SELF STUDY

PROGRAM REVIEW

BACHELORS OF SCIENCE

IN

COMPUTER SCIENCE

COLLEGE OF COMPUTING

SPRING 2016

DAKOTA STATE UNIVERSITY

ONSITE VISIT DATE: APRIL 11TH - 2016

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PART 1: INSTITUTIONAL HISTORY

Brief History of Dakota State University

Dakota State University has enjoyed a long and proud history of leadership and service since its founding in 1881 as the first teacher education institution in the Dakota Territory.

For most of its history, DSU has been identified with teacher preparation, first as a normal school and later as a four-year public college. The University has had several different names, among them Madison Normal, Eastern Normal, and General Beadle State College. The name, Dakota State College, was adopted in 1969. On July 1, 1989, Dakota State College became Dakota State University. The University title was conferred on the institution by the South Dakota Legislature in order to better reflect its purpose in the total scheme of the state's higher education system. Prospective elementary and secondary teachers continue to be educated here. To this traditional emphasis, DSU added business and traditional arts and science programs in the 1960s and two health services programs, Health Information Management and Respiratory Care, in the late 1970s.

In 1984, the South Dakota Legislature and the South Dakota Board of Regents turned to Dakota State University to educate leaders for the information age. In response, Dakota State University developed leading-edge computer/information systems degree programs. The graduates of these programs enjoy enviable status in the national marketplace. As a leader in computer and information systems programs, DSU has pioneered the application of computer technology to traditional fields of academic endeavor. This thrust has led to the development of unique degree programs in biology, English, mathematics, and physical science.

Dakota State University continues to serve the needs of a changing society in its second century. In order to provide its academic programs to a broader audience, DSU has promoted the use of distance education to deliver academic courses and programs.

Dakota State has been recognized nationally for innovative curriculum. In Spring 2004, DSU was one of ten colleges in the country named a National Center of Academic Excellence in Information Assurance Education by the National Security Agency.

DSU was ranked first in the Top Public Comprehensive Colleges - Bachelor's Division in the Midwest region by U.S. News and World Report magazine in 2007, 2008, 2009, 2010 and 2011. When DSU added two Doctor of Science programs they were move to a new classification.

College Mission – College of Computing

During the 2014-2015 academic year, a College of Business and Information Systems (BIS) taskforce was convened to recommend possible modifications to the college mission. The result was the splitting off of the computer science related programs into a new college. The new College of Computing (CoC) came into existence at the start of the 2015-2016 academic year.

The mission of the College of Computing is to educate and prepare students to be lifelong learners and professionals in computer science, cyber operations, network & security administration, and computer game design. Inherent in the educational process is challenging individuals to develop information management skills, to think logically, and to make sound decisions. Information technology is integrated throughout the curriculum.

The following programs are offered in the College of Computing; at the undergraduate level: Computer Science, Cyber Operations, Network & Security Administration, Computer Game Design (a joint program with the College of Arts and Sciences); at the graduate level: Masters of Science in Applied Computer Science (MSACS), Masters of Science in Information Assurance and Computer Security (MSIA), Doctor of Science in Cyber Security.

History of the Computer Science Program

Dakota State University developed a Bachelor of Science in Computer Science in 1989 as a continuation of the 1984 mission change. The program evolved from its information system roots to what would be considered a traditional CSC program by the late 1990s. The program has continued to change over time to meet the evolving needs of the field. The program rode the crest of the large enrollments during that time, managed the general decrease in the field during the 2000s and now is evolving and growing rapidly again. The program not only serves its majors but is a vital component of the other majors found in the College of Computing.

Prior Institutional Review of the Computer Science Program

The last institutional review for the Computer Science program was conducted in Spring 2005. The review at that time looked at three bachelor programs together: Computer Information Systems, Computer Science, and Electronic Commerce & Computer Security. The current environment has changed significantly since this review. In the comments that relate directly or indirectly to the Computer Science program, the review stated that the program, in general, is very good and that accreditation by ABET would be realistic. (note: the reviewer also served as an ABET reviewer) It was stated that the science requirement was weak in terms of the ABET standards. One other important observation was that several faculty at that time did not hold a Ph.D. and although working towards them, may not finish.

Since that review, these areas have been addressed. A decision was made not to seek ABET accreditation in computer science and therefore that the additional credits would remain with mathematics, and we would continue with the current science requirements as is. Though we do not strictly adhere to the standard we continue to review the ABET 2013 Body of Knowledge Tier 1 and Tier 2 mappings to help guide curriculum in the program. The issue with currency of faculty has been addressed with the completion of the Ph.D. by faculty and the hiring of others holding a Ph.D. Also, DSU began a campus wide focus on the increase and support of research. No major changes were made to the CSC program in its curriculum as a result of the review itself. The finding that the program was at or near what would then be current ABET standards supported that decision. The changes in the program since the last review are more a results of the need to meet the evolving demands of the field, the release of the 2013 ABET standards, and the mission of the College of Computing.

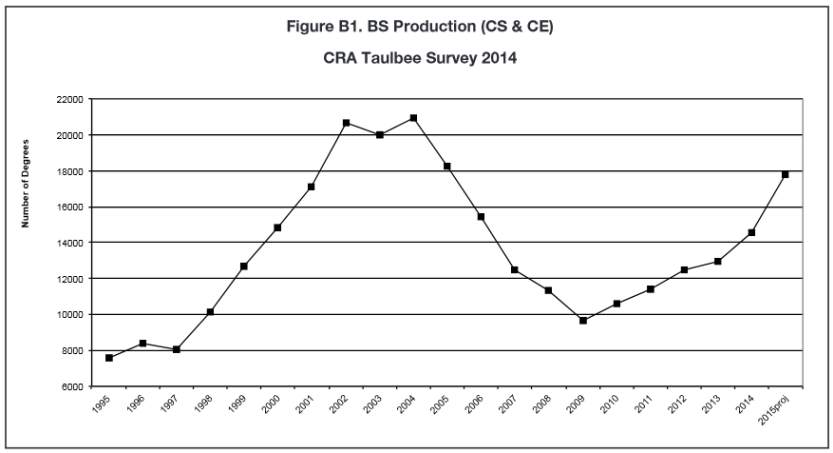
PART 2: TRENDS IN THE DISCIPLINE

International trends

For several years if one were to comment on the impact of international trends for Computer Science majors it would focus on "Outsourcing". As the world becomes increasingly "flat" many of the other technology trends become very similar to domestic trends. Recently the trend in outsourcing has become less of an issue at least when it comes to the international aspect. Instead, "Domestic Outsourcing" has become a common trend. With several of the top international countries needing to meet their own growing domestic demand for technology personnel, countries, including the U.S. are looking more and more to "Offshoring" their IT needs to others within their own borders.

National and regional trends

Trends in the area of Computer Science are often hard to quantify as they fall into the broader category of technology-related trends with the computer science graduate becoming an important player in many technical areas. However, it is clear that the national trend in the enrollment of CSC majors nationwide continues to show sustained increases.



The graph above is from the 2014 CRA Taulbee Survey. The subtitle of the survey included the phrase "Relentless Growth in Undergraduate CS Enrollment", which reflects current enrollment growth in Computer Science enrollment at DSU.

http://cra.org/wp-content/uploads/2015/06/2014-Taulbee-Survey.pdf

In terms of technology trends, several areas of interest have arisen. They include such areas as Mobile Computing, Social Networks, Cloud computing, BIG DATA, to list just a few. Additionally, the rise of the open-source movement had dramatically changed the way in which these technologies are developed.

Multi-core computing environments are becoming common place and the need for CSC programs to prepare their students will require the topics of concurrency and parallel programming to be addressed with greater emphasis at the undergraduate level.

Security has also become a major area of concern over the last decade. Cyber operations in particular is an area that significantly overlaps with traditional CS core offerings.

Although a graduate with a 4 year degree in Computer Science can be hired into various positions, a large number of undergraduate programs prepare students for the role of software developer. The U.S. Dept. of Labor's Bureau of Labor Statistics in Dec 2015 posts the following information:

Quick Facts: Software Developers	
2014 Median Pay	$97,990 per year $47.11 per hour
Typical Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2014	1,114,000
Job Outlook, 2014-24	17% (Much faster than average)
Employment Change, 2014-24	186,600

The overwhelming majority of software developers hold a degree in Computer Science. As can be seen by the job outlook, there will be a strong need for people with the right education to fill the demand over the next 10 years.

State trends

From a state perspective, South Dakota offers a viable alternative to offshore outsourcing and a good target for domestic outsourcing. Specifically, South Dakota's lower than average cost of living, lower than average cost of doing business, established information technology infrastructure, central location, attractive amenities, and overall excellent quality of life makes South Dakota particularly attractive to businesses and employees. In addition, the last decade has seen an accelerated growth in IT related companies along the I-29 corridor and across the state as a whole.

