

# **Proposal**

## **Conversion of Computer Science Concentration of the B.S. in Computer Science and Information Systems (CSIS) to a Full Degree Program**

**Proposed new degree:  
B.S. in Computer Science**

**Prepared by**

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March 8<sup>th</sup>, 2017

## CONVERTING OPTIONS/CONCENTRATIONS WAIVER

Institutions requesting a waiver to the New Degree Program Review Process when converting an existing option or concentration into full program must answer the following questions:

1. Is the program degree level within the mission designation of the college?

The proposed conversion will result in a B.S. in Computer Science, which is within Stockton's current mission level of Masters.

2. What is the need/impetus for the requested change?

- external review?
- accreditation review?
- other? (please explain below)

We plan to pursue accreditation for the new degree program through the Accreditation Board for Engineering and Technology (ABET). To do so, the current Computer Science (CS) concentration must first be converted to a full degree program. Additionally, during our most recent five-year review of the existing program in Computer Science & Information Systems (CSIS), our external evaluator recommended that we convert the CS concentration to a full degree program regardless of our pursuit of ABET accreditation.

3. How long has the option/concentration been offered?

The existing Computer Science concentration of the B.S. in Computer Science and Information Systems has been offered since 1988.

4. What is the enrollment history?

The number of students enrolled in the Computer Science concentration for the past several years is as follows:

	Fall '06	Fall '07	Fall '08	Fall '09	Fall '10	Fall '11	Fall '12	Fall '13	Fall '14	Fall '15	Fall '16
# students	22	26	27	27	24	32	37	52	101	138	186

We have seen a significant increase in enrollments in the concentration over the past several years, including a substantial steady increase from Fall 2013 through Fall 2016.

5. Will the new program have sufficient content depth to justify classification as a major?

- Will the new program have sufficient credits to justify being a major?
- How is the new program different from the existing degree program?

The existing B.S. in Computer Science & Information Systems, Computer Science Concentration, consists of: (a) a CSIS major core of 29 credits, (b) a CS concentration core of 17 credits, (c) 24 credits of CS concentration electives, and (d) 10 additional credits of CSIS major electives, which can be additional CSIS or MATH. This is a total of 80 credits in program and related courses. The remaining 48 credits of the current degree are Stockton's general education requirements. The requirements of the existing CS concentration of the CSIS major are in line with the requirements of a typical full degree program in Computer Science. Thus, the content depth is sufficient to justify conversion to a full degree program.

The new program, B.S. in Computer Science, will consist in: (a) 46 credits of CS courses (30 required CS credits + 16 CS elective credits), (b) 31-34 credits of mathematics and science (credit variation derives from student choice of lab science), and (c) 0-3 additional credits of CS, CIS, math, or science electives. All of the required courses in the proposed new B.S. in Computer Science already exist in the current concentration, except for a new 2-credit senior seminar. The proposed new B.S. in Computer Science will introduce 2 new elective courses, replacing two current electives. In one case, a course that is currently an elective will become required in the new degree. The lab science requirement is new to the proposed new degree. The curriculum of the proposed B.S. in Computer Science is designed to meet the accreditation requirements of ABET.

6. Will the college continue to offer the existing major?

- In establishing the new major, what will be the impact on the existing major?

The existing CS concentration of the existing B.S. in Computer Science & Information Systems will be phased out. It will continue until all current students in the concentration either graduate or switch to the new degree, but no new students will be enrolled into the existing concentration. There should be no effect on the ability to serve students who remain in the existing CS concentration as all of the required courses of the existing concentration will still exist in the new CS degree or will otherwise continue to be offered in support of other concentrations or programs (e.g., although the new CS degree is replacing the current freshmen level Statistics course, CSIS 1206, with a junior-level Calculus-based Probability and Statistics course, the CSIS 1206 course will still be offered in support of the Business Studies major, etc).

7. Would students currently enrolled in the option/concentration be "grandfathered" as to their degree title?

- Can students choose either the title of the existing degree program or the title of the degree program created from the option/concentration as their graduation major?
- Will current students receive the new degree designation?

