Data Center, Communications Network Specialist, 2008-2011, full time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

None

### ***Honors and awards***

None

### ***Service activities (within and outside of the institution)***

National Security Agency Center of Academic Excellence in Cyber Operations Principal  
CyberCorps Scholarship for Service Principal Investigator  
Program Coordinator, B.S. Cyber Operations  
Program Coordinator, Ethical Hacking Graduate Certificate program

### ***Publications and presentations (selected, from the past five years)***

S. Zwach, M. Ham. "ICT: Attendance & Contact Tracing During a Pandemic." International Conference on Information Technology (ITNG). April 2023, Virtual Conference.  
C. Welu, K. Cronin, and M. Ham. "Verifying X.509 Certificate Extensions." International Conference on Information Technology (ITNG). April 2023, Virtual Conference.  
M. Ham, K. Cronin, and T. Halverson. "Electronic Cyber Badge: An Experiential Teaching Platform for Cybersecurity Concepts." EDSIG Conference on Computing Education (EDSIGCON) 2022.  
K. Cronin, M. Ham. "Teaching Routing Concepts: The Internet of Strings." EDSIG Conference on Computing Education (EDSIGCON) 2022.  
M. Ham, K. Cronin, and T. Halverson. "Wireless Security: Learning by Hacking with Software Defined Radios." Midwest Instruction and Computing Symposium (MICS) 2022.

K. Cronin, M. Ham, and T. Halverson. "Internet of Strings: Introducing Routing Concepts to Kids." Midwest Instruction and Computing Symposium (MICS) 2022.

M. Ham, K. Cronin, and T. Halverson. "IPv6 RPKI Implementation Validator: A Security Utility for BGP Administrators". Conference on Information Systems Applied Research (CONISAR) 2021.

K. Cronin, M. Ham (2021). "Using Python for teaching 802.11 security and intrusion detection." Paper presented at EDSIGCON in Washington, D.C.

K. Cronin, M. Ham (2020). "Open Source Capture and Analysis of 802.11 Management Frames." Proc. of the 17th International Conference on Information Technology: New Generations (ITNG: 2020). April 2020, Las Vegas, NV USA (virtual conference).

K. Cronin, M. Ham (2020). "A python tool for rogue 802.11 hunting." Paper presented at Central Area Networking and Security Workshop (CANSec) in Ames, IA.

***Professional development activities***

DEF CON Security Conference, Las Vegas, NV, August 2023

Black Hat Training, Reverse Engineering Firmware with Ghidra, Las Vegas, NV, August 2023

Center of Academic Excellence Symposium, Seattle, WA, June 2023

Invited Presentation at Marquette University, Milwaukee, WI, April 2023

Scholarship For Service Principals Meeting, Washington, D.C., January 2023

GenCyber Fall Meeting presentation, Online, October 2022

Center of Academic Excellence Northwest Hub, Denver, CO, September 2022

DEF CON Security Conference, Las Vegas, NV, August 2022

Black Hat Training, Advanced Threat Emulation, Las Vegas, NV, August 2022

Center of Academic Excellence Symposium, Atlanta, GA, June 2022

GenCyber Spring Meeting, Arlington, VA, May 2022

Scholarship For Service New Principal Investigator Workshop presentation, Arlington, VA, April 2022

Center of Academic Excellence Program Assistance Workshop, Online, January 2022

Cybersecurity Program Development Workshop, Online, January 2022

Center of Academic Excellence Peer Review Workshop, Online, January 2022

DEF CON Security Conference, Las Vegas, NV, August 2021

Center of Academic Excellence Principals, Columbia, MD, November 2021

Black Hat Briefings, Las Vegas, NV, August 2021

## **Patrick Engebretson**

### ***Education***

DSc., Information Systems, Dakota State University, 2009

Master of Science., Information Systems, Dakota State University, 2001

Bachelor of Science in Psychology, Bachelor of Science in Sociology, North Dakota State University, 1997

### ***Academic experience***

Dakota State University, Assistant Professor, Faculty Liaison for Rising II Gift, 2022 - Present, full time

Dakota State University, Dean, Beacom College of Computer and Cyber Sciences, 2020 - 2023, full time

Dakota State University, Assistant Professor of Information Assurance, 2009-2015, full time

Dakota State University, Department of Defense, 2012 – 2015, full time

Dakota State University, Instructor of Information Systems, 2007 – 2009, full time

Dakota State University, Graduate Teaching Assistant, 2006 –2007, full time

Mount Marty College – Watertown, Instructor, 2005 – 2006, full time

### ***Non-academic experience***

East River Electric, Chief Information Officer, 2015 – 2020, full time

Reliabank – Watertown, Information Technology Manager / Network Security Officer, 2004 – 2006, full time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

None

### ***Honors and awards***

Ernest M. Teagarden Award for Excellence in Teaching. Dakota State University, 2014

Aug. 2014: Co-PI on \$4,594,212 National Science Foundation Scholarship for Service (NSF-SFS) grant titled "DSU Cyber Corps Renewal". [awarded DGE-1423208]

May 2014: Co-PI on \$98,566 Department of Defense Information Assurance Scholarship Program (DoD IASP) grant. [awarded]

Feb. 2013: Co-PI on \$98,079.33 Department of Defense Information Assurance Scholarship Program (DoD IASP) grant. [awarded]

Feb. 2012: Co-PI on \$46,081.41 Department of Defense Information Assurance Scholarship Program (DoD IASP) grant. [awarded]

May 2012 - April 2015: Co-PI on \$500,000 "RET Site: Cyber Security" (NSF CNS 1200648). [awarded]

Feb. 2011: Co-PI on \$70,926 Department of Defense Information Assurance Scholarship Program (DoD IASP) grant. [awarded]

Jan. 2010: Co-PI on \$35,291.13 Department of Defense Information Assurance Scholarship Program (DoD IASP) grant. [awarded]

***Service activities (within and outside of the institution)***

PhD. Cyber Operations Program Coordinator

East River Federal Credit Union Board Member

4-H Shooting Sports Instructor and Leader

Bethel Lutheran Home Foundation Board Member

Serve as liaison between faculty and university leadership helping to guide, shape, and inform various mission critical projects in relation to the legislative funding and commitments of the Rising II gift.

Serve as the visionary, collaborative, energetic academic and administrative leader for the Beacom College. Reporting to the Provost.

Served as the Faculty Development Coordinator

Served on various college, campus, and academic committees.

***Publications and presentations (selected, from the past five years)***

The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy, 2nd Ed. P. Engebretson, Syngress, 2013. (This book was a number one best-seller and has been translated into 9 different languages.)

The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy, P. Engebretson, Syngress, 2011

***Professional development activities***

Center for Teaching and Learning: Faculty Book Club. Harriet L. Schwartz's Connected Teaching. 3-part discussion covering book topics and implementation strategies.

Leader: New Faculty Orientation (3-week onboarding session for new faculty).

Academic Advisor Series: Best practices for advising.