Curriculum implications

The technology programs at DSU have been greatly affected by the major trends over the last few years. Developing the security programs, separate from the computer science program reflects the large and growing demand for students in that particular area. Particular areas of security, such as cyber operations, are evolving to include more and more of the computer science core. Computer science programs with this dual audience will see demands on their resources beyond those already accruing because of the growth in the computer science programs alone. The need for students grounded in the fundamentals of computer science and mathematics will never fade, but new trends such as multi-core environments and mobile technologies will require the program to offer students courses that prepare them for these new technologies and methods. The open-source movement provides the ability to introduce students to a vast array of emerging technologies, but will also require faculty to develop curriculum to do so in a sound pedagogical manner.

Program Limitations

Currently the major limitation of the computer science program at DSU is the ability to grow and retain the computer science faculty and related faculty in the other College of Computing programs to match the growth in enrollment. Physical and other financial resources are adequate and reflect the mission of the university.

PART 3: ACADEMIC PROGRAM AND CURRICULUM

Program description and requirements

The computer science program offers a Bachelor's of Science in Computer Science and a Minor in Computer Science. Students obtaining a degree in Computer Science only need to complete the Mathematics Component of the Math program to obtain a second major in Mathematics for Information Systems. (12 additional credits) Several CSC majors take advantage of this double major.

2015-2016 Program Requirements

http://catalog.dsu.edu/preview_program.php?catoid=18&poid=1265

System-wide General Education Requirement (30 Credits)

Majors who test directly into MATH 123 will not need to complete MATH 102, but must take 3 credits of general electives.

Institutional Graduation Requirement (11 Credits)

Majors must take CSC 150 as part of the Institutional Graduation Requirements.

Required Courses (51 Credits)

- CIS 332 - Structured Systems Analysis and Design 3 credits
- CIS 383 - Networking I 3 credits
- CIS 484 - Database Management Systems 3 credits
- CSC 245 - Information Security Fundamentals 3 credits
- CSC 250 - Computer Science II 3 credits
- CSC 260 - Object Oriented Design 3 credits

- CSC 300 - Data Structures 3 credits
- CSC 314 - Assembly Language 3 credits
- CSC 410 - Parallel Computing 3 credits
- CSC 456 - Operating Systems 3 credits
- CSC 461 - Programming Languages 3 credits
- CSC 466 - Language Processing 3 credits
- CSC 470 - Software Engineering 3 credits
- CSC 482 - Algorithms and Optimization 3 credits
- Select three 300-400-level CIS/CSC courses 9 credits
  (CIS 275 allowed)

Support Courses (19 Credits)

- MATH 123 - Calculus I 4 credits
- MATH 201 - Introduction to Discrete Mathematics 3 credits
-
- MATH 281 - Introduction to Statistics 3 credits OR
- MATH 381 - Introduction to Probability and Statistics 3-4 credits (3 credits required)
-
- MATH 316 - Discrete Mathematics 2-3 credits (3 credits required)
- MATH Electives* 6 credits
- * MATH 125 or MATH 200-level or above (except MATH 341/MATH 342)

Electives (9 Credits)

Computer Science Minor: (18 credits)

- CIS 484 - Database Management Systems 3 credits
- CSC 250 - Computer Science II 3 credits
- CSC 260 - Object Oriented Design 3 credits
- CSC 300 - Data Structures 3 credits
- CSC 461 - Programming Languages 3 credits
- CSC 470 - Software Engineering 3 credits

Sample Academic Plans for Computer Science

1) Entering at the level of Calc I
2) Entering at the level of College Algebra

Note: There is currently discussions for the removal of the 11 IGR credits. It is anticipated that if this were to happen, the Computer Science program will include CSC 105 and CSC 150 as part of the CSC major directly. The remaining 5 credits will either be added to the CSC elective requirement or the general electives taking them from 9 to 14.

Academic Plan Entering for students who test into Calc I

MAJOR ACADEMIC PLAN (MAP)

COMPUTER SCIENCE - Tested into MATH 123

EFFECTIVE CATALOG YEAR 2015-16

Sample Schedule (subject to course rotations)

FALL		SPRING	
First Semester	**CR**	**Second Semester**	**CR**
WEL 100/100L Wellness for Life/Lab	2	SGE Oral Communications	3
SGE Written Communication	3	SGE Social Sciences	3
IGR CSC 105 Introduction to Computers	3	CSC 250 Computer science II	3
IGR CSC 150 Computer Science I	3	CIS 245 Info Security Fundamentals	3
MATH 123 Calculus I	4	MATH 201 Intro to Discrete Math	3
	15		15
			30

Third Semester	**CR**	**Fourth Semester**	**CR**
SGE Written Communication	3	SGE Art and Humanities	3
SGE Natural Science	3	SGE Natural Sciences	3
CSC 300 Data Structures	3	CSC 260 Object Oriented Design	3
CSC 314 Assembly Language	3	CIS 484 Database Management Systems	3
MATH 316 Discrete Math	3	MATH Elective (1)	3
	15		15
			30

Fifth Semester	**CR**	**Sixth Semester**	**CR**
SGE Arts and Humanities	3	IGR Writing Intensive	3
CIS 383 Networking I	3	SGE Social Science	3
CIS 332 Structured Systems Analysis	3	CSC 410 Parallel Computing	3
CSC 482 Algorithms and Optimization	3	CIS/CSC 300-400 Elective (1)	3
MATH 281 or MATH 381 Probability & Statistics	3	Open elective (1)	3
	15		15
			30

Seventh Semester	**CR**	**Eighth Semester**	**CR**
CSC 461 Programming Languages	3	CSC 456 Operating Systems	3
CSC 470 Software Engineering	3	CSC 466 Language Processing	3
CIS/CSC 300-400 Elective (2)	3	CIS/CSC 300-400 Elective (3)	3
MATH Elective (2)	3	Open elective (3)	3
Open elective (2)	3	Open elective (4) (*replaces MATH 102 credits)	3
	15		15
			30

Academic Plan for students who need to complete College Algebra

MAJOR ACADEMIC PLAN (MAP)

COMPUTER SCIENCE

EFFECTIVE CATALOG YEAR 2015-16

Sample Schedule (subject to course rotations)

FALL		SPRING	
First Semester	**CR**	**Second Semester**	**CR**
SGE Written Communication	3	SGE Oral Communications	3
IGR CSC 105 Introduction to Computers	3	SGE Social Sciences	3
IGR CSC 150 Computer Science I	3	CSC 250 Computer Science II	3
SGE MATH 102 – College Algebra	3	CIS 245 Info Security Fundamentals	3
SGE Art and Humanities	3	MATH 201 Intro to Discrete Math	3
	15		15
			30

Third Semester	**CR**	**Fourth Semester**	**CR**
SGE Written Communication	3	WEL 100/100L Wellness for Life/Lab	2
SGE Natural Science	3	SGE Natural Sciences	3
CSC 300 Data Structures	3	CSC 260 Object Oriented Design	3
CSC 314 Assembly Language	3	CIS 484 Database Management Systems	3
MATH 120 Trigonometry (as open elective (1))	3	MATH 123 Calculus I	4
	15		15
			30

Fifth Semester	**CR**	**Sixth Semester**	**CR**
SGE Arts and Humanities	3	IGR Writing Intensive	3
CIS 383 Networking I	3	SGE Social Science	3
CIS 332 Structured Systems Analysis	3	CSC 410 Parallel Computing	3
CSC 482 Algorithms and Optimization	3	CIS/CSC 300-400 Elective (1)	3
MATH 316 Discrete Math	3	MATH Elective (1)	3
	15		15
			30

Seventh Semester	**CR**	**Eighth Semester**	**CR**
CSC 461 Programming Languages	3	CSC 456 Operating Systems	3
CSC 470 Software Engineering	3	CSC 466 Language Processing	3
CIS/CSC 300-400 Elective (2)	3	CIS/CSC 300-400 Elective (3)	3
MATH 281 or MATH 381 Probability & Statistics	3	Open elective (2)	3
MATH Elective (2)	3	Open elective (3)	3
	15		15
			30

Accreditation Standards in the Discipline

Though the program has chosen not to seek a discipline-related accreditation such as ABET (at this time), the program does use the ABET 2013 guidelines to help shape the design of the program and efforts are made to stay current with issues related to curriculum. In the previous external review in 2005, it was determined by the reviewer (who also served as an ABET program reviewer) that the program was close to matching the guidelines set out in that standard. Assessment of the program is done under the campus wide AQIP program.

Program delivery

Courses in the program are delivered both face-to-face on-site in Madison, SD in a traditional classroom and online. All courses required to earn a major are available through DSU. An online presence for each class is maintained using the Desire2Learn (D2L) course/learning management system. Faculty record video of their course lectures for online students to view but online students are not required to watch in real time. The videos are also available online for in-class students to review. DSU also delivers lower-level computer science required courses on site at the University Center in Sioux Falls, SD. This gives distance students in that area the opportunity to attend classes locally early on in the program.