Current students of the existing CS concentration can choose whether to retain their current degree title or switch to the newly formed B.S. in Computer Science. If they choose to switch to the new degree, they will be required to meet all of the requirements of the new degree.

8. Are sufficient resources available to support the new program in the following areas:

- Personnel such as faculty and support staff?
- Facilities?
- Operating expenses -- equipment, library resources, etc.?

Given that the requirements of the proposed new degree program have significant overlap with the existing concentration's requirements, the new degree program should have a minimal effect on our resource needs. For example, the existing degree option and the new degree that results from the conversion require students to take the same number of courses offered by the CSIS program. The new degree, therefore, does not directly impact our resource needs. However, due to increasing enrollments, we estimate a need to offer approximately 3 additional course sections per semester, regardless of conversion.

9. Since the proposed option/concentration is part of an approved ongoing program, will the proposed conversion create any additional duplication with ongoing programs at other colleges in New Jersey?

The proposed conversion should not create any additional duplication with ongoing programs at other colleges in New Jersey.

## Program Announcement Narrative Proposal

### a. Program Objectives

Computer Science (CS) professionals design and develop innovative solutions to computing problems in a broad range of disciplines, such as science, engineering, aerospace, medicine, and entertainment. The B.S. in Computer Science includes the theory and conceptual knowledge, programming and analytical skills, and an understanding of contemporary platforms that are fundamental to modern software development. All CS majors learn programming and problem solving, data structures and algorithms, software engineering, computer networking, mathematics and science. This major is ideal for creative analytical thinkers who like to solve problems.

The B.S. in Computer Science is designed to provide a solid education in preparation for employment as CS professionals, or entry to graduate school for research and advanced studies. In addition to the technical skills, our students strengthen their communication, teamwork and collaboration, and ethical reasoning skills needed to be successful computer scientists. Our degree offers a broad foundation enabling our graduates to acquire life-long learning skills needed to adapt and advance in an ever changing professional workplace.

The proposed degree, B.S. in Computer Science, will be housed within Stockton's Computer Science and Information Systems (CSIS) program, whose mission statement is as follows:

*The mission of the CSIS Program at Stockton University is to provide outstanding undergraduate degrees and courses that are consistent with the missions of the University and the School of Business, and that meet the full range of needs of the students. The Program provides students with an adaptable curriculum and pedagogy that complements the evolution of computer technology and the computing profession so that our graduates will have:*

- *A strong theoretical and application oriented background across the computer science and information systems disciplines;*
- *Practical skills and experience that enables them to become valuable contributors to their profession;*
- *The ability and motivation to grow professionally and/or to continue their education after graduation;*
- *An understanding of their professional and ethical responsibilities.*

In addition to the educational objectives of the CSIS program outlined in the above mission statement, graduates of the B.S. in Computer Science will additionally have:

- The ability to be productive in professional software development settings;
- The computer science skills applicable to related industries, such as science, engineering, aerospace, medicine, or entertainment;
- The confidence to explore emerging domains, such as data science, internet of things, and augmented reality.

### b. Evaluation and Learning Outcomes Assessment Plan

Computer Science (CS) Learning Outcomes: The CS Learning Outcomes are adapted from the Accreditation Board for Engineering and Technology's (ABET) learning outcomes for CS Programs. Learning Outcomes (a) through (i) below are common to all degrees and degree options offered within the CSIS program. Learning Outcomes (j) and (k) are specific to the proposed new B.S. in Computer Science. By the time of graduation, CS students will attain:

- a) An ability to apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline.
- b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
- c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
- d) An ability to function effectively on teams to accomplish a common goal.
- e) An understanding of professional, ethical, legal, security and social issues and responsibilities.
- f) An ability to communicate effectively with a range of audiences.
- g) An ability to analyze the local and global impact of computing on individuals, organizations, and society.
- h) Recognition of the need for and an ability to engage in continuing professional development.
- i) An ability to use current techniques, skills, and tools necessary for computing practice.
- j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- k) An ability to apply design and development principles in the construction of software systems of varying complexity.

Performance Indicators: Our assessment plan utilizes a mixture of direct and indirect measures, such as assessment problems embedded into exams, term projects in upper level courses, etc. We use the following set of performance indicators to assess student progress on our program learning outcomes:

Outcome a: An ability to apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline.