## **Robert Allen Richards**

### ***Education***

Ph.D., Cyber Defense, Dakota State University, In Progress  
M.S., Information Assurance, Dakota State University, 2017  
Rfid., Train the Trainer Computer Science, Oakton Community College  
Graduate Course work in Anthropology, University of Houston, 1991  
Bachelor of Arts in Anthropology, University of Houston, 1989

### ***Academic experience***

Dakota State University, Instructor, 2018-Present, full time  
ST. Clair County Community College, Professor & Adjunct Instructor, 1999 – Present & 1998 – 1999, full time

### ***Non-academic experience***

Quality Computer Solutions, Short Term Contract, 2016 – 2016  
Port Huron Hospital, Mini Computer Specialist, 1997 – 1999  
T.F.Hudings, INC, MIS Supervisor & MIS Coordinator, 1996 – 1997 & 1993 - 1996

### ***Certifications or professional registrations***

CompTIA - Server+  
CompTIA - Security+  
CompTIA - Network+  
CompTIA - A+  
CompTIA - i-net+  
EC Council - Computer Network Defender (Pending)  
Oracle Database Foundations Certified Junior Associate  
MOS 2002 Word (expert), Excel (expert), Access

### ***Current membership in professional organizations***

None

### ***Honors and awards***

2015 Del James Blessinger Award for Teaching Excellence (SC4's) highest teaching award  
2015-2016 Innovator of the Year for programming at SC4 STEM Institute - League for Innovation in the Community College  
2016 Nominated for Distinguished Faculty Award St. Clair County Community College.  
2017 Excellence Award - National Institute for Staff and Organizational Development (NISOD)

### ***Service activities (within and outside of the institution)***

None

### ***Publications and presentations (selected, from the past five years)***

None

### ***Professional development activities***

None

## **Shawn Zwach**

### ***Education***

Ph.D., ABD, Computer Science, Dakota State University, 2024 (expected)  
Master of Science., Applied Computer Science, Dakota State University, 2018  
B.Sc., Cyber Operation, Dakota State University, 2014

### ***Academic experience***

Dakota State University, Assistant professor of Computer and Cyber Sciences, 2022-Present, full time  
Dakota State University, Instructor of Computer and Cyber Sciences, 2019-2022, full time  
Dakota State University, Adjunct Instructor of Computer Science, 2016-2019, part time

### ***Non-academic experience***

Independent Information Technology Consultant, 2014-Present, full time  
Naval Information Warfare Center Atlantic, Computer Scientist, 2016 – 2019, full time  
Naval Information Warfare Center Atlantic, Intern-Computer Scientist, 2014 – 2015, full time  
The Schwan Food Company, Intern-Software Quality Assurance, Computer Security, 2012 – 2013, full time

### ***Certifications or professional registrations***

GIAC Reverse Engineering Malware Certification (Analyst 5802)

### ***Current membership in professional organizations***

None

### ***Honors and awards***

None

### ***Service activities (within and outside of the institution)***

Institutional hiring and search committees  
Chair of the DSU Parking Committee, AY21-22

### ***Publications and presentations (selected, from the past five years)***

S. Zwach, M. Ham (2023). "ICT: Attendance and Contact Tracing During a Pandemic." Proc. of the 20th International Conference on Information Technology: New Generations (ITNG: 2023). May 2023, Las Vegas, NV USA (virtual conference).

### ***Professional development activities***

Developed tool to assist with attendance & contact tracing  
Developed tool to assist with advising  
Developed tool for matching K-12 students with workforce opportunities in partnership with South Dakota Department of Labor and Regulation and South Dakota Department of Education  
Reverse Engineering Firmware with Ghidra at BlackHat USA 2023  
A Beginners Guide to Reversing with Ghidra at BlackHat USA 2022  
Wild West Hacking Fest CTF Winner / Black Badge Holder - 2019  
Digital Forensics Research Workshop Forensics Challenge, Grand Champion 2018

## **Stephen Krebsbach**

### ***Education***

Ph.D., Computer Science, North Dakota State University, 2005

M.S., Computer Science, Moorhead State University, 1990

B.Sc., Computer Science, Moorhead State University, 1986

### ***Academic experience***

Dakota State University, Professor of Computer Science, 2016 - Present, full time

Dakota State University, Associate Professor of Computer Science, 2006 - 2016, full time

Dakota State University, Assistant Professor of Computer Science, 2000 - 2006, full time

South Dakota State University, Assistant Professor of Computer Science, 1998 - 2000, full time

North Dakota State University, Teaching Fellow, Computer Science, 1997 – 1998, full time

North Dakota State University, Research Assistant, Computer Science, 1997 – 1998, full time

South Dakota State University, Instructor of Computer Science, 1988 - 1997, full time

Dakota State University, Coordinator in Doctor of Philosophy Computer Science, 2020 – Present, full time

Dakota State University, Coordinator in Master of Computer Science, 2015 – 2020, full time

Dakota State University, Academic Coordinator of Computer Science, 2003-2007, full time

### ***Non-academic experience***

None

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

ACM Member

SIGCSE – ACM Special Interest Group in Computer Education Member

IEEE Member

IEEE Computer Society Member

### ***Honors and awards***

2016 – The Alexander "Sandy" Davidson Award of Excellence in Advising – DSU

PI: \$75,588 (2009), as part of the State of South Dakota EPSCoR RII Track 1 proposal, for plan the vDUSEL/vSURF E&O project as South Dakota continues to partner on the DUSEL (vSURF) project. This EPSCoR participation in a major grant for DSU helped build our research presence in that organization. It also included funding to support State research communication infrastructure.

+ additional ~ \$5000 for Governor's PBS Documentary video

+ additional ~ \$2000 for additional vDusel work

+ additional ~\$1500 for VDUSEL Teaser Video

PI: \$5000 (2008) "Virtual SUSEL/DUSEL" SDBOR Mini Grant – This was pre EPSCoR vDUSEL and helped lay the groundwork for inclusion in that major grant.

Co-Principal Investigator Approx \$400,000 over 4 years (2002-2005) NSF - 02-006 CSEMS – CS, ENG & MATH SCHOLARSHIPS MACSTECH Scholars: A Mathematics and Computer

Science Technology Scholarship Program. Continued to serve as CO-PI and was awarded an additional ~ \$83,640 over the FY06-08 period.

***Service activities (within and outside of the institution)***

2008 – 2014, DSU EPSCoR Coordinator  
2005 – 2012, Governor's State IT Discipline Council (President 2006-07)  
2008 – 2012, VDUSEL/VSURF Project Leader – Sanford Underground Lab  
2009 – 2012, Sanford Center of Science Education (SCSE) Project Design Team  
2010 – 2013, SD EPSCoR Advisory Committee  
2022 – Present, Beacom ABET Taskforce  
2019 – Present, Academic Assessment Coordinating Committee  
2020 – Present, Joint DSU/SDSU CSC Doctorate Advisory Committee  
2015 – Present, University Graduate Coordinators  
2012 – Present, MSCS / PhD CSC Admissions  
2000 – Present, Graduate Council  
2020 – 2021, University Promotion and Tenure  
2008 – 2022, University Curriculum  
2018 – 2021, University Hall of Fame Committee  
2016 – 2018, College of Computing Dean's Advisory  
2016 – 2019, University Faculty Academic Integrity Board (chair)  
2016 – 2017, University Promotion and Tenure (President 2017)  
2016 – 2018, University General Education Review  
2008 – 2016, University Assessment  
2015 – 2016, Graduate Program Review  
2014 – 2016, Faculty/Admissions working group  
2014 – 2015, BIS Taskforce  
2006 – 2013, University Research  
2011 – 2012, President's Publication Taskforce (P&T related)

***Publications and presentations (selected, from the past five years)***

None

***Professional development activities***

"Sanford Underground Research Facility Website Enables Users to Explore Virtual Underground Environment Online" - SD EPSCoR UPDATE- Winter 2012 Edition – Authored by Dr. Stephen Krebsbach – 2012

"DSU website taking a closer look at Sanford lab in Lead" – Rapid City Journal – September 27, 2011

State of South Dakota Featured Researcher Profile – Dr. Stephen Krebsbach, Research, Education, & Economic Development Network (REED) Brochure/Booklet, SDBOR - 2009

"Virtual DUSEL to be major educational component for lab" – Wendy Pitlick; Black Hills Pioneer & The Rapid City Weekly News – October 21, 2008

## **Tom Halverson**

### ***Education***

Ph.D., Computer Science, The University of Iowa, 1999  
M.S., Computer Science, The University of Iowa, 1992  
B.A., Computer Science, University of Minnesota, 1990

### ***Academic experience***

Dakota State University, Professor Computer Science, Beacom College of Computer and Cyber Sciences, 2023-Present, full time

Dakota State University, Associate Dean for Undergraduate Programs, Beacom College of Computer and Cyber Sciences, 2022 - Present, full time

Dakota State University, Associate Professor, Beacom College of Computer and Cyber science 2005 - 2022, full time

Dakota State University, Academic Coordinator, Undergraduate Computer and Cyber Sciences programs 2000 – 2004, 2016 – 2022, full time

Dakota State University, Dean, College of Business and Information System, 2003 – 2014

Dakota State University, Assistant Professor, 1999 – 2005, full time

### ***Non-academic experience***

None

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

ACM

### ***Honors and awards***

None

### ***Service activities (within and outside of the institution)***

Serve as a co-PI for Dakota State University's CyberCorps Scholarship for Service (SFS) program. DSU's program is one of the nation's largest in providing full ride scholarships and has supported 113 students since its inception. The scholarship program places graduates into full-time positions within the government (federal, state, local, or Tribal), to help meet the need for qualified, technically capable cybersecurity professionals.