Strengths of the Program

The core requirements for the computer science program are similar to most of the four-year undergraduate programs in the region. What sets the program at DSU apart is that it is being delivered in an environment which also has strong programs in related areas such as Cyber Security and Computer & Network Security. The advantage to the student is in the quality of offerings in these related programs for which they can use their 12 applied electives and/or their additional 9 open electives. These programs are strong in their own right with highly qualified faculty, allowing the student to receive expert instruction. They are also in an environment that not only consists of computer scientist but also students pursuing degrees in security, networking, game design or information systems. This rich concentration is unique at any college of this size in the region. The DSU program also is unique in that it is viewed by the State of South Dakota as having a focused mission in the area of technology. This is reflected in the resources found at the university to support this mission. The addition of the masters in applied computer science and a doctorate in cyber operations also brings opportunities for students, such as the 4+1 program and the ability to do undergraduate research with graduate faculty.

Curriculum management

The computer science major is designed to allow students to be completed within a traditional four year period. The major is also delivered online and care is taken to make sure a student could also complete the online program in four years though most online students usually take a lighter load due to work and other demands on their time.

The program also supports required courses in other majors beyond the traditional Intro to Computers course. Students taking either the security or the gaming majors are now required to complete the four course core programing sequence CSC150, CSC250, CSC260, CSC300. In

addition cyber operations students are also required to take Assembly and several of the upper level computer science courses. As both of these programs have grown substantially, multiple sections of courses are offered in both semesters of the academic year, as well as the summer term. Coverage demands of these courses are being met through the use of course overloads for faculty through the use of multiple sections. Transitioning to multiple-semester offerings will require additional faculty resources.

Curriculum for the program is overseen by an informal working group made up of faculty that teach in the program, with senior computer science faculty overseeing the process. Under the current departmental structure, curriculum modifications initiated at this level are then reviewed by both departments and approved by the department chair. They are then forwarded to the university curriculum committee and are acted on under the university policies.

PART 4: PROGRAM ENROLLMENTS AND STUDENT PLACEMENT

Admission standards

Each university may adopt specific admission regulations, consistent with law and the requirements set by the Board of Regents, as may be required for each school or program to assure acceptable student preparation and enrollment levels. A copy of such regulations and any subsequent amendments shall be filed with the Executive Director and shall be subject to review by the Board of Regents.

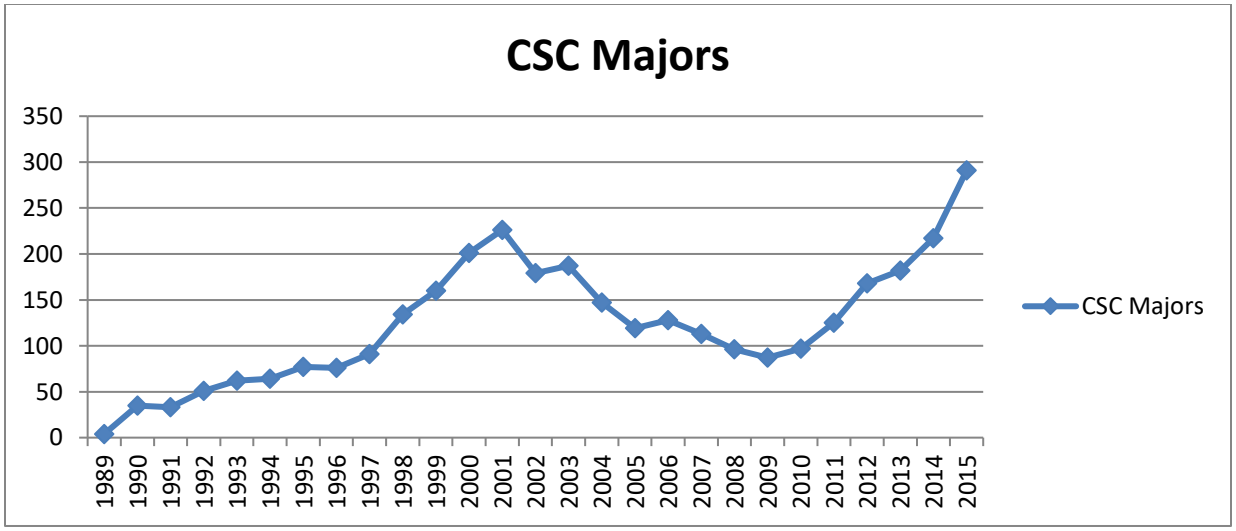
The Computer Science program does not have any additional requirements into the program beyond those stated for the university as a whole. The current DSU admissions guidelines now cover a wide range of potential students. Therefore it is recommended that one view the current admission standards at:

http://catalog.dsu.edu/content.php?catoid=18&navoid=972

Program Enrollment Breakdown

Program enrollment had shown a strong trend upward since 2009.

Graph 1: Computer Science Fall Enrollment



This trend reflects the national trend shown in Part 2 of this report. In the last couple of years a system wide emphasis has been placed on retention and persistence of freshmen. The retention rate in particular is affected by the availability for declared freshmen computer science majors to discover other related majors that they may be attracted to, and that may have a less rigorous math requirement. The following tables show program data related to total enrollment, diversity, degrees awarded, persistence, and retention.

Total 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) as of fall census. If a student is enrolled in multiple programs, they will be counted in each of the programs.

College enrollment is based on the number of students enrolled in at least one DSU class with an active program in the College of Business and Information Systems as of fall census. If a student in enrolled in programs in multiple colleges, they will be counted in each of the colleges (CSC – BIS & Math – AS). However, if a student has multiple active programs in the same college, they will only be counted once at the college level.

University 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, they are only counted once at the university level.

Table 1: Program, College and University Enrollments

	Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2009	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015
Computer Science (BS)	119	128	113	96	87	97	125	168	182	217	291
College of Business & Information Systems	787	799	792	850	948	1027	1068	1101	1186	1318	1445
University Enrollment	2329	2439	2570	2780	2861	3101	3102	3110	3129	3047	3145

Table 2: Student Diversity – Gender & Ethnicity for Computer Science

Computer Science (BS)	Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2009	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015
Gender											
Female	10	10	9	8	9	9	11	13	10	21	34
Male	109	118	104	88	78	88	114	155	172	196	257
Ethnicity											
White	111	110	96	79	74	89	117	150	163	183	236
Other Races/Unknown	8	18	17	17	13	8	8	18	19	34	55

A student with an ethnicity of white includes only those students who are non-Hispanic with a race of white only. Immigration status is not considered.

The number of females with computer science majors remains low compared to males. Efforts have been made to increase enrollment and retention of females in the computer science program, such as assigning female majors a female computer science instructor as their first advisor and research to identify factors that contribute to females choosing to pursue a computer science degree. There is also a Woman in Science program on campus. This persistent trend in

STEM-related programs is something that has had and may continue to have a negative impact on potential enrollments as women become a majority of the national college student population.

Degrees Awarded

Table 3: Number of Degrees Awarded by Academic Year

	SU05, FA05 & SP06	SU06, FA06 & SP07	SU07, FA07 & SP08	SU08, FA08 & SP09	SU09, FA09 & SP10	SU10, FA10 & SP11	SU11, FA11 & SP12	SU12, FA12 & SP13	SU13, FA13 & SP14	SU14, FA14 & SP15
Computer Science (BS)	24	19	17	8	12	7	10	15	21	14

An academic year is defined as summer, fall, and spring for the purpose of this report.

As the number of enrolled students increases it is expected that the number of graduates will also increase. Additionally, the Board of Regents has made the increase in the percent of majors obtaining degrees a stated priority.

Persistence

Persistence is defined as the proportion of a student cohort who enrolled for the first time in a given fall semester and then re-enrolled in a subsequent spring semester. The student must be enrolled in at least one DSU class to be considered persisted. For persistence purposes, a specific population is used: first-time, full-time, baccalaureate degree-seeking freshmen. A student may be counted more than once. If the student is a double major, they will be counted in each major.

Table 4: Persistence Rates for First-time, Full-time, Baccalaureate Degree-seeking Freshmen (Fall 2005 to Fall 2011 Cohorts)

	Fall 2005 Cohort		Fall 2006 Cohort		Fall 2007 Cohort		Fall 2008 Cohort		Fall 2009 Cohort		Fall 2010 Cohort		Fall 2011 Cohort	
	N	% Ret. 2nd semester (SP06)	N	% Ret. 2nd semester (SP07)	N	% Ret. 2nd semester (SP08)	N	% Ret. 2nd semester (SP09)	N	% Ret. 2nd semester (SP10)	N	% Ret. 2nd semester (SP11)	N	% Ret. 2nd semester (SP12)
Computer Science (BS)	26	92.3%	39	89.7%	21	100.0%	17	88.2%	19	94.7%	25	100.0%	25	88.0%

N=total number of students
% Ret 2nd semester = the percentage of students from the cohort who registered for at least one DSU class in the subsequent spring.