- a.1: Students will demonstrate foundational computing knowledge.
- a.2: Students will use statistical concepts to model and interpret data.
- a.3: Students will apply discrete mathematics concepts and algorithms.

Outcome b: An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

- b.1: Students will analyze the computing requirements for a given problem description.
- b.2: Students will identify the resources, key components, and algorithms required to solve a given problem.
- b.3: Students will examine alternative solutions for a given problem.

Outcome c: An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.

- c.1: Students will design a computer-based solution for a given problem description.
- c.2: Students will implement a computer-based system, process, component, or program from a given specification.
- c.3: Students will evaluate a computer-based system, process, component, or program to assess its conformance to a given specification.

Outcome d: An ability to function effectively on teams to accomplish a common goal.

- d.1: Students will research and gather information.
- d.2: Students will fulfill duties of team roles.
- d.3: Students will share in the work of the team.
- d.4: Students will listen and communicate with other teammates.

Outcome e: An understanding of professional, ethical, legal, security and social issues and responsibilities.

- e.1: Students will recognize and evaluate ethical issues involved in a professional setting.
- e.2: Students will recognize and describe current issues in security.
- e.3: Students will demonstrate understanding of intellectual property issues.
- e.4: Students will recognize the need for proper etiquette and proactive social behavior in professional settings.

Outcome f: An ability to communicate effectively with a range of audiences.

- f.1: Students will write technical documentation of a computer-based system, process, component, or program.
- f.2: Students will make oral presentations for an appropriate target audience.
- f.3: Students will prepare materials for a non-technical audience.

Outcome g: An ability to analyze the local and global impact of computing on individuals, organizations, and society.

- g.1: Students will evaluate the impact of computing on individuals.
- g.2: Students will evaluate the impact of computing on organizations.
- g.3: Students will evaluate the impact of computing on society.

Outcome h: Recognition of the need for and an ability to engage in continuing professional development.

- h.1: Students will read and report on papers in the technical literature.
- h.2: Students will involve themselves in professional activities (e.g., professional meetings, presentations, workshops, internships).

Outcome i: An ability to use current techniques, skills, and tools necessary for computing practice.

- i.1: Students will use a professional integrated development environment (IDE) for implementing programming projects.
- i.2: Students will research online resources to learn and utilize new techniques, skills, and tools.

Outcome j: An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

- j.1: Students will apply computer science theory in the modeling and design of computer-based systems.
- j.2: Students will evaluate the effects of alternative data representations and algorithms on the performance of computer based systems.

Outcome k: An ability to apply design and development principles in the construction of software systems of varying complexity.

- k.1: Students will construct a simple software system using basic design and development principles.
- k.2: Students will construct a more sophisticated software system using advanced design and development principles.

Stockton University Essential Learning Outcomes: Stockton University has established a set of university-wide Essential Learning Outcomes (ELOs). The following table provides a mapping of the performance indicators for the proposed B.S. in Computer Science to the Stockton University ELOs:

		Computer Science Performance Indicators																														
		a.1	a.2	a.3	b.1	b.2	b.3	c.1	c.2	c.3	d.1	d.2	d.3	d.4	e.1	e.2	e.3	e.4	f.1	f.2	f.3	g.1	g.2	g.3	h.1	h.2	i.1	i.2	j.1	j.2	k.1	k.2
Stockton University Essential Learning Outcomes	Adapting to Change																								X		X					
	Communication Skills												X				X	X	X	X					X							
	Creativity and Innovation						X	X																					X		X	X
	Critical Thinking				X	X	X			X													X	X	X					X		
	Ethical Reasoning												X	X		X	X															
	Global Awareness																						X	X	X							
	Information Literacy and Research Skills											X														X		X				
	Program Competence	X			X	X	X	X	X	X						X	X		X							X		X	X	X	X	X
	Quantitative Reasoning		X	X																										X	X	
	Teamwork and Collaboration											X	X	X				X														

**Curriculum Mapping:** The proposed B.S. in Computer Science includes required CS courses offered by the CSIS program as well as required courses from the Mathematics program. Additionally, there are elective CS courses offered by the CSIS program, elective Math courses, and a choice of lab sciences. The curriculum mapping (mapping courses to performance indicators) presented here includes only a mapping of courses offered by the CSIS program, and does not include courses offered by other academic programs, whether required or elective.

