

**Student Learning Outcomes Assessment**  
**Department: Mathematics and Computer Science**

**Academic Year: 2018-2019**

*Program: Mathematics (BS)*

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
2019	<p><b>Mathematics, Objective 1:</b></p> <p>1. Graduates will be able to explain the fundamental concepts of</p> <ul style="list-style-type: none"> <li>a. real analysis of one variable</li> <li>b. calculus of several variables and vector analysis</li> <li>c. linear algebra and the theory of vector spaces</li> <li>d. probability and statistics</li> <li>e. abstract algebra</li> </ul>	<p>Seventeen questions issued in five areas, scored 0–5.</p> <p>Usually embedded within upper-level courses; some given to students individually.</p> <p>Graded to agreement by two faculty members.</p>	<p>Overall averages by area:</p> <p>1a: 3.05            1b: 3.86            1c: 3.53*            1d: 3.60            1e: 2.88</p> <p>*See note below (“Impression”) on Linear Algebra.</p>	<p>Senior surveys (ranking 1–4); collective from 2017–2019</p>	<p>Averages:</p> <p>1a: 2.63*            1b: 3.40            1c: 3.50            1d: 3.50            1e: 3.29</p> <p>*See note below (“Limitations”) on survey question 1a</p>
<b>Impression</b>	<p>Comments on the results:</p> <ul style="list-style-type: none"> <li>• Linear Algebra (objective 1c) seems acceptable for basic problems (such as solving a system by row reduction), but upper-level students show very little recall of more abstract topics, such as bases, dimension, rank, and nullity. Students earlier in the program do fine on either measure. It seems students do forget these more abstract topics as they move forward.</li> <li>• Students show weaker performance in both Abstract Algebra (1e) and Real Analysis (1a) with more advanced, abstract topics as well. For example, students seem to have a strong grasp of elementary topics in real analysis (functions, continuity, etc.), but struggle with more advanced topics (definition of convergence of a sequence, uniform continuity) which is generally only covered in one course. Not surprisingly, the more advanced or abstract the topic and the fewer times it is touched on in the program, the less strength students show.</li> </ul>				

	<ul style="list-style-type: none"> <li>Both algebra topics (linear algebra and abstract algebra) show some weakness.</li> </ul>
<b>Limitations</b>	<p>Regarding senior surveys:</p> <ul style="list-style-type: none"> <li>The department has been engaged in an effort to increase response rate, and over the past year, we have gotten seven surveys returned. This is an increase, as we had only three surveys from the two earlier years.</li> <li>Senior surveys showed a significant drop for the 1a (Real Analysis) objective. However, two of the surveys (which rated the Real Analysis objective as “Not at all” [0] and “Somewhat” [1] met) included a lengthy complaint about a particular analysis professor. Student complaints regarding that professor have already been addressed by the Evaluation committee, and do not have direct relevance to our overall program design. These answers may not be telling us anything significant about the program, although it warrants monitoring the analysis objective.</li> </ul> <p>Regarding embedded questions:</p> <ul style="list-style-type: none"> <li>We extended the questions for Real Analysis, and changed problems for Abstract Algebra, Linear Algebra, and Probability and Statistics to better reflect the spirit of the objectives.</li> </ul>
<b>Proposed Action Item: Assessment Tool</b>	<p>Further assessment of Linear Algebra may be warranted in the next year to check upper-level students’ understanding of abstract concepts such as bases, dimension, and rank.</p> <p>We should consider a revision of the advanced Linear Algebra questions, and consider whether or not the more abstract questions are the best choices for engaging with the spirit of the notion of this objective’s call for “fundamental concepts”.</p>
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	<p>Possible approaches to addressing the weakness unveiled in the abstract Linear Algebra questions, and in the more abstract questions in general (see Appendix for details on the particular questions and performance) follow. The Mathematics Curriculum Committee will need to consider these, and other possible adjustments.</p> <ul style="list-style-type: none"> <li>Use of Linear Algebra in Multivariable Calculus is now possible (see Action Item below), which may help a bit with reinforcing Linear Algebra concepts. We should give some consideration to where else these topics may make an appearance. (Although the prerequisite change was approved, we have so far had to approve some overrides for students caught in the transition.)</li> <li>Abstract reasoning should continue to be emphasized at all levels, but particularly in Math 270 (which introduces proofs), Math 290 (which is new and specifically intended to teach students to improve their proof writing), and in Math 275 (which also now includes some elements of proof writing).</li> </ul>
<b>Action Items Implemented</b>	<p>We note that in regards the multivariable calculus objectives, in 2016 we noted that we wished to have more detail in these assessment questions, and two new questions were added.</p> <p>In response to previous low performance on the multivariable questions, we implemented a new sequencing which requires Linear Algebra as a prerequisite for Multivariable Calculus, since there is heavy overlap in these topics, and having students</p>