Table 5: Persistence Rates for First-time, Full-time, Baccalaureate Degree-seeking Freshmen (Fall 2012 to Fall 2015 Cohorts)

	Fall 2012 Cohort		Fall 2013 Cohort		Fall 2014 Cohort		Fall 2015 Cohort	
	N	% Ret. 2nd semester (SP13)	N	% Ret. 2nd semester (SP14)	N	% Ret. 2nd semester (SP15)	N	% Ret. 2nd semester (SP16)
Computer Science (BS)	37	97.3%	31	96.8%	25	92.0%	51	90.2%

N=total number of students
% Ret 2nd semester = the percentage of students from the cohort who registered for at least one DSU class in the subsequent spring.

Retention

Retention is defined as the proportion of a student cohort who enrolled for the first time in a given fall semester and then re-enrolled in a subsequent fall semester. The student must be enrolled in at least one DSU class to be considered retained. For retention purposes, a specific population is used: first-time, full-time, baccalaureate degree-seeking freshmen. A student may be counted more than once. If the student is a double major, they will be counted in each major.

Table 6: Retention Rates for First-time, Full-time, Baccalaureate Degree-seeking Freshmen (Fall 2005 to Fall 2011 Cohorts)

	Fall 2005 Cohort		Fall 2006 Cohort		Fall 2007 Cohort		Fall 2008 Cohort		Fall 2009 Cohort		Fall 2010 Cohort		Fall 2011 Cohort	
	N	% Ret. 2nd year (FA06)	N	% Ret. 2nd year (FA07)	N	% Ret. 2nd year (FA08)	N	% Ret. 2nd year (FA09)	N	% Ret. 2nd year (FA10)	N	% Ret. 2nd year (FA11)	N	% Ret. 2nd year (FA12)
Computer Science (BS)	26	73.1%	39	74.4%	21	90.5%	17	70.6%	19	78.9%	25	64.0%	25	72.0%

N=total number of students
% Ret 2nd year = the percentage of students from the cohort who registered for at least one DSU class in the subsequent fall.

Table 7: Retention Rates for First-time, Full-time, Baccalaureate Degree-seeking Freshmen (Fall 2012 to Fall 2014 Cohorts)

	Fall 2012 Cohort		Fall 2013 Cohort		Fall 2014 Cohort	
	N	% Ret. 2nd year (FA13)	N	% Ret. 2nd year (FA14)	N	% Ret. 2nd year (FA15)
Computer Science (BS)	37	78.4%	31	90.3%	25	72.0%

N=total number of students
% Ret 2nd year = the percentage of students from the cohort who registered for at least one DSU class in the subsequent fall.

Program Graduation

Graduation is defined as the number of the first-time, full-time, baccalaureate degree-seeking freshmen who enrolled at DSU in the fall and received a baccalaureate degree from DSU within five or six years. If a student graduated with an associate degree, they are counted as not graduated.

Table 8: Graduation Rates for First-time, Full-time, Baccalaureate Degree-seeking Freshmen (Fall 2002 & Fall 2003 Cohorts)

	Fall 2002 Cohort					Fall 2003 Cohort				
	Total No. of Students in Cohort	Graduate within 5 years		Graduate within 6 years		Total No. of Students in Cohort	Graduate within 5 years		Graduate within 6 years	
		N	%	N	%		N	%	N	%
Computer Science (BS)	35	15	42.9%	17	48.6%	47	14	29.8%	16	34.0%

N=number of students
% = the percentage of students from the cohort who graduated.

Table 9: Graduation Rates for First-time, Full-time, Baccalaureate Degree-seeking Freshmen (Fall 2004 & Fall 2005 Cohorts)

	Fall 2004 Cohort					Fall 2005 Cohort				
	Total No. of Students in Cohort	Graduate within 5 years		Graduate within 6 years		Total No. of Students in Cohort	Graduate within 5 years		Graduate within 6 years	
		N	%	N	%		N	%	N	%
Computer Science (BS)	24	10	41.7%	12	50.0%	26*	5	19.2%	5	19.2%

N=number of students
% = the percentage of students from the cohort who graduated.

Table 10: Graduation Rates for First-time, Full-time, Baccalaureate Degree-seeking Freshmen (Fall 2006 & Fall 2007 Cohorts)

	Fall 2006 Cohort					Fall 2007 Cohort				
	Total No. of Students in Cohort	Graduate within 5 years		Graduate within 6 years		Total No. of Students in Cohort	Graduate within 5 years		Graduate within 6 years	
		N	%	N	%		N	%	N	%
Computer Science (BS)	39	15	38.5%	16	41.0%	21	15	71.4%	15	71.4%

N=number of students
% = the percentage of students from the cohort who graduated.

Table 11: Graduation Rates for First-time, Full-time, Baccalaureate Degree-seeking Freshmen (Fall 2008 to Fall 2009 Cohorts)

	Fall 2008 Cohort					Fall 2009 Cohort				
	Total No. of Students in Cohort	Graduate within 5 years		Graduate within 6 years		Total No. of Students in Cohort	Graduate within 5 years		Graduate within 6 years	
		N	%	N	%		N	%	N	%
Computer Science (BS)	17	3	17.6%	4	23.5%	19	8	42.1%	8	42.1%

N=number of students
% = the percentage of students from the cohort who graduated.

Overall Computer Science Related Enrollment

DSU graduates the largest number of baccalaureate and master's students in computer science-related degree programs annually in the BOR system. Many of these programs use computer science courses as required parts of their curriculum. The numbers shown below indicate the overall student environment a computer science major experiences in the College of Computing (formally BIS) at DSU.

Table 12: DSU Fall Enrollment in Computer Science-Related Majors

	2007	2008	2009	2010	2011	2012	2013	2014	2015	DSU Total	DSU 6-Year Average
B.S. Computer Science	113	96	87	97	125	168	182	217	291	**1376**	**180.0**
B.S. Computer and Network Security	79	96	149	165	155	173	144	77	38	**1076**	**125.3**
B.S. Cyber Operations	0	0	0	0	0	0	65	168	217	**450**	
B.S. Computer Game Design	0	5	39	61	88	103	116	110	112	**634**	**98.3**
B.S. Network & System Admin	0	0	5	40	36	41	42	24	10	**198**	**32.2**
B.S. in Network & Security Admin	0	0	0	0	0	0	37	83	128	**248**	
UG Fall Enrollment	**192**	**197**	**280**	**363**	**404**	**485**	**586**	**679**	**796**	**3982**	**552.2**
M.S. Info Systems	85	108	108	94	82	64	72	89	58	**760**	**76.5**
M.S. Info Systems - Application Development	0	0	0	0	0	0	0	0	3	**3**	
M.S. Info Systems - Data Management	0	0	0	0	0	0	0	0	9	**9**	
M.S. Info Systems - General (MS)	0	0	0	0	0	0	0	0	1	**1**	
M.S. Info Systems - Networking/Admin/Security	0	0	0	0	0	0	0	0	3	**3**	
M.S. Info Assurance	19	35	43	42	39	43	36	37	46	**340**	**40.5**
M.S. in Applied Computer Science	0	0	0	0	0	0	4	16	21	**41**	
M.S. in Applied Computer Science – Cyber Operations	0	0	0	0	0	0	0	0	2	**2**	
DSC in Cyber Security	0	0	0	0	0	0	0	0	14	**14**	
GR Fall Enrollment	**104**	**143**	**151**	**136**	**121**	**107**	**112**	**142**	**157**	**1173**	**129.2**

Source: DSU Fall Enrollment Reports. B.S. in Computer Game Design was approved in 2008; B.S. in Network and System Administration was approved in 2009.

The "UG Fall Enrollment" and "GR Fall Enrollment" may count a student more than once. For example, if a student is seeking a program in computer science and a program in cyber operations, the student will be counted in both programs.

Note: The names of programs have changed since 2007, though majors retain the name for the program they began under. Also, beginning with new students, specializations of graduate programs are listed separately of formally declared.

Table 13: DSU Degrees Conferred in Computer Science-Related Majors by Academic Year

	2007	2008	2009	2010	2011	2012	2013	2014	2015	DSU Total	DSU 6-Year Average
B.S. Computer Science	19	17	8	12	7	10	15	21	14	123	**13.2**
B.S. Computer & Network Security	2	8	11	18	24	30	26	26	31	176	**25.8**
B.S. Cyber Operations	0	0	0	0	0	0	0	2	4	6	
B.S. Computer Game Design	0	0	0	0	0	0	4	13	16	33	
B.S. Network & System Administration	0	0	0	0	1	2	12	8	12	35	
B.S Network & Security Administration	0	0	0	0	0	0	0	0	0	0	
UG Degrees Conferred	**21**	**25**	**19**	**30**	**32**	**42**	**57**	**70**	**77**	**373**	**51.3**
M.S. Info Systems	25	28	25	41	39	33	26	34	45	296	**36.3**
M.S. Info Assurance	5	3	5	11	12	16	20	12	21	105	**15.3**
M.S. Applied Computer Science	0	0	0	0	0	0	0	0	9	9	
DSC in Cyber Security	0	0	0	0	0	0	0	0	0	0	
GR Degrees Conferred	**30**	**31**	**30**	**52**	**51**	**49**	**46**	**46**	**75**	**410**	**53.2**

Academic year is defined as summer, fall and spring. For example, the academic year '2015' includes summer 2014, fall 2014, and spring 2015.