		Computer Science Performance Indicators																														
		a.1	a.2	a.3	b.1	b.2	b.3	c.1	c.2	c.3	d.1	d.2	d.3	d.4	e.1	e.2	e.3	e.4	f.1	f.2	f.3	g.1	g.2	g.3	h.1	h.2	i.1	i.2	j.1	j.2	k.1	k.2
Required CSIS Courses	CSIS 2101	X		X	X	X	X	X	X									X								X	X	X			X	
	CSIS 2102	X		X	X	X	X	X	X									X								X	X	X			X	
	CSIS 3103	X		X		X	X	X	X									X								X	X	X	X	X	X	
	CSIS 3230	X			X						X				X																	
	CSIS 3250	X		X	X	X	X		X	X																	X	X	X			
	CSIS 4104* (Data Structures and Algorithms 2)		X	X	X	X	X	X	X	X									X								X	X	X	X	X	X
	CSIS 4485			X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X		X
	CSIS 4600* (Senior Seminar)														X		X	X		X	X		X	X	X	X						
	CSIS 2226			X			X		X																					X	X	
	CSIS 3327		X	X					X	X																				X	X	
Elective CSIS Courses	CSIS 3222			X	X			X	X																	X		X			X	
	CSIS 3381	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					
	CSIS 4135			X	X	X	X	X	X		X															X	X				X	
	CSIS 4251				X	X	X	X	X	X	X	X	X		X				X	X					X			X	X	X	X	
	CSIS 4463		X	X			X	X	X	X																	X		X	X	X	
	CSIS 4469	X			X	X	X		X	X	X				X	X									X		X	X	X		X	
	CSIS 4481			X			X		X	X					X												X			X	X	
	CSIS 4510																															
	CSIS 4xxx* (Data Science)		X	X		X	X	X	X	X																	X	X	X	X	X	X
	CSIS 4xxx* (Mobile App Dev)			X	X	X	X	X	X																		X	X				X

### c. Relationship to Institutional Strategic Plan and Impact on its own Offerings

As the field of computing has grown and diversified, so is the need to have focused curricular recommendations for Computer Science (CS). The proposed BS in Computer Science is in alignment with Stockton’s mission statement

*“Our insistence upon breadth of education for all students does not preclude an emphasis on depth of study in the major disciplines but rather, supplements it. Our academic programs must offer students a real understanding of the ideas and methods of their disciplines, including those most recently developed. Exposure to many disciplines*

*and intensive investigation of one discipline should prepare graduates to move into appropriate fields of employment, or to continue with graduate academic or professional study”*

The educational goals of the CS curriculum emphasize breadth, as well as depth. The students will be required to take courses including Programming & Problem Solving I & II, Computer Networking Principles, Computer Organization, Data Structures & Algorithm I & II, and Software & Security Engineering. The electives offered include courses like Database Systems, Information Assurance & Security, Web Application Engineering, Operating Systems, Artificial Intelligence, Computer Architecture, Cryptography & Data Security, Mobile Application Development, and Data Science. The curriculum is based on the recommendations made by the Association for Computing Machinery (ACM).

In alignment with Stockton’s mission of imparting liberal arts education, we will develop intellectual capabilities of our students by encouraging high level of student-teacher interactions inside and outside the classrooms. We aim to provide a personalized approach to teaching and learning by using innovative instructional methods technological resources to communicate and interact with our students.

Our faculty believes that teaching and research goes hand in hand and is involved in both theoretical and pedagogical research projects. The faculty will continue to encourage, support and involve students in their scholarly activities to provide a wonderful learning experience for our students. The CSIS program is committed towards General Studies Curriculum and during the last 5 years have offered various sections of General Studies courses.