Served as co-PI on the grant to include undergraduate students in the research project. This was part of the national collaboration involving over 10 universities and several federal agencies.

### ***Publications and presentations (selected, from the past five years)***

M. Ham, K. Cronin, and T. Halverson. "Electronic Cyber Badge: An Experiential Teaching Platform for Cybersecurity Concepts." EDSIG Conference on Computing Education (EDSIGCON) 2022.

M. Ham, K. Cronin, and T. Halverson. "Wireless Security: Learning by Hacking with Software Defined Radios." Midwest Instruction and Computing Symposium (MICS) 2022.

K. Cronin, M. Ham, and T. Halverson. "Internet of Strings: Introducing Routing Concepts to Kids." Midwest Instruction and Computing Symposium (MICS) 2022.

M. Ham, K. Cronin, and T. Halverson. "IPv6 RPKI Implementation Validator: A Security Utility for BGP Administrators". Conference on Information Systems Applied Research (CONISAR) 2021.

***Professional development activities***

None

## **Tyler Flaagan**

### ***Education***

Ph.D., Cyber Operations, Dakota State University  
M.S., Applied Computer Science, Dakota State University  
B.S., Cyber Operations, Dakota State University

### ***Academic experience***

Dakota State University, Assistant Professor, 2019 – Present, full time  
Dakota State University, Instructor, 2013 – 2018, full time

### ***Non-academic experience***

U.S. Cyber Games, Senior Technical Mentor, 2023 – Present, part time  
Naval Information Warfare Center Atlantic, Red Team Operator, 2014 – 2019, full time  
Dakota State University, Web Developer, 2012 – 2015, part time

### ***Certifications or professional registrations***

Offensive Security Certified Professional (OSCP)  
GIAC Exploit Researcher and Advanced Penetration Tester Certification (GXPN)

### ***Current membership in professional organizations***

None

### ***Honors and awards***

None

### ***Service activities (within and outside of the institution)***

Serve as Sr. Technical Mentor to US Cyber Games season 3 team  
Coach student cyber teams for various competitions  
Server as Director of Deep Red Lab within DSU MadLabs  
Advice university Offensive Security Club

### ***Publications and presentations (selected, from the past five years)***

CVE-2019-5523/VMSA-2019-0004 "VMware vCloud Director for Service Providers update resolves a Remote Session Hijack vulnerability"  
<https://www.vmware.com/security/advisories/VMSA-2019-0004.html>  
Flaagan, Tyler, "Traversing NAT: A Problem" (2021). Masters Theses & Doctoral Dissertations. 365. <https://scholar.dsu.edu/theses/365>  
Flaagan, T. (2023) 'Using ChatGPT to Generate Computer Science Problem Sets', International Journal on Integrating Technology in Education, 12(02), pp. 19–29. Available at: <https://doi.org/10.5121/ijite.2023.12202>

### ***Professional development activities***

Specter Ops Adversary Tactics: Red Team Operations  
SANS SEC660 Training  
SANS SEC642 Training  
Penetration Testing with Kali Training

Advanced Infrastructure Hacking Training  
Specter Ops Adversary Tactics: Vulnerability Research for Operators Training  
Cyber Corps Scholarship  
Cyber Sophomore Scholarship  
DSU Champion Scholarship  
Black Hat Scholarship  
DEF CON 28 OpenSOC Winner  
MetaCTF Winner  
SANS NetWars Champion  
ACM (Won local competition)



## **Varghese Mathew Vaidyan**

### ***Education***

Ph.D., Computer Engineering, Iowa State University, 2022

M.S., Electronics and Electrical Engineering, University of Glassgow, 2010

Bachelor of Technology., Electrical and Electronical Engineering, University of Calicut, 2007

### ***Academic experience***

Dakota State University, Assistant Professor, 2022-Present, full time

University of Texas, Adjunct Faculty, 2022 – 2022, full time

Benedict College, Faculty Member, 2022 –2022, full time

Grand View University, Adjunct Faculty, 2021 – 2021, full time

Iowa State University, Graduate Teaching Assistant, 2017 – 2017, full time

King Khalid University, Lecturer, 2012 – 2015, full time

Iowa State University, Graduate Teaching Assistant, 2016 – 2016, full time

### ***Non-academic experience***

Iowa State University, Graduate Teaching Assistant, 2020 – 2021, full time

Iowa State University, Graduate Teaching Assistant, 2018 – 2020, full time

Iowa State University, Graduate Teaching Assistant, 2017 – 2017, full time

NIT Calicut, Research Associate, 2012 – 2012, full time

ViMicrosystems Pvt Ltd, Research and Development Trainee, 2010 – 2011, full time

### ***Certifications or professional registrations***

AWS Certified Solutions Architect

Cisco Certified Network Associate (CCNA)

IBM Mainframes trained

### ***Current membership in professional organizations***

PhD Recruitment committee member

### ***Honors and awards***

None

### ***Service activities (within and outside of the institution)***

None

### ***Publications and presentations (selected, from the past five years)***

A. Rizzi, V. M. Vaidyan and B. Rimal. Leveraging Linear Recursive Sequences for Enhanced Domain Algorithm Obfuscation. Computers and Security, Under Review, 2023

V. M. Vaidyan and A. Tyagi, Towards Quantum Artificial Intelligence Electromagnetic Prediction Models for Ladder Logic Bombs and Faults in Programmable Logic Controllers, 2022

International Conference on Electronic Systems and Intelligent Computing (ICESIC), Chennai, India, 2022, pp. 1-6, doi: 10.1109/ICESIC53714.2022.9783543.

Vaidyan, V.M. and Tyagi, A. Instruction Level Disassembly through Electromagnetic Side Channel: Machine Learning Classification Approach with Reduced Combinatorial Complexity.

Proceedings of 3rd International Conference on Machine Learning and Signal Processing, ACM (22-24Oct.2020).

Vaidyan, V. M., & Tyagi, A. Electromagnetic failure analysis of control system processors in the internet of things. International Journal of Cybernetics and Cyber-Physical Systems, 1(2), 184-208, 2022

Vaidyan, V.M. and Tyagi, A. Electromagnetic Security Vulnerabilities and Instruction Disassembly of Controller in Adaptive Controllers. 12th International Multiconference on Complexity, Informatics and Cybernetics, IIS, IIS, March 2020.

[Invited Paper] Vaidyan, V.M. and Tyagi, A. Electromagnetic Security Vulnerabilities and Instruction Disassembly of Controller in Adaptive Controllers. Journal of Systems, Cybernetics and Informatics, May 2021

***Professional development activities***

None

## **Yong Wang**

### ***Education***

Ph.D., Computer Science, University of Nebraska-Lincoln, 2007

M.Eng., Computer Science, Wuhan University, 1998

B.Sc., Computer Science, Wuhan University, 1998

### ***Academic experience***

Dakota State University, Professor, Associate Dean of Beacom Graduate programs, 2022-Present, full time

Dakota State University, Associate Professor, Program Coordinator of the Ph.D. Cyber Operations Program, 2017-2022, full time

Dakota State University, Assistant Professor, 2012-2017, full time

### ***Non-academic experience***

Calient Networks, Santa Barbara, CA, Senior Software Engineer/Manager, 2007-2011, full time

UTStarcom R&D Center, Shenzhen, China, Senior Software Engineer, 2002-2003, full time

ZTE Corporation, Shenzhen, China, Senior Software Engineer, 1998-2000, full time

### ***Certifications or professional registrations***

None

### ***Current membership in professional organizations***

Senior Member, IEEE, 2004 – Present

PEV, Commissioner, ABET CAC, 2018 - Present

### ***Honors and awards***

2015 Merrill Hunter Award for Excellence in Research at Dakota State University.

2007 Outstanding graduate teaching assistant awarded by the Department of Computer Science and Engineering, University of Nebraska-Lincoln.