The number of degrees conferred will begin to reflect the large increase in the computer science program beginning in the spring of 2016 as that larger cohort moves through the system.

On average, about 10 percent of DSU's baccalaureate graduates go on to graduate school. That number is higher for DSU's baccalaureate graduates in the computer science-based degree programs, with an average of 22 percent of that group going on to graduate school each year Over the last five years, DSU computer science-based graduates have enrolled in graduate programs at DSU (MSACS, MSIA, MSIS); USD (computer science); NDSU (software engineering); University of Utah (computer science); Digipen Institute of Technology (computer science), Capital College (information assurance), UND (unspecified major), and SDSU (counseling).

Program Placement

Placement information for each program can be found at:
http://dsu.edu/assets/uploads/resources/Graduate-Placement-Data-2014.pdf

PART 5: FACULTY CREDENTIALS

The following is a list of principle instructors in the computer science program. (That is, they may teach at least one course that is 200 level and above and is required.) Faculty Vitae are included in **Appendix A**.

Primary Computer Science Faculty

Dr. Christopher Olson, Assistant Professor
Department Head – Computer Science
Ph.D. (Business Administration with Applied Computer Science specialization), Northcentral University

Dr. Tom Halverson, Associate Professor of Computer Science
Ph.D. (Computer Science), The University of Iowa

Dr. Stephen Krebsbach, Associate Professor of Computer Science
Ph.D. (Computer Science), North Dakota State University

Dr. Steven Graham, Associate Professor of Computer Science/Computer Game Design
Ph.D. (Computer Science), University of Kansas

Austin O'Brien, Assistant Professor of Computer Science
ABD-(Computational Statistics – Expected Spring/Summer 2016), South Dakota State University

Related Faculty (Faculty may teach required security or network courses and also electives)

Dr. Josh Pauli, Professor of Cyber Operations
Ph.D. (Software Engineering), North Dakota State University

Dr. Keven Streff, Professor of Network and Security Administration
Ph.D. (Electronic Business), Capella University

Dr. Ashley Podhradsky, Assistant Professor of Network and Security Administration
DS. (Information Systems), Dakota State University

Dr. Kyle Cronin, Assistant Professor of Network and Security Administration
DS (Information Assurance), Capital Technology University

Josh Stroschein –Instructor
ABD-(Cyber Security), Dakota State University

Mike Ham – Instructor
ABD-(Cyber Security), Dakota State University

Primary Computer Science Faculty Additional Information

Dr. Christopher Olson, Assistant Professor

Dr. Olson started as an Instructor at DSU in 2006. He earned his PhD in 2013 and was appointed to a tenure-track position the same year. He advises over 90 students and teaches undergraduate programming courses in the CSC program, as well as graduate web and mobile application programming courses in the MSIS program.

In June of 2015, Dr. Olson was named Department Chair for the department of Computer Science and Game Design in the newly-formed College of Computing. In addition to supervising 8 faculty, he chairs the Academic Integrity Board and serves on the following committees: Academic Council, Assessment Committee, Barrier-Free Learning Committee, Dean's Council, Planning Council, and the Readmission Committee.

He has been PI on 3 grants to promote assistive software technology and accessible education. He is currently serving as co-PI on a 5-year grant funded by SD EPSCoR to increase underrepresented populations in STEM education. As a part of this grant, he is teaching an accessible computer science programming course.

Dr. Tom Halverson, Associate Professor of Computer Science

Tom has been a member of the DSU Computer Science faculty since Fall of 1999. Throughout this time, his primary efforts have been focused on teaching and working with undergraduate students, although he has also covered the occasional graduate course in the MSIS and MSIA programs. For the first four years, he also served as the Computer Science program coordinator. He then served as Dean for the College of Business & Information Systems from 2003 to 2014. During this time, the college had significant growth in enrollment as well as the number of graduate & undergraduate programs. In particular, the security and game design degrees were developed along with DSU's first doctoral degrees. By 2014, BIS accounted for about 60% of declared majors. In 2015, the College of BIS was split into two colleges: the College of BIS and the College of Computing. The College of Computing is now approaching the level of containing half of the university enrollment.

In 2014, Tom returned to his role as a full-time faculty member. His emphasis remains on the undergraduate students. For the last 7 years, he has taken the lead on efforts to engage our best students. He developed a series of courses for honors students (ACT at least 24) that bring students together for two courses in the fall and another pair in the spring. This model has proven successful and Tom is working to expand to a wider range. There is no doubt this approach has increased student retention and enhanced student engagement.

Because of the growing demand for Computer Science courses, DSU faculty resources have been tight. Tom increased the use of carefully selected on-campus graduate students to cover courses. Tom works closely with the students to make sure they understand the expectations and provide a quality experience in the classroom. On that note, Tom also coordinates the CSC 150 & 250 instructors each term to make sure they all have a clear picture of how the courses fit in our programs and topics that are to be covered.

Tom is an advocate for utilizing students to complete technology projects for the campus. This model has produced several web applications that are in production across campus. Other noteworthy efforts include active involvement in the DSU Cyber Corps scholarship for service program, the GenCyber summer camps, and the INSuRE student research grant.

Dr. Stephen Krebsbach, Associate Professor of Computer Science

Dr. Krebsbach came to DSU in the fall of 2000 after spending 12 years at South Dakota State University in their CS department. He also spent one year as a teaching fellow at North Dakota State University. He is a senior member of the Computer Science team at DSU and is an active member of the graduate faculty. Stephen teaches undergraduate courses in the CSC program and graduate courses in the MSACS and MSIS programs at DSU. He advises roughly 120 undergraduates and has been the graduate advisor on over 40 graduate projects as well as a committee member on many more. His teaching focus in the CSC program has recently been Operation Systems, Programming Languages and Advanced Database topics.

In the summer of 2015 he became the Academic Coordinator of the Masters of Science in Computer Science. Dr. Krebsbach currently serves on several University wide committees at DSU including the Curriculum committee, Assessment Coordination committee, Graduate Admissions committee. He served several years on the State of South Dakota's Governor's Technology Discipline Taskforce including a term as president. Dr. Krebsbach has also served on other select committees in the past such as the University Promotion and Tenure Taskforce.

For 5 years within this review period Dr. Krebsbach served as the Director of the vSURF project. As PI of the SD-EPSCoR grant, he led a team of researchers and developers in the early development of the virtual online presence of the Sanford Underground Lab as part of the education and outreach (E&O) effort of the Sanford Center for Science Education (SCSE).

Dr. Steven Graham, Associate Professor of Computer Science/Computer Game Design

Dr. Graham teaches courses which overlap both the Computer Science and the Game Design programs. . For the game design program, he leads the Junior/Senior project courses. For the computer science program, he teaches Software Engineering, Algorithms, Artificial Intelligence, Graphical User Interface Programming, and Graphics Programming. Dr. Graham has been involved in the development of the vSURF, the virtual Sanford Underground Research Facility environment which provides a 3d model of aspects of SURF. Additionally, he works with students on various game development projects. Dr. Graham, in conjunction with Dr. Jeffrey Howard, founded the workshop on Integrated Design in Games (IDiG), for the third consecutive year November 6-8, 2013.

Austin O'Brien, Assistant Professor of Computer Science

Austin O'Brien is a recent hire at DSU, starting the fall of 2015. His previous research involves machine learning and various data analysis techniques. For the Computer Science program, he teaches entry level courses CSC I and CSC II, as well as Object-Oriented Design and Software

Engineering. He enjoys getting involved in student activities, and recently coached several DSU teams in the ACM Regional Programming Competition at the University of Nebraska-Lincoln. His dissertation topic involves a new statistical method for classification in noisy, high-dimensional data. Besides machine learning and data analysis, Austin is also interested in K-12 student outreach projects. His Doctorate defense is planned for spring 2016.

Anticipated Changes in the Program

It is anticipated that the Computer Science program will continue to grow through increased enrollment of CSC majors. It is also anticipated that the expansion of the security program(s) to include more CSC courses as part of their required and elective offerings will require more sections of many classes. One Asst. Prof. of CS was hired in the fall of 2015. Additional funding has been given for a tenure track Asst. Prof. in CS and a new CS Instructor to be filled in the fall of 2016. An increase in support staff has also been funded.

PART 6: ACADEMIC AND FINANCIAL SUPPORT

Resources providing academic support to faculty and students in computer science include the Karl E. Mundt Library, a wireless computer infrastructure, and classrooms equipped with computer projection systems.

Undergraduate Programs Support Services

The College of Computing office is the central point of support for undergraduate students with majors within this college. The central office is located in the college building and very convenient for students and faculty. The office is also provided with several work-study positions that are tasked with helping faculty whenever help is requested.

The College of Computing office staff

Name	Title
Chris Olson	Chair, Department of Computer Science and Game Design
Kathy Engbrecht	Retention Specialist
Kati Larsen	Senior Secretary

The addition of departments was initiated for the 2015-16 academic year. The search for a College of Computing Dean is underway with expectations for a Fall 2016 start date.