	<p>already well-versed in vector computations (and vector spaces) may help them perform better in Multivariable Calculus. This was approved through Department and University Curriculum Committees. The change was in place by 2019. However, it is not yet clear how much effect this had, as multiple Physics students have been approved to take the class without the prerequisite this semester, as students were caught in the transition.</p> <p>New assessment questions were also written in Real Analysis, Abstract Algebra, Probability and Statistics, and Linear Algebra.</p>
<p><b>Objective to be Assessed Next Year</b></p>	<p>Objective 2: Graduates will be able to demonstrate basic manipulative skills by</p> <ul style="list-style-type: none"> <li>a. using techniques of calculus of one and several variables</li> <li>b. solving problems using differentiation and integration</li> <li>c. transforming and manipulating statements involving formulas and algorithms</li> </ul> <p>Continue data gathering for Actuarial Objectives A1, A2, A3, and A5:</p> <ul style="list-style-type: none"> <li>A1. Gain an understanding of interest theory, annuities, discounts, and funds from a mathematical and financial viewpoint</li> <li>A2. Apply statistical models for description, prediction, and inference based on data samples</li> <li>A3. Attain an understanding of the fundamental factors which influence the economy</li> <li>A5. Gain an understanding of professional opportunities and responsibilities of the future actuary</li> </ul> <p><b>(Note:</b> Because of the small numbers of students in the Actuarial program, we have been left gathering one or two artifacts per year for these objectives as the students pass through.)</p>

Program: Computer Science (BS)

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection</b> <b>Spring-Fall 2018</b>  <b>Rubrics Applied</b> <b>Spring 2019</b>	<b>Objective 1.</b> Graduates will be able to apply the tools, theory and practices of computer science.  Outcome A.--CS students apply programming skills to meet specifications.	CSCI 330 Object Oriented Programming	BSCS Applied 2.7 (3.5) BSCS Theoretical 4.0 (3.0) BSCS Game 2.5 (3.6) BSCS Web 3.3 (4.0) BSCS Network 4.0 (3.5) ASCS 4.0 N/A Non-CS 4.0 N/A <b>Overall</b> 2.9 (3.5)	Senior surveys: 4= completely met, 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	Senior survey results were good for this objective. Ranging from 4.0 to 3.0 across all tracks and including the associate degree. Strongest were the programming skills, weakest were applying math skills. No measure was below <i>mostly met</i> with the majority more towards <i>completely met</i> .
		CSCI 385 Data Structures and Algorithm Analysis	BSCS Applied 2.3 (2.9) BSCS Theoretical 3.5 (2.0) BSCS Game 1.9 (2.7) BSCS Web 4.0 (3.0) BSCS Network 3.5 (3.4) <b>Overall</b> 2.4 (2.9)		
<b>Impression</b>	For CSCI 330; these are third semester students who are still developing programming skills; the committee believes everything above a 2.5 is acceptable. In CSCI 385; This was a <b>very</b> large class for the content. There were a number of students who either were clearly not prepared for the class, as can be seen from the data above – nearly one third of the students either did not submit their work, or submitted programs that would not compile. Those who did submit their work and had working programs did very well. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
<b>Limitations</b>	None.				
<b>Proposed Action Item: Assessment Tool</b>	None.				
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	If we consider these students to be “upper class”, the committee should discuss whether it is the expectation that programs submitted should at least run.  The committee believes that there was a very weak group of students in Algorithms and Data Structures in every time it was offered during the assessment period. The committee believes that this performance was an anomaly but will closely monitor the class. The instructor from Fall 2019 stated that the results were much better in the next offering. Under further discussion, the committee suggested that the class size be limited to 20. This course has been moved to every semester, previously it was offered yearly, should remedy the class size problem.				
<b>Action Items Implemented</b>	For these two courses, no measured recommendation. We assess these each year so continue to monitor student’s progress, as these are advanced course and can stop some students from graduation.				
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 1A				