2003-2007 Full scholarships for doctoral study at University of Nebraska-Lincoln.

1997 Outstanding graduate student scholarship awarded by the Wuhan University.

1994 Outstanding undergraduate research student awarded by the Wuhan University.

1992 Outstanding undergraduate student scholarship awarded by the Wuhan University.

### ***Service activities (within and outside of the institution)***

A member of DSU Graduate Council, Institutional Review Board, MSCS Admission Committee, MSCD Admission Committee, Ph.D. in Cyber Operations Admission Committee.

ABET Computing Accreditation Commission (CAC) Program Evaluator, since 2018

Served as a Co-chair for the Cybersecurity and big data working group in the Middle West Big Data Hub.

Served as Technical Program Committee member for over 40 conferences/workshops including IEEE ICC, IEEE Globecom, and ICNC.

Served as reviewer for over 10 journals including IEEE Transactions on Computational Social Systems, IEEE Transactions on Industrial Informatics, IEEE Access, and IEEE Computer.

Served as a reviewer/panelist for the US National Science Foundation (NSF).

Served as a proposal reviewer for Loire Valley Institute for Advanced Studies, France  
Served as poster co-chair for the 15th IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS) in 2018.

***Publications and presentations (selected, from the past five years)***

Carson Koball, Bhaskar P Rimal, Yong Wang, Tyler Salmen, Connor Ford, IoT Device Identification Using Unsupervised Machine Learning, Information 2023, 14(6), 320; <https://doi.org/10.3390/info14060320>.

Kaushik Muthusamy Ragothaman, Yong Wang, Bhaskar Rimal, and Mark Lawrence, Access Control for IoT: A Survey of Existing Research, Dynamic Policies and Future Directions, Sensors, 23, no. 4: 1805 (2023). <https://doi.org/10.3390/s23041805>

Bhaskar Rimal, Cuiyu Kong, Bikrant Poudel, Yong Wang, Pratima Shahi, Smart Electric Vehicle Charging in the Era of Internet of Vehicles, Emerging Trends, and Open Issues. Energies. 2022; 15(5):1908. <https://doi.org/10.3390/en15051908>

Kai Taylor, Alexandra Smith, Adam Zimmel, Korina Alcantara, and Yong Wang, Medical Device Security Regulations and Assessment Case Studies, the 8th National Workshop for REU Research in Networking and Systems (REUNS 2022), Denver, Colorado, October 20 - 22, 2022. (Best Paper Runner Up Award)

Yong Wang, Bhaskar P. Rimal, Mark Elder, Sofia I. Crespo Maldonado, Helen Chen, Carson Koball, and Kaushik Ragothaman, IoT Device Identification Using Supervised Machine Learning, 2022 IEEE International Conference on Consumer Electronics (ICCE), Jan 7-9, 2022.

Mohammad Nur and Yong Wang, Identity Relationship Management for Internet of Things: A Case Study, 2022 IEEE International Conference on Consumer Electronics (ICCE), Jan 7-9, 2022.

Mohammad Nur and Yong Wang, An Overview of Identity Relationship Management in the Internet of Things, 2021 IEEE International Conference on Consumer Electronics (ICCE), Jan 10-12, 2021.

Yong Wang, Kaushik Muthusamy Ragothaman, and Bijay Shakya, Towards Trusted Data Processing for Information and Intelligence Systems, Hawaii International Conference on System Sciences (HICSS-54), Kauai, Hawaii, January 5-8, 2021.

Sulabh Bhattarai and Yong Wang, End-to-End Trust and Security for Internet of Things Applications, IEEE Computer, April 2018.

***Professional development activities***

Principle Investigators: NSF CNS 1123220, NSF CNS 1200648, NSF CNS 1337529, NSF CNS 1852145, and NCAE-C-001-2021 H98230-21-1-0164; Co-PI: NSF OAC 1730105. Total: \$2.3MM.

## **Youssef Harrath**

### ***Education***

Ph.D., Computer Science, Franche-Comte University, 2003

M.Sc., Operational Research, Optimization and Combinatorial, Polytechnic National Institute, Grenoble, France, 2000

B.Sc., Applied Mathematics & Computer Science, Science University, Tunisia, 1998

### ***Academic experience***

Dakota State University, Visiting Assistant Professor, 2023 – present, full time

University of Bahrain, Associate Professor, 2023, full time

University of Bahrain, Assistant Professor, 2010 – 2022, full time

University of Hail, Assistant Professor, 2006 – 2010, full time

King Fahad University of Petroleum & Minerals, Assistant Professor, 2005 – 2006, full time

High Institute of Applied Computer Sciences of Lorraine, Assistant Professor, 2004 – 2005, full time

National Institute of Applied Science, Assistant Professor, 2003 – 2004, full time

High National Institute of Mechanics and Mecatronics, student and teaching assistant, 2001 - 2004, full time

Franche-Comte University, Ph.D. student and Teaching Assistant, 2000 - 2003, full time

Science University, Teaching Assistant, 1998-1999, part time

### ***Non-academic experience***

None

### ***Certifications or professional registrations***

Microsoft Certified Educator

### ***Current membership in professional organizations***

Senior member, IEEE, 2019

Secretary of the Execution Committee, IEEE, 2018 – 2020

### ***Honors and awards***

6-month M.Sc. Training Program Scholarship, University of Troyes, France, 2000.

3-year Ph.D. scholarship, Ministry of Higher Education, France, 2000-2003.

Best paper award, 3rd International Conference on Modeling and Simulation, MOSIM'01, Troyes-France, 2001.

Top 5 best Blackboard users, University of Bahrain, 2014.

### ***Service activities (within and outside of the institution)***

Coordinator of the Quality Assurance Committee, Department of Computer Science, College of Information Technology, University of Bahrain, 2018-2023

Long experience in coordinating and working for accreditation tasks: ABET (Accreditation Board for Engineering and technology), NQF (National Qualification Framework), BQA (Bahrain Qualification Authority)

Senior project coordinator, Department of Computer Science, College of Information Technology, University of Bahrain, 2012 – 2018  
Senior project coordinator, College of Information Technology, University of Bahrain, 2015-2018

***Publications and presentations (selected, from the past five years)***

Muhammad Ayaz, Abdullah Arshad, Usman Iftekhar, Muhammad Waqas, Youssef Harrath, Shanshan Tu (2023), Cloud-based Smart Parking System using Internet of Things, IWCMC 2023 Symposium on Smart cities and mobile platforms, 19-23 June 2023, Marrakesh, Morocco.

Jihene Kaabi, Youssef Harrath, Amine Mahjoub, Nabil Hewahi, Khadija Abdulsattar, Modeling and solving an Unmanned vehicle routing problem, 4OR- A Quarterly Journal of Operations Research, <https://doi.org/10.1007/s10288-022-00526-0>, 2022.

Youssef Harrath, A Three-Stage Layer-Based Heuristic to Solve the 3D Bin-Packing Problem under Balancing Constraint, Journal of King Saud University - Computer and Information Sciences, Vol. 34, Issue 8, Part B, pp. 6425-6431, 2022.

Youssef Harrath, Three-step Metaheuristic for the Multiple Objective Multiple Traveling Salesmen Problem, International Journal of Applied Metaheuristic Computing, Vol. 11, No. 4, pp. 130-148, 2020.

Jihene Kaabi, Youssef Harrath, Permutation Rules and Genetic Algorithm to solve the Traveling Salesman Problem, Arab Journal of Basic and Applied Sciences, Vol. 26, No. 1, pp. 283-291, 2019.