Graduate Programs Office

The Office of Graduate Studies and Research was established to promote and support graduate education at DSU. The Dean of Graduate Studies and Research 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 and Research staff is included in the table below.

The day-to-day operations and services provided by the Office of Graduate Studies and Research 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 (URL: http://dsu.edu/graduate-students). 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 and Research 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; and serving as a liaison among other support staff, faculty, and administrators.

Office of Graduate Studies and Research Staff

Name	Title
Mark Hawkes	Interim Dean, Office of Graduate Studies & Research
Erin Blankespoor	Senior Secretary

Library Resources and Services

The mission of the Karl E. Mundt Library and Learning Commons is to supply the library and information needs of the students, staff, and faculty of Dakota State University and to support the University's stated mission and goals.

In an information society, information literacy is critical. DSU students should be able to find, evaluate and use information for problem solving and decision making in all aspects of their lives -- at home, in the workplace, and as informed citizens in a democratic society. The goal of the library is to provide the instruction and tools students need to be effective information users.

A Learning Commons is defined as a student-centered collaborative learning place. Increasing use of technology as a means of accessing information and the recent shift towards cooperative learning and group study have brought changes in the way students use academic libraries and library resources. In the Mundt Library and Learning Commons they are experimenting with new ways to combine information resources, services, technology, and research assistance. They partner with the DSU Retention Specialist to provide space for tutoring, and provide art gallery space managed by the College of Arts and Sciences.

The Library provides access to an extensive collection of materials through its online library catalog which includes the over 4.5 million holdings of more than 70 member libraries of the South Dakota Library Network (SDLN). In addition to its print holdings, the Library subscribes to numerous electronic indexes and full text research databases, most notably, EBSCO's Academic Search Premier, IEEE CS Digital Library, ProQuest Research Library, ABI-Inform, MLA Bibliography, Lexis-Nexis and many, many more. These databases are authoritative scholarly research tools needed to support DSU's academic programs. The Library's website provides the on- and off-campus community with direct access to the information resources critical to the various disciplines. Materials held by other libraries are also readily available through the interlibrary loan system so rarely is the Library unable to quickly meet an individual's information needs. The Library also provides online access to tutorials and other research aids for the independent scholar.

The most important and best resources available are the library staff. These trained professionals are here to help you find and use the resources you need – in person or online by using the "Ask a Librarian" link on the Library's website. In addition to the collections, systems and services offered, library staff provides assistance and instruction to faculty and students through workshops, classroom and one-to-one instruction.

The Library has a wide array of digital equipment like video cameras and digital audio recorders for use by students as well as standard AV equipment like video players and format converters.

Meeting rooms, collaboration spaces, study rooms and viewing rooms equipped with TV/DVD/VCR or video projectors connected to various types of players are also available. Many computer peripheral devices like cameras and recording devices are available for check out. Networked computers and scanners are located on the main floor as are many tables equipped with power sources for quick and easy Tablet PC battery recharging between classes.

Peer tutoring services are available in the Tutor Center located on the main floor of the Library. Additional tutorial support is provided online in Lynda.com and Learning Express Library; link to them in the Database Quicklinks drop down box on the Library's main page.

In addition to the collections, systems and services offered, library staff also provide assistance and instruction to faculty and students through workshops, classroom instruction, and one-to-one. Library faculty collaborates with course faculty to ensure students have the research background necessary to complete course assignments. Library faculty develop tutorials, subject guides, and other instructional materials to support classroom learning on campus and at a distance.

It is also the Library's goal to graduate students who are able to find, evaluate, and use information to solve problems and to make decisions effectively. Graduates should have the knowledge and skills to function successfully as continuous learners in a continuously changing information world. To successfully meet its goals, the library provides excellent collections, information systems, services, instruction, and staff. The professional library staff is included in the table below.

Professional Library Staff

Name	Title
Ethelle Bean	Assoc. VP/ Professor / Library Director
Mary Francis	Assistant Professor / Instruction / Reference Librarian
Risë Smith	Professor / Digital Access & Design Librarian

Technology infrastructure

DSU has an excellent technology infrastructure supporting wired and wireless access to computing resources. Information Technology Services staff provides technology support to faculty, staff, and students.

Lead Information Technology Services Support Staff

Name	Title
Stephanie Baatz	Director of Help Desk Services
Jordan Stewart	Senior Computer Support Specialist
Craig Miller	Director of Networking Services

David Overby	Vice President for Technology & Chief Information Officer
Scott Paulsen	Network Administrator
Brent Van Aartsen	Director of Web Services
Tyler Steele	Multimedia Specialist
Haomin Wang	Manager of Instructional Technology

E-Education services

Extended Programs is responsible for program planning, marketing, program implementation and overall management of courses and programs offered by alternative delivery (i.e., Internet, DDN) or at off-campus locations by Dakota State University. Working in partnership with the colleges and the institution's academic support areas, Extended Programs works to design and develop active and collaborative degree programs at a distance or at off-campus sites such as the University Center in Sioux Falls.

The Extended Programs staff is located in the Tunheim Classroom Building. The staff serves the needs of students who are enrolled in the online and videoconferencing courses at DSU and in courses at off-campus locations. The office is the mainstay of distance services to students, working with the administrative offices of DSU to provide these services. The office staff assists faculty in the design and implementation of courses delivered by various forms of technology. Proctoring services for online courses are provided by the Extended Programs office at DSU.

The video conferencing classrooms on campus are located in the Tunheim Classroom Building (TCB). The Dakota Digital Network (DDN) room is located in TCB 103. The Governor's Electronic Classroom (GEC) is located in TCB 111 and the third room is located in TCB 109.

E-Education Services is staffed with the Director of Extended Programs, the Manager of Instructional Technology, an Instructional Technology Specialist, a Communications Network Specialist, the Distance Education Specialist, and a Senior Secretary. 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 Web needs of faculty, staff and students at DSU and the needs related to educational technology. The office staff assists faculty in the design and implementation of courses delivered by various forms of technology.

Extended Programs Support Staff

Name	Title
Sarah Rasmussen	Director of Extended Programs
Susan Eykamp	Distance Education Specialist
Annette Miller	Senior Secretary

MingMing Shao	Instructional Technology Specialist

Administrative Staff

Current administrative staff provide the academic support services to successfully deliver undergraduate and graduate programs at DSU. The administrative support personnel who are particularly critical to the delivery of these programs are listed below.

Administrative Support Staff

Name	Title
Jay Kahl	Director of Institutional Effectiveness and Assessment
Kathy Callies	Registrar
Steve Bartel	Director of Student Union/Residence Life
Keith Bundy	Asst. Dean for Student Development
Amy Crissinger	Associate VP for Enrollment Management/Marketing
Heather Gillespie	Director of Bookstore
Jeff Dittman	Director of Athletics
Amy Dockendorf	Controller
Dan Friedrich	Director of Center for the Advancement of Health Information Tech
Denise Grayson	Director of Financial Aid
Maria Harder	Director of Human Resources
Sara Hare	Director of Budget & Grants Administration
Javier Lopez	Director of Food Service
Eric Rulofson	Director of Physical Plant
Kacie Fodness	Director of Sponsored Programs
Marie Lohsandt	Director of Career Services / Assoc Vice President for Student Affairs
Mandy Parpart	Director of Student Activities
Jona Schmidt	Director of Alumni Affairs

Academic Advising

Undergraduate students are assigned advisors in the College of Computing and all faculty are expected to contribute to academic advising. Advisees are assigned based on majors and students can request a change in advisor at any time. Some faculty elect to participate in the Freshman Seminar activities while others focus more on graduate and upper level advising duties. The retention efforts on campus have led to increased analysis of the advising process.

Graduate students in the MS ACS program will be required to work with their advisor to complete a Plan of Study within their first semester in the program. Information regarding advising, program rules and requirements, rotations, knowledge courses, and expected milestones will be provided through the online materials posted on the Graduate Offices website and in the Graduate Catalog.

Computer Infrastructure

Information Technology Services (ITS) advances the mission of DSU by ensuring reliable core systems and network infrastructure, excellent technology support, and assisting technology integration into the curriculum and business processes. Information Technology Services is responsible for the planning, management, and direction of technology initiatives in support of both academic and administrative operations at DSU. ITS staff provides the campus community with a diverse set of technology services including:

- Development, monitoring, and maintenance of the campus data network
- Help desk and tablet repair services
- Computer lab and server management
- Administrative application development
- Website and web application development services
- Academic technology training and assistance
- Multimedia services

Working in partnership with the colleges and the institution's academic support areas, Information Technology Services develops the image of applications installed on student tablets. ITS staff operates a help desk and repair center, staffed primarily by students, to quickly respond to any computing or network access problems in campus offices or computing laboratories or with students' tablet PCs.

Financial Support

There are multiple sources of funds that support these programs.