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection Spring-Fall 2016</b>  <b>Rubrics Applied Spring 2017</b>	<u>Objective 1.</u> Graduates will be able to apply the tools, theory and practices of computer science.  Outcome C -- CS students administer network systems.	CSCI 425 Network System Operation and Administration	ASCS 3.0 (none) BSCS Applied 2.5 (2.8) BSCS Network 3.76 (3.8) BSCS Theoretical 3.25 (3.0) BSCS Web 3.25 (2.0) <b>Overall</b> 3.21 (3.0)	Senior surveys: 4= completely met, 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	No graduates
<b>Impression</b>	This marked the second cycle in which artifacts were collected from this capstone course in network and system administration. This course moved location to an updated lab for the next cycle. The committee believes that these are reasonable results. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
<b>Limitations</b>	None				
<b>Proposed Action Item: Assessment Tool</b>	None.				
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	None				
<b>Action Items Implemented</b>	None.				
<b>Objective to be Assessed Next Year</b>	Data is collected every other year for Outcome 1C – next scheduled Spring 2020				

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection Spring-Fall 2018</b>  <b>Rubrics Applied Spring 2019</b>	<p><u>Objective 1.</u> Graduates will be able to apply the tools, theory and practices of computer science.</p> <p>Outcome D -- CS students produce game systems.</p>	CSCI 485 Senior Project in Game Development	BSCS Game 3.08 (3.3) <b>Overall 3.08</b>	Senior surveys: 4= completely met, 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	Senior survey result indicates <i>mostly met</i> .
<b>Impression</b>	<p>Instructor comment; Most students added value to the game. It is difficult to have each student work on all of the components of a game and have the game mesh together well. A different approach to assessing will be necessary. The team was highly fractured and only worked on their individual piece.</p> <p>This course only had Game track students. Overall the results are good, 3.08/4.00 scale. Instructor made some comments about group work change, else the objective was met.</p> <p>The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.</p>				
<b>Limitations</b>	None				
<b>Proposed Action Item: Assessment Tool</b>	None				
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	<p>The outcome needs to be reworded to “CS Students, as members of a group, contribute significantly to the game system”.</p> <p>With the following criteria:</p> <p>4: The student successfully implemented all assigned portions of the game system.</p> <p>3. The student’s implementation of assigned portions of the game system work but need improvement.</p> <p>2. The student did not complete the implementation assigned portions of the game system.</p> <p>1. The student participated in development of the game system but failed to implement assigned portions of the game system.</p>				
<b>Action Items Implemented</b>	<p>The outcome was revised to reduce the complexity of levels so that the outcome at each level: 1) is documented, and 2) can be measured with two distinct artifacts.</p> <p>Major curriculum review is presently being done to fit student needs and curriculum restrictions that make it hard for students to fit everything in to 4 year program.</p>				
<b>Objective to be Assessed Next Year</b>	Data is collected every other year for Outcome 1D – next scheduled Spring 2020				

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection Spring-Fall 2018</b>  <b>Rubrics Applied Spring 2019</b>	<b>Objective 1.</b> Graduates will be able to apply the tools, theory and practices of computer science.	CSCI 408 Software Engineering	BSCS Applied 3.2 (2.8) BSCS Game 3.0 (2.0) BSCS Network 4.0 BSCS Theoretical 3.5 (3.0) BSCS Web 3.5 (3.0) <b>Overall 3.3 (2.8)</b>	Senior surveys: 4= completely met, 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	Senior surveys indicate objectives were <i>completely met to somewhat met.</i>
	Outcome E -- CS students demonstrate a theoretical understanding of computing systems.	CSCI 410 Programming Languages	BSCS Applied 2.57 BSCS Game 3.0 BSCS Network 5.0 BSCS Theoretical 3.4 BSCS Web 3.5 Overall 3.05		
<b>Impression</b>	<p>The results seemed to show that students had a better understanding of modeling. Results were good for CSCI 408, with all in the good or better category. The committee believes that these results are appropriate</p> <p>The committee believes that this outcome needs more in-depth discussion. The committee believes that the assessment method for this item may need to be revised. The item will be included on the agenda of an upcoming CSCC.</p> <p>The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.</p>				
<b>Limitations</b>					
<b>Proposed Action Item: Assessment Tool</b>	None.				
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	None.				
<b>Action Items Implemented</b>	Further discussion when instructor is available for the Programming Languages assessment.				
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 1E, but in different courses				
<b>Curriculum Recommendations for Objective 1</b>	<p><b>As a result of last year's assessment, the Computer Science faculty met and discussed at length the content of each course in the programming sequence. Any recommendations have been made to the courses. No action was taken to courses relative to assessment that needed department approval. There was mostly assessment reporting and artifact recommendations.</b></p>				