Youssef Harrath, Amine Mahjoub, Jihene Kaabi, A multi-objective genetic algorithm to solve a scheduling problem on a single machine with setup-times, International Journal of Services and Operations Management. Vol. 33, No. 4, pp. 494-511, 2019.

Youssef Harrath, Abdul Fattah Salman, Abdulla Alqaddoumi, Hesham Hasan & Ahmed Radhi, A Novel Hybrid Approach for Solving the Multiple Traveling Salesmen Problem, Arab Journal of Basic and Applied Sciences, Vol 26, No 1, pp 103-112, 2019.

Jihene Kaabi, Youssef Harrath, Scheduling of uniform parallel machines under availability constraints, International Journal of Production Research, Vol. 57, No. 1, pp. 216-227, 2019.

Amine Mahjoub, Jihene Kaabi, Youssef Harrath, Absolute bounds of list algorithms for parallel machines scheduling with unavailability periods, International Transactions in Operational Research, Vol. 28, No 3, pp. 1594-1610, 2018.

***Professional development activities***

Promoted to the rank of Associate Professor at the University of Bahrain, June 2023 (The file was evaluated by a departmental, college, and university committees as well as 5 international Professors in the field of Operations Research from Spain, UK, and France)

## APPENDIX B: Course Syllabi

The syllabi for the courses being utilized in the ABET Assessment plan are included in this appendix:

- CSC 105 - Introduction to Computers (required)
- CSC 150 - Computer Science I (required)
- CSC 234 - Software Security (required)
- CSC 247 - Introduction to Artificial Intelligence (AI/ML specialization)
- CSC 250 - Computer Science II (required)
- CSC 260 - Object Oriented Design (required)
- CSC 285 - Networking I (required)
- CSC 300 - Data Structures (required)
- CSC 310 - Advanced Data Structures (required)
- CSC 314 - Assembly Language (required)
- CSC 321 - Cyber Law and Policy (CIS 332 or CIS 424 or CSC 321)
- CSC 334 - Web Development (Software engineering specialization)
- CSC 386 - Applications of Deep Learning (AI/ML specialization)
- CSC 404 - Foundation of Computation (required)
- CSC 410 - Parallel Computing (required)
- CSC 447 - Artificial Intelligence (AI/ML specialization)
- CSC 456 - Operating Systems (required)
- CSC 461 - Programming Languages (required)
- CSC 470 - Software Engineering (required)
- CSC 482 - Algorithms and Optimization (required)
- CIS 332 - Structured Systems Analysis and Design (CIS 332 or CIS 424 or CSC 321)
- CIS 424 - Software Development with Agile Methodologies (CIS 332 or CIS 424 or CSC 321)

The syllabi for CSC 494 - Internship 1-8 credits and CSC 498 - Undergraduate Research/Scholarship are not required and thus not included in the Appendix B.

## **CSC 105 Introduction to Computers**

### ***Credits and contact hours***

3 credits, course meets 150 minutes per week

### ***Instructor's or course coordinator's name***

Kathy Engbrecht

### ***Required course materials***

- Textbook(s): None
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: Overview of computer applications with emphasis on word processing, spreadsheets, database, presentation tools and internet-based applications.
- Prerequisite(s): None
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Demonstrate the use of computer application software.
  - Demonstrate knowledge of computer technology.
- Student outcome(s): Communicate effectively in a variety of professional contexts.

### ***Brief list of topics covered in the course***

- DSU Student application knowledge
- D2L
- Banner Self Service and other student applications
- WebMail /Outlook - configuration and usage
- Computer Operating Knowledge – Windows, Laptop functionality, printing, connecting to networks
- Office 365 including OneNote, Word, Excel, Access, PowerPoint.
- Webpages – how the web works, creating basic pages, understanding links, and publishing to the server



## **CSC 150 Computer Science I**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Alexander Maxey

### ***Required course materials***

- Textbook(s): None
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: An introduction to computer programming. Focus on problem solving, algorithm development, design, and programming concepts. Topics include sequence, selection, repetition, functions, and arrays.
- Prerequisite(s): None
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Problem Solving - students should learn to identify, evaluate, and solve a given problem with the tools/skills available to them.
  - Programming - students should learn to code basic programs in C.
  - Linux - students should gain a basic understanding of how to work a Linux environment - navigation, folders, files, etc.
  - Communication - students should learn to communicate about programming with their peers and instructors.
  - Convention - students should develop good habits when programming, such as indentation, naming conventions, etc.
  - Curiosity - students should leave the class with a sense of excitement & anticipation of what they can learn in a future course, using the building blocks learned here.
- Student outcome(s): Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

### ***Brief list of topics covered in the course***

- Basic Linux Commands
- Sequential Programming, IO, Variables
- Mathematical Operators
- Conditional Statements, Logical Operators
- Arrays
- Loops
- Functions
- Supporting Libraries in C (string.h and math.h, etc.)

- Nested Loops, Conditionals, etc.
- Basics of 2D arrays

## **CSC 234 Software Security**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Rob Richardson

### ***Required course materials***

- Textbook(s): None
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: This course will make use of hands-on exercises in compiled and web-based software to illustrate attack methodologies and techniques that lead to software vulnerabilities that violate fundamental security principles. Attacks and mitigation strategies related to filter evasion, session management, input validation, buffer overflows, and related areas will be emphasized.
- Prerequisite(s): CSC 250 Computer Science II
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Discuss the fundamental principles underlying cyber security and how these principles can be employed to secure systems.
  - Identify which fundamental security design principles are in play, given a particular scenario.
  - Discuss how failure to follow secure design principles results in vulnerabilities that can be exploited.
  - Distinguish morals, ethics and legal requirements.
  - Apply ethical standards to real-world situations.
  - Evaluate the ethical and legal ramifications of real-world scenarios.
  - Discuss vulnerability taxonomies such as CVE, CWE, OSVDB, and CAPEC.
  - Identify implicit and explicit trust in systems.
  - Identify the advantages and disadvantages of the various authentication interfaces.
  - Demonstrate, in a lab environment, how authentication attacks occur.
  - Discuss techniques to mitigate or prevent various types of overflow attacks
  - Demonstrate, in a lab environment, how overflow attacks occur.
  - Discuss techniques to mitigate or prevent privilege escalation attacks.
  - Demonstrate, in a lab environment, how privilege escalation attacks occur.
  - Discuss techniques to mitigate or prevent injection attacks.
  - Demonstrate, in a lab environment, how input validation attacks occur.
  - Discuss the need to balance security with business goals, user productivity, and user convenience.

- Apply fundamental security design principles during system design, development, and implementation to minimize vulnerabilities.
- Discussion Security issues related to user Interfaces and human machine interfaces.
- Student outcome(s): Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

***Brief list of topics covered in the course***

- Security First Principles
- Cyber Ethics
- Vulnerability Families and Classification Schemes
- Trust Relationships
- Authentication Attacks
- Overflows
- Privilege Escalation
- Injection Attacks
- User Interface Attacks
- HMI/ICS/SCADA

## **CSC 247 Introduction to Artificial Intelligence**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Jason Mixon

### ***Required course materials***

- Textbook(s): Grokking Artificial Intelligence Algorithms. Rishal Hurbans. Manning; 1st Edition. Sep 1st, 2020
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: This course introduces the field of artificial intelligence by covering a wide array of problems, genres, techniques, and uses of AI. It will also address issues and concerns such as the ethics, bias, the effect AI may have on society, and careers connected to AI.
- Prerequisite(s): CSC 150 Computer Science I and MATH 201 Introduction to Discrete Mathematics
- Required, elective, or selected elective: AI/ML Specialization Requirement

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Understand the history of AI and how it influenced current AI algorithms.
  - Identify the proper algorithms for various AI related problems.
  - Implement AI algorithms in Python.
  - Consider the philosophical and ethical questions surrounding artificial intelligence.
- Student outcome(s): Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