- Computer Science discipline fees - $45.00 per credit (on-campus undergraduate students only)

- Computer Science differential tuition fees – $124.25 per credit above base online tuition
- WMCI fee - $390.00 per semester

These lab fees are placed in a local account and support courses in the College of Computing. Funds that remain in the lab fees account at the end of the fiscal year are placed in a reserve account.

The enhanced online tuition rate for computer science courses should provide support for course development and student services to meet the needs of our growing online enrollment. The funds have been collecting, but efforts have begun to direct some of this significant funding back to the program.

Additional support for professional development and training is provided from funds allocated through the Vice-President of Academic Affairs (VPAA) office. Faculty members apply for support up to $1,000 per year, which is available for each faculty member. In addition to these traditional funds, there is also available funding from the VPAA's Office for additional faculty development funding that has historically been used to attend Black Hat (and similar) training sessions.

PART 7: FACILITIES AND EQUIPMENT

All campus students are required to have a mobile computer. Freshmen and sophomores participate in a program to lease a DSU-issued machine. This standardization is very beneficial to students and faculty. Upper-level students may lease a machine or supply their own device. Through this program the general computing needs are met. The university is able to spend money on wireless infrastructure, specialized hardware needs, power to the tables, bandwidth, etc. rather than turning over general purpose computing labs.

All programs within the College of Computing make use of DSU's Information Assurance (IA) lab. The lab is built upon industry standard hardware and software. In order to provide dynamic use of the hardware resources, a platform of virtualization has been developed in order to allow all students to complete hands on labs in an independent fashion without interference. Students using the lab will not only become more familiar with the topics being taught, but will also become familiar with the use of enterprise level virtualization hardware and software in an environment similar to a realistic business.

Classroom space is adequate but pressured by growing enrollment and increasing class sizes. Space and facility needs will be augmented by the new Beacom Institute of Technology building that has a schedule construction completion date of Fall 2017. This new construction will not solve all of the space challenges but it will allow specialized needs to have a dedicated space.

PART 8: ASSESSMENT AND STRATEGIC PLANS

The assessment plans for the B.S. in Computer Science program were developed by the faculty and adhere to the university's guidelines for major-field assessment.

The AQIP assessment process https://public-info.dsu.edu/aqip/ provides for both a general education and major-field includes an annual evaluation of data linked to measurement of student learning outcomes. Data are aggregated and reported annually in a web-based data table format.

The major assessment weakness recognized by the CSC faculty is that of formality. As a small department much informal assessment has occurred and has led to several curriculum modifications (see below). This included discussions on such issues as student exit exam results, placements, and employer feedback; however, as this was done in an informal way, the ability to tie improvements, or lack thereof, to these actions was lacking. The need for a more formal methodology for the complete assessment cycle became clear.

The AQIP process adopted by DSU has provided a way to move to address the need for a more formal process for assessment in the CSC program. This process requires an annual formal internal review of the program. Using the AQIP process it has been determined that more direct assessment tools would enhance the quality of assessment. The CSC program's main direct assessment tool is the ETS Major Field Test in Computer Science which is a nationally normed exam. A review of the exam has shown that the exam may be becoming outdated and that it may also not be a good fit for the type of undergraduate program offered at DSU as the exam lags in reflecting much of the current innovation in CS curriculum. However, until appropriate alternative direct measurement tools are adopted, the ETS will remain an important part of the assessment of the program.

In 2010 a review of the state of the computer science field led to a decision to not seek ABET accreditation. However, their core curriculum guidelines will still form the bases for the current curriculum. This approach has continued with the release of the 2013 curriculum guidelines which has led to modifications in the curriculum such a required course in parallel and multi-core programming.

Curriculum modifications from Assessment since last program review

- In the 2006-2007 catalog, a new required course was introduced as a direct results of the department members analyzing the results of the Computer Science Major Field Assessment exam that is given to all seniors. The analysis showed that our students were weaker than we would like in the area of formal analysis of algorithms. In response, the CSC 482 Algorithms and Optimizations course was developed.
- In the 2007-2008 catalog, a new required course was introduced to reflect the national trend towards information security. The assessment for the need for such a course was done in relation to the development of the graduate and undergraduate programs in security at DSU. The course CSC 245 Information Security Fundamentals gives the

computer science students an early introduction into the security area and also allows them to take security electives in the cyber operations major.

- In the new 2008-2009 catalog, a new required course was introduced as a response to the assessment meeting the department held on the goals and outcomes of particular courses. It became clear that the freshmen CSC majors would benefit in later courses if given a broad introduction to many of the fundamental issues in the field of Computer Science early on. CSC 251 was designed to address that need.
- In the 2010-11 catalog, the CSC 251 content was moved to a new Introduction to Discrete Math course offered by the Math department.
- There were no significant changes to the 2011-2012 catalog as the Board of Regents for the state of South Dakota mandated a reduction in the total credits in most majors, including computer science, from 128 to 120.
- The 2012-13 CSC program reduced the number of open electives to handle the loss of 8 credits do to the reduction of programs from 128 to 120 credits.
- There were no significant changes in the 2013-14 Catalog for the CSC major.

The following is a list of activities and changes made in response to the assessment activities:

Computer Science Changes for Improvement 2014

In reviewing of the 2013 ACM/IEEE Curriculum Report it was determined that a new required course should be developed to be included in the 2015 catalog which addresses the need for undergraduates to have a stronger background in parallel and multicore programming. It was determined that a major review of the use of current assessment tools such as the graduate survey was needed. For the most part, projects were put on hold as the issues dealing with the college of BIS and other related university issues put a great demand on the time of computer science faculty and staff.

Computer Science Changes for Improvement 2013

The major focus this year will in terms of the 5 year external review report and the ACM/IEEE Curricula Report. 2013. Review of recommendations will drive curriculum discussion and will have an impact on the form of assessment used. For example the MSAT and more direct assessment approaches. The addition of the now approved MSACS will dictate that an assessment process be implemented for the undergraduate part of the 4+1 program. Adjust the CSC assessment process with the revised DSU AQIP guidelines to be completes in the spring and summer of 2014 which may greatly modify the goals and assessment data in the future.

Computer Science Changes for Improvement 2012

The new catalog will reflect the reduction of credits in the Computer Science major from 128 to 120. It is not anticipated to cause any major assessment issues as the current plan is to reduce the General Electives form 19 to 9. We will be looking to see if it may have an effect of the MFAT as students may no longer choice to use some of those credits for CSC related courses. We have deferred a final decision on a possible replacement for the MSAT until the 2013-2014 academic

year. As in the last report we will continue to watch closely how the influx of a new type of student affects outcomes in those courses. One additional issue will be the development of a 4 +1 program if the request for a Masters of Applied Computer Science is granted.

2011-2012 projected activities

1. Begin an informal review of the assessment activities directly related to the first two years of the CS program to lead to a more formal, possibly AQIP project.
2. Increase the degree of undergraduate research by CSC students
3. Continue to analyze Employer and Alumni feedback to improve the program. (Unfortunately the data from the last period was not useable)
4. Continue to stay abreast of current ACM trends in both content and teaching of undergraduate computer science curriculums.

Computer Science Changes for Improvement 2011

The major change for the Computer Science Department will be the focus on the influx of non-CSC majors into the first two years of the Computer Science core. This is happening as the Gaming, Network Administration, and Security programs will be requiring their graduates to complete the CSC track through the Data Structures course. Assessment will be undertaken to understand how this new mix of students will affect class outcomes as a whole. We anticipate that modifications to teaching approaches may be needed to allow student success without reducing the rigorousness of the materials covered and the level of materials covered. We will be looking at possible AQIP assessment methods to help with our understanding of this transformation in the makeup of our students in these classes. We also anticipate the beginning of a review of the current MFAT exam for currency as it relates to the CSC program and the possibility of changing the assessment tool used.

2010-2011 projected activities

5. Review the current MFAT exam against the focus of the CSC program at DSU.
6. Increase the degree of undergraduate research by CSC students
7. Renew a focus on tracking alumni progress in the field.
8. Continue to analyze Employer and Alumni feedback to improve the program.
9. Continue to stay abreast of current ACM trends in both content and teaching of undergraduate computer science curriculums.

Computer Science Changes for Improvement 2008

Though the faculty have been generally pleased with the overall results of the assessment data it is apparent that a more ***formal assessment structure*** needs to be implemented. The major effort will be to align the assessment activities for the CSC program with the new 2010 ABET accreditation guidelines. A major reason for adopting the ABET criteria is that the new 2010 model is strongly assessment based. By aligning the CSC program with the ABET standards this summer, the assessment weaknesses reflected in earlier reports will be addressed. The following formal activities are planned for the 2008-09 year. These will be done in preparation for seeking ABET accreditation for the Computer Science program at DSU.

1. Review/update existing major field assessment plan.
2. Review and update employer and alumni survey instrumentation.

3. Develop a new computer science Advisory Board.
4. Develop new and/or revise goals and outcomes for CSC courses and CSC program using the new ABET 2010 guidelines for assessment.
5. Analyze alumni results.
6. Analyze employer results.
7. Analyze computer science exit exam results using current and historical data
8. Develop formal documentation/practices for the above activities which we have been doing but did not formalize.