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection Spring-Fall 2018</b>  <b>Rubrics Applied Spring 2018</b>	<b>Objective 2:</b> Graduates will be able to apply critical thinking, analytical and logical skills to solve problems.	CSCI 385 Data Structures and Algorithm Analysis (Assessment #1)	BSCS Applied 2.2 (2.0) BSCS Game 2.4 (3.0) BSCS Network 3.0 (3.0) BSCS Theoretical 3.5 (none) BSCS Web 3.0 (3.0) <b>Overall</b> 2.4 (2.6)	Senior surveys: 4= completely met, 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	Senior surveys were between <i>mostly met</i> and <i>completely met</i> .
	Outcome A -- CS students employ critical thinking and mathematical skills.	CSCI 385 Data Structures and Algorithm Analysis (Assessment #2)	BSCS Applied 3.3 (3.1) BSCS Game 3.0 (3.3) BSCS Network 4.0 (3.6) BSCS Theoretical 4.0 (none) BSCS Web 4.0 (3.3) <b>Overall</b> 3.3 (3.3)		
<b>Impression</b>	<p>This was the first attempt at reasoning about an algorithm. The results were what I expected. This was the first attempt at algorithm improvement and analysis. The instructor believes this score is acceptable. Instructor notes for the 2<sup>nd</sup> assignment that this assessment was done much later in the semester after students were further instructed in algorithm analysis. There are a large number of students who did not submit this assignment, see discussion for 1A.</p> <p>The committee accepts the instructor's analysis of these results.(for both artifacts)</p> <p>The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.</p>				
<b>Limitations</b>	None.				
<b>Proposed Action Item: Assessment Tool</b>	None.				
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	None.				
<b>Action Items Implemented</b>	None.				
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 2A				



Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)		Indirect Measure (IM)	IM Results
<b>Data Collection Spring-Fall 2018</b>  <b>Rubrics Applied Spring 2019</b>	<b>Objective 2:</b> Graduates will be able to apply critical thinking, analytical and logical skills to solve problems.	CSCI 330 Object Oriented Programming	Non CS students 1.0 (none) ASCS 4.0 (3.0) BSCS Applied 3.22 (3.3) BSCS Game 3.45 (3.1) BSCS Network 3.67 (3.3) BSCS Theoretical 3.67 (3.3) BSCS Web 3.0 (2.8) <b>Overall</b> 3.31 (3.1)		Senior surveys: 4= completely met 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	Senior surveys for this objective are quite good <i>(completely to mostly met)</i>
	Outcome B --CS students analyze and synthesize problem information in order to develop a solution.	CSCI 385 Data Structures and Algorithm Analysis	BSCS Applied 3.1 (3.0) BSCS Theoretical 4.0 (3.0) BSCS Game 2.3 (3.0) BSCS Web 4.0 (4.0) BSCS Network 3.5 (4.0) <b>Overall</b> 2.9 (3.3)			
<b>Impression</b>	<p>Those who submitted the work and actually attempted a design did exceptionally well. Even though the total score does not reflect an improvement, ignoring the zeros, the scores for this have improved considerably. I believe this has to do with the emphasis on design that has been implemented in the entire programming sequence.</p> <p>The committee is pleased with the increased focus in design work in the preceding classes is paying off. Also, please see comments in 1A and 2A for this course.</p> <p>The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.</p>					
<b>Limitations</b>	None.					
<b>Proposed Action Item: Assessment Tool</b>	None.					
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	None					
<b>Action Items Implemented</b>	None					
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 2B.					
<b>Curriculum Recommendations for Objective 2</b>	<b>As a result of last year's assessment, the Computer Science faculty met and discussed at length the content of each course in the programming sequence. It was decided that the current method of assessment and quality was appropriate. No changes recommended.</b>					