Our faculty recognizes the importance of internships for our students’ job readiness and professional growth as it could help them to experience possible career opportunities, apply knowledge and skills developed in the classroom, and gain practical experience which could distinguish them from other candidates when they apply for a job after graduation. The proposed degree is designed to facilitate the internship opportunities for our students.

*Relationship to Institutional Strategic Plan:* Stockton’s institutional strategic plan, known as “Stockton 2020,” includes four themes: Learning, Engagement, Global Perspectives, and Sustainability. The proposed new degree, B.S. in Computer Science, relates to these four themes as follows:

- *Learning:* Converting our existing CS concentration of the CSIS degree will enable our pursuit of accreditation for this new CS degree with the Accreditation Board for Engineering and Technology (ABET) further enhancing the educational and career pursuits of our students. Our CS students have the opportunity to collaborate with our CSIS faculty on research and other scholarly activities. Such student-faculty collaborations have resulted in publications and presentations co-authored between faculty and students. Several of our CS students go on to pursue graduate level degrees upon completion of their Stockton undergraduate degree. These things relate directly to the Stockton 2020 strategy “S1 - Deliver high value-added learning experiences and promote scholarly activity.” A member of the Stockton CS faculty is involved with Stockton’s interdisciplinary minor in behavioral neuroscience, and a CS course on Artificial Intelligence serves as an elective in that minor. This relates to the Stockton 2020 strategy “S2 – Promote liberal arts ideals to develop lifelong learners.”
- *Engagement:* We have a very active student club, the Stockton Computer Society, who organize an annual Computer Festival, attend the monthly dinner meetings of the South Jersey Chapter of the IEEE Computer Society, plan invited speakers utilizing the ACM’s Distinguished Speaker service, and participate in programming and other computing competitions, among many other activities. Several students have also participated in the development and delivery of workshops for the local community on topics such as cyber security, etc.

- *Global Perspectives:* One of our program learning outcomes relates directly to this Stockton 2020 theme: “Outcome g: An ability to analyze the local and global impact of computing on individuals, organizations, and society.” Additionally, we recently had the opportunity to host two international CS students for a year (2014-2015) and an additional seven during the current year (2015-2016) through a program with the Brazilian government.
- *Sustainability:* Relating also to Learning Outcome g, one cannot analyze the global impact of computing, in particular the global impact on society, without considering sustainability issues, such as Green Computing and more generally the impact technology has on the environment.

*Impact on other Stockton programs:* Students from Stockton’s Mathematics and Engineering programs both are required to take our CSIS 2101, Programming and Problem Solving I, so this course is both a requirement for our own CS majors as well as a service course to others. We do not anticipate any substantial changes to this course.

CS students take several Mathematics courses, including Calculus I, II, and Discrete Mathematics. The proposed CS degree will add to that with slightly increased math requirements compared to the current CS concentration of the existing CSIS major. Though several of our CS students opt to take either Calculus III or Linear Algebra at the present time regardless.

Students in the new CS degree will be required to take at least one semester of a lab science (Biology, Chemistry, or Physics). The existing CS concentration of the CSIS degree does not have this requirement. The immediate impact on science enrollments should be low. The existing CS concentration has approximately 186 enrolled students, so approximately 46 CS students per year will be directed toward one of the sciences. With three sciences to choose from, this is approximately 15 CS students per year (7-8 students per semester) for each of the three sciences. The actual impact will be lower, as many of our incoming transfer students from A.S. degrees often come in with transfer credit for at least one semester of a science, and quite often two semesters.

**d. Need**

The Bureau of Labor Statistics, Occupational Outlook Handbook (<https://www.bls.gov/ooh/computer-and-information-technology/home.htm>), lists the following CS related careers, along with 2015 median salary and projected job growth through 2024:

Occupation	2015 Median Pay	Projected Growth through 2024
Computer and Information Systems Managers	\$131,600 per year	15% (Much faster than average)
Software Developers	\$100,690 per year	17% (Much faster than average)
Computer Network Architects	\$100,240 per year	9% (Faster than average)
Information Security Analysts	\$90,120 per year	18% (Much faster than average)
Computer Programmers	\$79,530 per year	-8% (Decline)