Assessment Reports Background

Assessment Reports at Dakota State University are completed the year prior to Program Review. These Reports are generated at this time to give faculty members and their respective Dean/Chair enough time to review results and begin an action plan for changes they would like to see with student learning and general program outcomes. In this way, the Assessment Report offers a time for reflection of past practices as they relate to student learning and preparedness, so that the year of Program Review can focus on space, staffing, funding, and any other supporting structures to student learning.

Data

The following Report was generated by the Office of Institutional Effectiveness and Assessment and the Department of Computer Science. It covers the Computer Science program at the Bachelor's level and focuses on the following goals for the program:

- Goal #1 – Graduates will be prepared for entry-level positions in the Computer Industry
- Goal #2 – Graduates will be knowledgeable and competent users of computer technology

Currently, this is measured by Alumni and Employer surveys, Major Field Tests, grades, and primary measures whenever possible. Below is the most recent data along with their respective benchmarks:

Goal #1 – Graduates will be prepared for entry-level positions in the Computer Industry

Assessment Tools (Evaluation Measures) And Benchmark	2013-14 Graduates	2012-13 Graduates	2011-12 Graduates	2010-11 Graduates	2009-10 Graduates	2008-09 Graduates	2007-08 Graduates	2006-07 Graduates
1. Graduate Survey: Graduates will indicate they are "satisfied" or "very satisfied" with their knowledge of their academic area as it relates to their position. 70%	*	N/A	N=4 75%	N=0	N=6 83%	N=4 75%	N=7 86%	*N=6* *100%*
2. Graduate Survey: Graduates will indicate they are "satisfied" or "very satisfied" with their ability to solve work-related problems. 70%	*	N/A	N=4 100%	N=0	N=6 83%	N=4 100%	N=7 100%	
3. Graduate Survey: Graduates will indicate they are "satisfied" or "very satisfied" with their overall professional capabilities. 70%	*	N/A	N=4 100%	N=0	N=6 83%	N=4 100%	N=7 71%	
4. Employer Survey: Employers will indicate that DSU graduates "Exceed" or "Greatly Exceed" expectations in their ability to solve work related problems. 80%	*	N = 4 75%	N=4 50%	N=0	N=1 100%	N=2 100%	N=7 100%	
5. Employer Survey: Employers will indicate that DSU graduates "Exceed" or "Greatly Exceed"	*	N = 4 100%	N=4 50%	N=0	N=1 100%	N=2 100%	N=7 86%	

expectations in their ability to learn on the job. 80%								
6. Employer Survey: Employers will indicate that DSU graduates "Exceed" or "Greatly Exceed" expectations in overall professional capabilities. 80%	*	N = 4 75%	N=4 50%	N=0	N=1 100%	N=2 100%	N=7 86%	*N=6* *100%*
7. Major field Assessment Test: Will score no lower than 1 standard deviation below the user norm. 50%	N=24 84%	N=15 100%	N=10 100%	N=7 86%	N=12 83%	N=8 63%	N=16 44%	N=16 56%
1. Major field Assessment Test: Will score no lower than 1 standard deviation below the user norm. 50%	N=24 84%	N=15 100%	N=10 100%	N=7 86%	N=12 83%	N=8 63%	N=16 44%	N=16 56%
2. Advanced Degree Programs: More than 50% of our graduates attempting advanced degree programs will successfully complete their programs. 50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Graduate Survey is currently being administered, data not available at this time

Goal #2 – Graduates will be knowledgeable and competent users of computer technology

Assessment Tools (Evaluation Measures) and Benchmark	2014-15 Graduates	2013-14 Graduates	2012-13 Graduates	2011-12 Graduates	2010-11 Graduates	2009-10 Graduates	2008-09 Graduates	2007-08 Graduates	2006-07 Graduates
1. Placement: Graduating students will find employment in the field or matriculate in an advanced degree program within one year of graduation. 80%			N/A	N=8 100%	N=7 86%	N=5 100%	N=9 89%	N=14 93%	N=14 100%
2. Major field Assessment Test: Will score no lower than 1 standard deviation below the user norm. 50%		N=24 84%	N=15 100%	N=10 100%	N=7 86%	N=12 83%	N=8 63%	N=16 44%	N=16 56%
3. Employer Survey: Employers will indicate that DSU graduates "Exceed" or "Greatly Exceed" expectations in the ability to use computer applications effectively. 80%			N = 4 100%	N=4 75%	N=0	N=1 100%	N=2 100%	N=7 86%	N=6 83%

1. Course grades: Students will be expected to have completed courses using the major computing environments e.g., MS Windows and UNIX, with grades of C or better. (CIS 332, CSC 150, 250, 300, 461)	N = 14 79%	N = 21 90%	N=15 100%	N=10 100%	N=7 100%	N=12 100%	N=8 100%	N=15 100%	N=20 95%
2. Employer Survey: Employers will indicate that DSU graduates "Exceed" or "Greatly Exceed" expectations in the ability to select and apply appropriate technology. 85%			N=4 50%	N=4 50%	N=0	N=1 100%	N=2 100%	N=7 86%	N=6 83%
3. Graduate Survey: DSU graduates will indicate they are satisfied or very satisfied with their ability to select and apply appropriate technology. 70%			*	N=4 100%	N=0	N=6 83%	N=4 100%	N=7 100%	N=6 100%

*Graduate Survey is currently being administered, data not available at this time

The DSU Employer Survey is administered to the employers of DSU graduates 1 year after graduation. The survey was revised in 2010; the results are on a 4-point likert scale 1=Does not meet expectations 2= Meets expectations 3= Exceeds expectations 4= Greatly exceeds expectations. "Non-Applicable" responses on surveys are not included.

The DSU Alumni Survey is administered to graduates at 1 year and 3 years post-graduation. For example: The 2008 Alumni Survey was completed by 2006-07 graduates (1 year) and 2004-05 graduates (3 years post-graduation). The survey was revised in 2010; the results are on a 4-point likert scale 1=Very Dissatisfied 2=Dissatisfied 3=Satisfied 4= Very Satisfied. Data from Alumni Survey is from previous year's alumni.

The MFAT criteria in the Assessment Plan were changed beginning with the 2010 graduates. Effective 2008, survey data will be analyzed by the year the student graduated. "N/A" = Data is not available.

Strategic Planning

Note: a new strategic plan will be in effect in 2015

https://dsu.edu/assets/uploads/resources/Strategic-Plan.pdf

**The following Plan was in effect for the majority of the program review period*

Strategic Plan of Dakota State University 2007-2012 (*extended to 2014*)

Introduction

Dakota State University is a public, mission-driven institution. It is South Dakota's designated information technology university and is a leader in integrating this technology into the academic disciplines of its curriculum. Academic rigor and the infusion of information technology into teaching, research, and creative activity are at the heart of the university's work.

Vision (2012)

DSU has a broad national reputation for providing a dynamic, information technology rich learning and research environment.

Values and Commitments

Dakota State University's 2007-2012 strategic plan reflects the following set of values and shared commitments to:

1. An uncompromising passion for DSU's information technology mission.
2. The use of data-informed decision making to improve and enrich the university's programs.
3. Academic research that produces adapts and incorporates new discipline- and pedagogy-based knowledge.
4. An unwavering support for student success and learning by promoting active engagement and creative problem-solving.
5. A relentless pursuit of emerging technologies.
6. Effective communication that is open and honest.
7. A university experience that promotes an understanding of our diverse world.
8. Cutting-edge academic programs focused on its information-technology mission.

Where We Are Now

Dakota State University provides students with an open, friendly, safe, challenging, and collaborative environment. The university encourages all students to participate in activities that

enrich their academic experience, such as participation in extra-curricular activities, research, and outreach. Its faculty and staff are high-quality, caring, and student-focused. In 1881 the university began as the teacher education institution for the entire Dakota Territory. It continues to fulfill that mission and at the same time integrate the use of information technology in the education of teachers. Dakota State University is proud to be recognized by both the National Security Agency (NSA) and the Department of Homeland Security as a National Center of Excellence in Information Assurance Education. In December 2005, the South Dakota Board of Regents authorized DSU to offer its first doctoral degree.

The institution is proud of its graduates, the high job placement levels that they achieve, and their frequent choices to remain in the state to build South Dakota's economic base and quality of life.

Focus

Through a strategic planning process, DSU has developed seven overarching goals for the University. The goals are stated in brief here and discussed more fully in later sections.

1. Expand current information technology leadership through cutting-edge programs.
2. Optimize on-campus student enrollment and enhance program quality by attracting high-ability students.
3. Increase student retention and graduation by providing an exceptional student experience.
4. Advance DSU's emphasis on applied research.
5. Extend DSU's educational outreach through online and alternative-location delivery.
6. Promote increased visibility and recognition of the University.
7. Develop new sources of revenue.

Appendix A: Vita Information

See Separate Document.