### ***Brief list of topics covered in the course***

- History of AI
- AI Basics
- Search
- Evolutionary Algorithms
- Swarm Intelligence
- Machine Learning
- Neural Networks
- Reinforcement Learning
- Ethical AI

## **CSC 250 Computer Science II**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Aaron Ingalls

### ***Required course materials***

- Textbook(s): None
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: Problem solving, algorithm design, standards of program style, debugging and testing. Extension of the control structures and data structures of the high-level language introduced in CSC 150. Elementary data structures and basic algorithms that include sorting and searching. Topics include more advanced treatment of functions, data types such as arrays and structures, and files.
- Prerequisite(s): CSC 150 Computer Science I
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Students will be able to develop, compile, and execute readable, functional code.
  - Students will be able to identify the proper use case for arrays of different dimensions, lists, and functions.
  - Students will be able to understand strengths/weaknesses of algorithm design.
  - Students will be able to identify and create the correct sorting and searching algorithms for a problem.
- Student outcome(s): Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

### ***Brief list of topics covered in the course***

- Problem solving & algorithm design
- Standards of program style
- Programming, debugging, and testing
- Arrays, string, multi-dimension arrays
- File IO
- Search & sort
- Recursion
- Structures
- Memory allocation & pointers
- List ADT – array & linked list versions

## **CSC 260 Object-Oriented Design**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Jason Jenkins

### ***Required course materials***

- Textbook(s): Learning Object-Oriented Programming. Gaston c. Hillar. Packt publishing; Jul 16, 2015
- Other supplemental materials: UML Distilled: A Brief Guide to the Standard Object Modeling Language, Addison-Wesley Professional; 3rd edition; September 15, 2003

### ***Specific course information***

- Brief description of course content: This course emphasizes object-oriented programming methodologies. An object-oriented language will be used to illustrate these OO concepts. The Unified Modeling Language (UML) will be introduced.
- Prerequisite(s): CSC 250 Computer Science II or CIS 251 Business Application Programming
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Students will differentiate the object-oriented programming paradigm from others.
  - Students will learn the core pillars of object-oriented design.
  - Students will focus on software design in addition to its implementation.
  - Students will learn the Unified Modeling Language as a way to visually express software design.
  - Students will learn how object-oriented design can create opportunities for clean, elegant, and flexible code.
  - Students will leverage a commonly utilized object-oriented language to apply lessons from other outcomes.
- Student outcome(s): Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

### ***Brief list of topics covered in the course***

- Classes
- Objects
- Constructors/Destructors
- Class and Instance Members
- Encapsulation
- Abstraction
- Inheritance

- Polymorphism
- UML
- Class and Program Design
- Access Modifiers
- Interfaces/Multiple Inheritance
- Generic Types and Collections
- Organization of Object-Oriented Code
- SOLID Principles



## **CSC 285 Networking I**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Brent Tulloss

### ***Required course materials***

- Textbook(s): Guide to Networking Essentials- Course Technology. Gregory Tomsho. Cengage learning; 8th Edition. Jul 10, 2020
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: LAN topologies, media choices, protocols and transmission techniques are addressed. Overview of LAN planning and installation considerations. LAN hardware and software offerings and problem determination procedures are presented.
- Prerequisite(s): None
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Articulate the building blocks that form a modern network, such as protocols, topologies, hardware, and network operating systems.
  - Enumerate the most important concepts in networking, such as TCP/IP, Ethernet, wireless transmission, and security.
  - Acquire the foundation of knowledge needed to undertake more advanced course work.
- Student outcome(s): Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

### ***Brief list of topics covered in the course***

- Introduction to Computer Networks
- Network Hardware Essentials
- Network Topologies and Technologies
- Network Media
- Network Protocols
- IP Addressing
- Network Reference Models and Standards
- Introduction to Network Security
- Network Operating System Fundamentals (Linux and Windows)
- Network Management and Administration (Linux and Windows)

## **CSC 300 Data Structures**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Tom Halverson

### ***Required course materials***

- Textbook(s): None
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: A systematic study of data structures and the accompanying algorithms used in computing problems; structure and use of storage; methods of representing data; techniques for implementing data structures; linear lists; stacks; queue; trees and tree traversal; linked lists; and other structures.
- Prerequisite(s): CSC 250 Computer Science II
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Understanding of abstract data types, data structures, and required properties.
  - Ability to implement data structures.
  - Knowledge of well-known algorithms and a grasp of major properties.
  - Application of data structures to real problems and the ability to make informed choices.
- Student outcome(s): Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

### ***Brief list of topics covered in the course***

- ADT: abstract data types
- List ADT
- Arrays
- Linked list
- Structures
- Basic O(): O(1), O(N)
- Memory allocation
- Searching & sorting algorithms
- O(N<sup>2</sup>), O(log n), O(n log n)
- Stack: array & linked
- Queue: array & linked
- STL implementations
- Priority queue
- Tree (general, binary): root, leaf, parent, child, sibling, branch, etc.

- Tree representation/implementation: array, linked
- Binary search tree: find, insert, delete
- Tree traversal algorithms
- Expression tree
- Heap: insert, delete
- Recursion efficiency, memorization, dynamic programming
- Graph
- Graph representation/implementation: adjacency matrix & list
- Graph traversal
- Graph algorithms such as shortest path, spanning tree, etc.
- Algorithm complexity concepts and meaning of  $O(1)$ ,  $O(n)$ , etc.
- NP problems
- Code timing & relation to theoretical expectations
- Additional topics on C++ & OO, Vectors, sets, Hash functions, dictionary if time allows

## **CSC 310 Advanced Data Structures**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Tom Halverson

### ***Required course materials***

- Textbook(s): None
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: Describe and implement a variety of new and advanced data structures not studied in typical introductory courses on data structures and algorithms.
- Prerequisite(s): CSC 300 Data Structures
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Gain a broader understanding of data structure applications.
  - Gain a better understanding of Big-O.
  - Develop new techniques to develop efficient algorithms.
  - Gain experience with new data structures and their applications.
- Student outcome(s): Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

### ***Brief list of topics covered in the course***

- Lists
- Algorithms – searching & sorting; analysis and comparison
- Trees – additional trees, balanced trees, tree algorithms
- Graphs – representation & algorithms
- Files (text and binary)
- Languages (beyond C/C++)

## **CSC 314 Assembly Language**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Tom Halverson

### ***Required course materials***

- Textbook(s): None
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: A thorough introduction to assembly language programming and processor architecture. A study of low-level programming techniques, and the layout of a typical computer. The student will gain insight into the memory layout, registers run-time stack, and global data segment of a running program.
- Prerequisite(s): CSC 250 Computer Science II
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Students will be comfortable reading, writing, compiling, and debugging basic x86 assembly language programs.
  - Students will gain an understanding of registers, the stack, and instruction usage.
  - Students will understand the relationship between C/assembly code.
- Student outcome(s): Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

### ***Brief list of topics covered in the course***

- Number bases (decimal, binary, hexadecimal)
- Signed integer representation
- CPU architecture (registers, instructions, memory)
- Arithmetic instructions
- Control structures, branching, loops
- Subroutines and the call stack
- Calling conventions, stack parameters and local variables
- .data/.bss memory segments, arrays, pointer arithmetic
- Interrupts and system calls
- 64-bit assembly

## **CSC 321 Cyber Law and Policy**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Kanthi Narukonda

### ***Required course materials***

- Textbook(s): Management of Information Security. Michael E. Whiteman and Herbert J. Mattord. Cengage Learning; 6th Edition. May 3rd 2018.
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: The course will review information security programs, security policies and procedures, as well as investigate disaster recovery, security awareness, and IT auditing concepts. In addition, students will understand and interpret current regulatory bodies that influence businesses from an IT security standpoint. Special attention will be paid to legal and ethical considerations surrounding cyber operations from a military and government perspective, including international/US laws, authorities applicable to a given scenario, and moral reasoning models
- Prerequisite(s): None
- Required, elective, or selected elective: Required in the choose from CIS 332 or CIS 424 or CIS 321 option