Several CS related careers appear in the 2017 CNN Money list of the “100 Best Jobs in America” (<http://money.cnn.com/pf/best-jobs/2017/list/index.html>) including the following:

Rank	Occupation	Median Pay	10 Year Job Growth
1	Mobile Applications Developer	\$97,100	19%
5	Information Assurance Analyst	\$98,900	18%
13	IT Director	\$128,000	15%
33	Video Game Designer	\$81,600	13%
41	Analytics Manager	\$108,000	30%

47	Front End Developer/Engineer	\$81,000	27%
50	IT Security Director	\$147,000	15%
70	Applications Engineer	\$81,900	19%
80	Software Developer	\$96,600	13%

The following 8 schools within the State of New Jersey are the only NJ institutions to currently offer undergraduate Computer Science degrees that are accredited by the Accreditation Board for Engineering and Technology (ABET), under ABET's Computer Science criteria:

<b>Institution</b>	<b>Degree Offered</b>	<b>Years ABET Accredited</b>
Fairleigh Dickinson University (Metropolitan Campus)	B.S. in Computer Science	1987-present
Monmouth University	B.S. in Computer Science with a concentration in Advanced Computing	2010-present
Montclair State University	B.S. Computer Science - concentration in Professional Computing	1993-present
New Jersey Institute of Technology	B.S. in Computer Science B.A. in Computer Science	1986-present (B.S.) 1995-present (B.A.)
Rowan University	B.S. in Computer Science	1999-present
Stevens Institute of Technology	B.S. in Computer Science	1986-present
The College of New Jersey	B.S. in Computer Science	1997-present
William Paterson University of NJ	B.S. in Computer Science	2006-present

Additionally, the following 13 schools within the State of NJ currently offer undergraduate Computer Science degrees that are not accredited by ABET. We have included our own institution in this list, with our current degree offerings B.S. in Computer Science and Information Systems / B.A. in Computer Science and Information Systems. Our proposed new B.S. in Computer Science is a conversion of our existing Computer Science concentration of our current B.S. degree. We intend to phase out the existing concentration that this proposed degree is designed to replace. Thus, we are not proposing any additional redundancy beyond the degree programs currently available within the State of NJ.

<b>Institution</b>	<b>Degree Offered</b>
College of Saint Elizabeth	B.S. in Computer Science
Drew University	B.A. in Computer Science B.A. in Mathematics & Computer Science
Felician College	B.S. in Computer Science
Georgian Court University	B.S. in Computer Science
Kean University	B.S. in Computer Science
New Jersey City University	B.S. in Computer Science
Princeton University	B.S.E. in Computer Science B.A. in Computer Science
Ramapo College of New Jersey	B.S. in Computer Science
Stockton University	B.S. in Computer Science and Information Systems B.A. in Computer Science and Information Systems
Rutgers University / Camden	B.S. in Computer Science B.A. in Computer Science
Rutgers University / New Brunswick	B.S. in Computer Science B.A. in Computer Science

Saint Peters University	B.S. in Computer Science
Seton Hall University	B.S. in Computer Science

**e. Students**

Anticipated enrollments in the proposed CS major are estimated directly from the enrollment history of the existing CS concentration of the current B.S. in CSIS major. Recent enrollment history in the concentration that this degree will replace is as follows:

	Fall '06	Fall '07	Fall '08	Fall '09	Fall '10	Fall '11	Fall '12	Fall '13	Fall '14	Fall '15	Fall '16
# students	22	26	27	27	24	32	37	52	101	138	186

**f. Program Resources**

The Computer Science and Information Systems (CSIS) program currently has 9 full-time tenure-track lines (one of which is filled this year with a 13D) and we also have 1 half-time faculty member. All of the full-time tenured/tenure-track faculty have doctoral degrees. Of these, three have doctoral degrees in Information Systems, four have doctoral degrees in Computer Science, and one has an Ed.D. Additionally, we have several adjuncts who currently offer courses in the existing program, who will continue to do so in the new.

The existing concentration and the new degree that results from the conversion require students to take the same number of courses offered by the CSIS program. Therefore, the new degree does not directly increase our resource needs. However, the concentration proposed for conversion to a full degree has experienced a significant enrollment increase. Our preliminary analysis indicates that we need faculty (full time or adjuncts) to support three additional class sections every semester, regardless of the proposed conversion to a full degree.

## Degree Requirements

<b>Computer Science Degree Program Requirements (80 credits total):</b>		
<b>Computer Science (46 credits):</b>		
Computer Science Core (required courses): 30 credits		
CSIS 2101	Programming & Problem Solving I	4 credits
CSIS 2102	Programming & Problem Solving II	4 credits
CSIS 3230	Computer Networking Principles	4 credits
CSIS 3250	Computer Organization	4 credits
CSIS 3103	Data Structures & Algorithms I ( <b>Renamed</b> )	4 credits
CSIS 4xxx	Data Structures & Algorithms II ( <b>proposed new course</b> )	4 credits
CSIS 4485	Software & Security Engineering	4 credits
CSIS 4600	Senior Seminar ( <b>proposed new course</b> )	2 credits
Computer Science Electives (choose 4 of the following): 16 credits		
CSIS 3222	Database Systems	4 credits
CSIS 3381	Information Assurance and Security	4 credits
CSIS 4135	Web Application Engineering	4 credits
CSIS 4251	Operating Systems	4 credits
CSIS 4463	Artificial Intelligence	4 credits
CSIS 4469	Computer Architecture	4 credits
CSIS 4481	Cryptography and Data Security	4 credits
CSIS 4510	Topics in Computer Science	4 credits
CSIS 4xxx	Mobile Application Development ( <b>proposed new course</b> )	4 credits
CSIS 4xxx	Data Science ( <b>proposed new course</b> )	4 credits
CSIS 4800	With a project proposal approved by the CSIS program, to ensure sufficient depth in Computer Science, a student who meets eligibility guidelines (TBD), such as minimum GPA, etc may use up to 4 credits of CSIS independent study toward the 16 required CS elective credits.	4 credits
<b>Mathematics and Science (Minimum 31 credits to a maximum of 34 credits):</b>		
# credits will vary from 31 to 34 depending on elective selection		
These 5 courses are all required:		
MATH 2215	Calculus I	5 credits
MATH 2216	Calculus II	5 credits
MATH 2225	Discrete Mathematics	4 credits
CSIS 2226	Foundations of Computer Science ("Discrete Math II")	4 credits
CSIS 3327	Probability & Applied Statistics ( <b>reactivating retired course</b> )	4 credits
Science Requirement: Choose one of the following 3 science courses with lab:		
BIOL 1200/1205	Cells and Molecules / Cells and Molecules Lab	5 credits
CHEM 2110/2115	Chemistry I / Chemistry I Lab	5 credits
PHYS 2220/2225	Physics I / Physics I Lab	6 credits
Math/Science Electives: Choose one of the following:		
MATH 2217	Calculus III	5 credits
MATH 3323	Linear Algebra	4 credits
BIOL 1400/1405	Biodiversity and Evolution / with Lab	5 credits
CHEM 2120/2125	Chemistry II / Chemistry II Lab	5 credits
PHYS 2230/2235	Physics II / Physics II Lab	6 credits

Students may also choose to take an additional first science course (e.g., if they took BIOL 1200/1205 to meet the science requirement, they also have the option to take either CHEM 2110/2115 or PHYS 2220/2225 here).	5 or 6 credits
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**Cognates:** # credits will vary depending on student options in math/science section, and must be sufficient to bring total credits in program area to at least 80. Choose from the following:

CSIS 4900	Internship, with approval of the CSIS program.
CSIS xxxx	Other computer science or information systems course. Note: CSIS 1206 (Statistics) may not be used here.
Other cognates	Other courses approved by CSIS preceptor. Note: MATH 1100 (Pre-Calculus) may not be used here.

**General Education Requirements (48 credits total):**

<b>General Studies (32 credits):</b>		
32 credits of General Studies credits per Stockton's current General Studies distribution		
<b>At Some Distance (16 credits):</b>		
Additional General Studies or other courses outside the degree program. May include MATH 1100 (Pre-Calculus) and/or CSIS 1206 (Statistics).		