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Students will obtain the skills to evaluate information security policies, strategies, and contingency plans.
  - Students will be able to create information security policies, strategies, and contingency plans.
  - Students will be able to understand cyber ethics and laws, compliance, and governance.
  - Students will be able to conduct risk assessments of small organizations.
  - Students will be able to relate each of the above learning outcomes to relevant US/international laws and cyber ethics.
- Student outcome(s):
  - Communicate effectively in a variety of professional contexts.
  - Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

### ***Brief list of topics covered in the course***

- Introduction to the management of information security
- Protection mechanisms

- Law and ethics
- Governance and strategic planning for security
- Information security policy
- Developing the security program
- Risk management: assessing risk
- Risk management: treating risk
- Security management models
- Security management practices
- Planning for contingencies
- Security maintenance

## **CSC 334 Web Development**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Aaron Ingalls

### ***Required course materials***

- Textbook(s): None
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: Students will develop the skills necessary to prototype, design, test and deploy web applications using modern frameworks and technologies. Development of applications that are RESTful is emphasized, but other communication structures may be explored. Security, scalability, user experience, and accessibility are additional considerations of delivering these pieces of software that will be analyzed.
- Prerequisite(s): CSC 250 Computer Science II
- Required, elective, or selected elective: Required for Software Engineering specialization

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Understand the difference between website frontends and backends.
  - Design a RESTful API to send and receive data.
  - Design an accessible website adhering to best practices.
- Student outcome(s): Apply computer science theory and software development fundamentals to produce computing-based solutions.

### ***Brief list of topics covered in the course***

- Brief list of topics to be covered
- HTML markup
- Web styling with CSS
- Accessibility design considerations
- JavaScript syntax
- HTML and JavaScript interaction
- Intro to OO paradigm
- Basic web server (express)
- REST API design
- Retrieving data from remote source
- Asynchronous JavaScript



## **CSC 386 Applications of Deep Learning**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Austin O'Brien

### ***Required course materials***

- Textbook(s):
  - Deep Learning with Python. Francois Chollet. Manning; 2nd Edition. Dec 21, 2021.
  - Deep Learning – A Visual Approach. Andrew Glassner. No Starch Press; Jun 29, 2021.
  - Machine Learning with Python Cookbook. Albon. O'Reilly Media; Apr 17, 2018.
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: This course covers different types of Deep Neural Networks and their Applications in AI. Types of neural networks include multi-layer perceptrons, convolutional neural networks, and recurrent neural networks. Applications range from image processing, natural language processing, and reinforcement learning. Students will learn how to preprocess input, interpret and tune hyperparameters, as well as analyze and interpret output and performance.
- Prerequisite(s): CSC 250 Computer Science II
- Required, elective, or selected elective: Required for the AI/ML specialization

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Students will be able to explain the process of how Neural Networks learn through forward propagation and gradient descent with backpropagation.
  - Students will implement a neural network that will fit a model to estimate supervised output given input values.
  - Students will compare different neural network architectures and understand their specific use cases.
  - Students will implement different architectures used for different A.I. fields, such as NLP, Computer Vision, and Reinforcement Learning.
  - Students will evaluate multiple pretrained neural networks to review their performance.
- Student outcome(s): Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

### ***Brief list of topics covered in the course***

- Introduction to machine learning
- Forward propagation

- Introduction to gradient descent
- Gradient descent with multiple inputs/outputs
- Introduction to backpropagation
- Visualization, regularization, and activation functions
- Convolutional neural networks
- Recurrent neural networks
- Introduction to NLP
- Introduction to reinforcement learning

## **CSC 404 Foundation of Computation**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Mark Spanier

### ***Required course materials***

- Textbook(s): None
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: An overview algorithms and approaches to solving cyber operations problems, which include essential underlying concepts drawn from discrete mathematics, algorithms analysis, and finite automaton. Topics may include, but are not limited to, searching and sorting algorithms, complexity theory, regular expressions, computability, mathematical foundations of cryptography, and entropy.
- Prerequisite(s): CSC 300 Data Structures and MATH 201 Introduction to Discrete Mathematics
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Design automata, regular expressions, context-free grammar, and Turing Machines that accept or generate a certain language.
  - Describe the language accepted by an automaton or generated by a regular expression.
  - Design, analyze, and implement Turing machines that perform specific tasks.
  - Analyze the asymptotic performance of algorithms and write correctness proofs for algorithms.
  - Design randomized algorithms (e.g., Las Vegas Method and Monte Carlo Method) to solve appropriate problems and compare correctness and performance to deterministic algorithms.
  - Derive, analyze, and implement various graph, randomized, network flow, and matching algorithms.
  - Understand and apply fundamental concepts in information theory such as probability, entropy, data compression, and coding theory.
  - Analyze and implement multiple forms of hashing. Determine collision frequency and run-time differences in hashing approaches.
  - Describe how and understand why various cryptographic algorithms and protocols work.
  - Analyze and implement multiple forms of cryptographic algorithms. Determine vulnerabilities and differences in various protocols.

- Student outcome(s): Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

***Brief list of topics covered in the course***

- Finite Automaton
- Regular Expressions and Language Recognition
- Pushdown Automaton
- Turing Machines
- Algorithms and Complexity
- Graph Algorithms
- Graphs and Network Flows
- Randomized Algorithms
- Information Theory and Entropy
- Hash Functions
- Symmetric-Key Algorithms and
- Public-Key Cryptosystems

## **CSC 410 Parallel Computing**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Tom Halverson

### ***Required course materials***

- Textbook(s): None
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: The fundamental ideas and issues involved in programming and using parallel computers. This course will cover topics in the design, analysis, and implementation of parallel algorithms. Environments discussed and used may include a variety of shared-memory and message passing models, cluster computing, and GPU computing.
- Prerequisite(s): CSC 300 Data Structures
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Fundamentals of multi-threaded, multi-core, multi-processor paradigms.
  - Core problems in communication, synchronization, mutual-exclusion, etc. in terms of conceptual issues as well as actual program implementations.
  - Benefits and challenges to moving beyond a single thread of control.
- Student outcome(s): Apply computer science theory and software development fundamentals to produce computing-based solutions.

### ***Brief list of topics covered in the course***

- Terminology, thread/process, shared/distributed
- Threads: pthread, create & join
- Threads: locks & communication
- Scheduling
- OpenMP (primitives to match with pthread topics)
- MPI: message passing
- MPI: broadcast, gather, reduce
- Measurement, efficiency, scalability
- Compare models
- Other languages & libraries

## **CSC 447 Artificial Intelligence**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Jason Mixon

### ***Required course materials***

- Textbook(s): Artificial Intelligence – A Modern Approach 4th ed., Stuart Russel and Peter Norvig, Pearson Education Inc.; ISBN-13 978-0-13-461099-3. 2022.
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: Concepts in Artificial intelligence: programming in languages such as Prolog or LISP; knowledge representation; search algorithms.
- Prerequisite(s): CSC 250 Computer Science II
- Required, elective, or selected elective: Required for the AI/ML specialization

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Understand what artificial intelligence is and how it relates to intelligent agents.
  - Demonstrate problem solving through search and constraint satisfaction.
  - Understand how agents use reasoning to make decisions.
  - Understand and describe how uncertainty affects agent decisions.
  - Understand the different techniques agents use to learn.
  - Consider the philosophical and ethical questions surrounding artificial intelligence.
- Student outcome(s): Apply computer science theory and software development fundamentals to produce computing-based solutions.

### ***Brief list of topics covered in the course***

- Intelligent Agents
- Adversarial Search and Games
- Logical Agents
- First Order Logic and Inference
- Knowledge Representation
- Probabilistic Reasoning
- Multi-Agent Decision Making
- NLP and Computer Vision
- Robotics
- Philosophical Questions, Ethics and Safe AI

## **CSC 456 Operating Systems**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Stephen Krebsbach

### ***Required course materials***

- Textbook(s): Operating System Concept Essentials. Silberschatz Wiley. Wiley; 2nd Edition. Nov 6, 2013
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: A study of functions and structures associated with operating systems with respect to process management, memory management, auxiliary storage management and processor management. Topics included concurrent and distributed computing, deadlock, real and virtual memory, job and processor scheduling, security and protection.
- Prerequisite(s): CSC 300 Data Structures and CSC 314 Assembly Language
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Students will understand the main components of an Operating System's:
    - Process Management
    - Memory Management
    - Processor Management
  - Students will understand the states of process execution
  - Students will understand multi-programming with both single and multiple threading
  - Students will understand inter-process communication
  - Students will be able to apply different short-term scheduling algorithms to analyze performance
  - Students will understand how multi-core processor impact OS management
  - Students will understand Concurrency and race conditions
  - Students will understand the critical section concurrency problem
  - Students will understand Deadlock and starvation issues
  - Students will understand static and virtual memory issues
  - Students will understand segments and paging
  - Students will be able to apply different page replacement algorithms to analyze performance
  - Students will understand Thrashing
- Student outcome(s): Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

***Brief list of topics covered in the course***

- OS structure
- Process management
- Multi-programming
- Process scheduling
- Inter-Process Communication (IPC)
- Threads
- Multi-core issues
- Process synchronization
- Critical section problem
- Semaphores
- Deadlocks
- Processor management
- CPU scheduling criteria
- CPU scheduling algorithms
- Real-time CPU scheduling
- Main memory management
- Segmentation
- Paging
- Virtual memory
- Demand paging
- Page replacement algorithms
- Thrashing
- OS protection (memory, processes, ...)



## **CSC 461 Programming Languages**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Stephen Krebsbach

### ***Required course materials***

- Textbook(s): Concepts of Programming Languages. Robert W. Sebasta. Pearson; 12th Edition. 2019.
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: This course consists of two parts. The first part introduces how programming languages are designed, including an introduction to the concepts of parsing and compiling. Issues related to implementation such as type checking, binding, and memory management are discussed. Secondly, the course will survey the spectrum of programming languages paradigms, including traditional imperative, object oriented, functional, and logic languages.
- Prerequisite(s): CSC 300 Data Structures
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Students will understand the general concepts of programming language design.
  - Students will understand the differences between Compilers / Interpreters.
  - Students will be able to describe a programming language Syntax using a formal method.
  - Students will understand both Static and Dynamic approaches to type checking, bindings, scopes, and memory management.
  - Students will be able to compare and contrast the different approaches to Expressions, Control structures, and Data structures.
  - Students will understand the design issues related to subprograms.
  - Students will be able to recognize the classic programming language paradigms.
- Student outcome(s): Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

### ***Brief list of topics covered in the course***

- Evolution of Major Prog Languages
- Issues with Describing Syntax
- Formal methods for Describing Syntax BNF
- Static Semantics

- Issues with Dynamic Semantics
- Overview of Parsing Methods
- Variable
- Data Types
- Expressions
- Assignment Statements
- Mixed-Mode Assignment
- Control Structures (Statement Level)
- Subprograms
- Interpreters vs. Compilers

## **CSC 470 Software Engineering**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Jason Jenkins

### ***Required course materials***

- Textbook(s):
  - Beginning Software Engineering. Rod Stephens. Wrox; 2nd Edition. Mar 23, 2015
  - The Pragmatic Programmer. Andrew Hunt. David Thoma;.20th Anniversary Edition. Dec 26, 2019.
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: An introduction to the software engineering process, including lifecycle phases, problem analysis, specification, project estimation and resource estimations, design, implementation, testing/maintenance, and project management. In particular, software validation and verification as well as scheduling and schedule assessment techniques will be discussed.
- Prerequisite(s): CSC 300 Data Structures
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Students shall become familiar with the software engineering process.
  - Students will gain awareness of tools and practices used by those in the software industry.
  - Students will create software solutions as a group.
  - Students will gain understanding on giving and receiving feedback as a group.
  - Students will understand common roles and activities taking place in professional software development.
- Student outcome(s): Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

### ***Brief list of topics covered in the course***

- Team formation, success, and goals
- Project management
- Requirements gathering
- Software design
- Security design
- User experience
- Programming

- Testing
- Deployment
- Metrics
- Maintenance

## **CSC 482 Algorithms and Optimization**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Youssef Harrath

### ***Required course materials***

- Textbook(s): Introduction to the Design and Analysis of Algorithms. Anany Levitin. Addison-Wesley. Pearson; 3rd Edition. Sep 29, 2011.
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: This course will study computer algorithms, their performance, and techniques for optimizing algorithm implementation. A variety of algorithms including search, sorting, and graph algorithms will be examined. Tools and methods for analyzing and measuring both theoretical and practical performance will be studied. Techniques for improving the performance of implementations of the algorithms will be examined.
- Prerequisite(s): CSC 300 Data Structures and MATH 316 Discrete Mathematics
- Required, elective, or selected elective: Required

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Students will be able to compare different methods for analyzing algorithms.
  - Students will analyze algorithms to determine their Big-O Computational Complexity.
  - Students will write code to compare different algorithms and their computational complexity when solving computer science problems.
- Student outcome(s): Apply computer science theory and software development fundamentals to produce computing-based solutions.

### ***Brief list of topics covered in the course***

- Introduction to algorithm analysis
- Fundamentals of the Analysis of Algorithm Efficiency
- Brute Force algorithm design
- Divide and conquer algorithm design
- Transform and Conquer
- Greedy algorithms
- Dynamic programming

## **CIS 332 Structured Systems Analysis and Design**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Andrew Behrens

### ***Required course materials***

- Textbook(s): Systems Analysis and Design. Dennis, Wixom and Tegarden. Object oriented approach with UML. Wiley; 5th Edition Nov 11, 2014
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: The study of the Systems Development Life Cycle, including strategies and techniques of structured analysis, planning and design, testing and implementation s stressed. Case studies will be used along with hands-on application of concepts.
- Prerequisite(s): CIS 130 Visual Basic Programming or CIS 123 Problem Solving and Programming or CSC 150 Computer Science I
- Required, elective, or selected elective: Required in the choose from CIS 332 or CIS 424 or CIS 321 option

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Communicate effectively in a variety of professional contexts.
  - Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Student outcome(s):
  - Communicate effectively in a variety of professional contexts.
  - Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

### ***Brief list of topics covered in the course***

- Introduction to System Analysis and Design
- Project Management
- Requirements Determination
- Functional Modeling
- Structural Modeling
- Behavioral Modeling
- System Design
- Class and Method Design
- Data Management Design
- Human-Computer Interaction Design
- Physical Architecture Design

- Construction
- Installation and Operations

## **CIS 424 Software Development with Agile Technologies**

### ***Credits and contact hours***

3 credits, course meet 150 minutes per week

### ***Instructor's or course coordinator's name***

Jason Mixon

### ***Required course materials***

- Textbook(s): Clean Agile. Robert C. Martin. Pearson; 1st Edition. October 17, 2019.
- Other supplemental materials: None

### ***Specific course information***

- Brief description of course content: Agile methodologies are alternate means of managing the development of software systems. Agile methodologies include but are not limited to Scrum, Extreme Programming, Lean programming and kanban. This course is a survey of agile methodologies and processes that will be encountered in the software development environment.
- Prerequisite(s): CSC 250 Computer Science II or CIS 251 Business Application Programming
- Required, elective, or selected elective: Required in the choose from CIS 332 or CIS 424 or CIS 321 option

### ***Specific goals for the course***

- Specific outcomes of instruction:
  - Identify the various prominent Agile Methodologies.
  - Understand how the principles from the Agile Manifesto relate to software development.
  - Compare and contrast different project management methodologies to Agile.
  - Work as a team to implement software using Agile.
  - Use critical thinking to apply Agile principles in a software development lifecycle.
- Student outcome(s):
  - Communicate effectively in a variety of professional contexts.
  - Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

### ***Brief list of topics covered in the course***

- Agile Manifesto and Principles
- Business Practices
- Team Practices
- Technical Practices
- Extreme Programming
- Scrum
- Kanban