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection</b> <b>Spring-Fall 2018</b>  <b>Rubrics Applied</b> <b>Spring 2019</b>	<u>Objective 3:</u> Graduates will possess the ability to communicate in a professional manner.	CSCI 408 Software Engineering (Research Assignment)	AS Computer Science: none BSCS Applied: 3.2 BSCS Game: 3.0 BSCS Network: 3.3 BSCS Theoretical: 3.5 BSCS Web: 4.0 <b>Overall</b> 3.3	Senior surveys: 4= completely met 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	Senior surveys indicate no concerns, with scores of <i>completely met.</i>
	Outcome A - CS students produce readable and understandable documents.	CSCI 425 Network System Operation and Administration (Research Assignment)	No Data Collected		
		CSCI 440 Game Design and Development (Reflection on Work)	AS Computer Science: none BSCS Applied: 3.5 (1.7) BSCS Game: 2.5 (3.2) BSCS Network: none BSCS Theoretical: none BSCS Web: none <b>Overall</b> 2.8 (2.8)		
		CSCI 480 Computer Science Seminar (Paper Proposal)	AS Computer Science: none BSCS Applied: 2.7 (3.0) BSCS Game: 2.5 (3.2) BSCS Network: none (2.0) BSCS Theoretical: 4.0 (3.7) BSCS Web: none <b>Overall</b> 3.0 (2.8)		
		CSCI 485 Senior Project in Game Development (Work Reflection)	AS Computer Science: none BSCS Applied: 3.0 BSCS Game: 2.6 BSCS Network: none BSCS Theoretical: none BSCS Web: none <b>Overall</b> 2.6		
<b>Impression</b>	Comments: from reviewer of CSCI 408, note there is little difference between a 3 and 4 on this assessment. Students who received a 2 tended to have grammatical flaws. Most notably run on sentences and paragraphs. Comments, evaluator of CSCI 480; There is one student in the class who was clearly not interested in producing a quality report. Comments, evaluator of CSCI 485; some of these results are not appropriate for this measurement. Students some used questionable language, some tended to answer as bullet points, not answering in full sentences or paragraphs. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
<b>Limitations</b>	None.				
<b>Proposed Action Item: Assessment Tool</b>	None.				

<p><b>Proposed Action Item: Program Content and Course Assessment Practices</b></p>	<p>The committee believes that the instructor of CSCI 485 needs to emphasize that anything collected for this assessment will be used to evaluate writing and therefore is expected be performed in a professional manner. The instructor should consider requesting a professional level report in the assignment statement. The committee recognizes that there was better direction on the assignment related to this assessment.</p> <p>For CSCI 408 The committee believes that the results of this evaluation is acceptable.</p> <p>Students who are not in the theoretical track take CSCI 480 as an elective. Some of the students who are only taking this as an elective and put in minimal effort. The committee is happy with the results of the theoretical students in this evaluation.</p>
<p><b>Action Items Implemented</b></p>	
<p><b>Objective to be Assessed Next Year</b></p>	<p>Data is collected yearly for Outcome 3A.</p>

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)		Indirect Measure (IM)	IM Results
<b>Data Collection</b> <b>Spring-Fall 2018</b>  <b>Rubrics Applied</b> <b>Spring 2019</b>	<u>Objective 3:</u> Graduates will possess the ability to communicate in a professional manner.	CSCI 408 Software Engineering (Peer Evals)	BSCS Applied	3.2	Senior surveys: 4= completely met 3= mostly met 2=somewhat met 1=not met 0=no opinion	Senior survey results for this outcome are good and range from <i>mostly met to completely met.</i>
	Outcome B - CS students design, compose, and effectively deliver professional presentations.	CSCI 425 Network System Operation and Administration	ASCS	3.0 (none)		
		CSCI 440 Game Design and Development (Game Design Presentation)	BSCS Applied	4.0 (3.6)		
			BSCS Game	3.1 (3.9)		
			<b>Overall:</b>	3.1 (3.8)		
<b>Impression</b>	CSCI 408: Comments: When evaluating presentations of individuals on a group projects, must be diligent about what is expected from each member. It worked better this time. CSCI 440: Comments: The students did well; more practice delivering presentations across all classes may be useful. More practice delivering presentations across all classes may be useful.  CSCI 480: Comments: The presentations were fine. Maybe need more work in material supporting the content?  The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.					
<b>Limitations</b>	Senior survey results were good.					
<b>Proposed Action Item: Assessment Tool</b>	None.					
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	None					
<b>Action Items Implemented</b>	CSCI 425 The committee believes that these results are acceptable. CSCI 480 The committee believes that these results are acceptable. CSCI 408 No comment CSCI 440 The committee believes that these results are acceptable.					
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 3B.					
<b>Curriculum Recommendations for Objective 3</b>	<b>Students are performing well in on this objective. We could possibly improve the description of quality of work requirement for assignments. Require professional level papers. Possibly require supporting materials for presentations.</b>					

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection Spring-Fall 2018</b>  <b>Rubrics Applied Spring 2019</b>	<u>Objective 4:</u> Graduates will recognize and understand the professional, social and ethical responsibilities associated with computer science.  Outcome A - CS students understand professional issues and responsibilities.	CSCI 408 Software Engineering (Peer Evaluations)	BSCS Applied 3.65 (3.2) BSCS Game 3.0 (2.5) BSCS Network 4.0 (none) BSCS Theoretical 3.5 (3.3) BSCS Web 3.5 (4.0) <b>Overall</b> 3.53 (3.2)	Senior surveys: 4= completely met 3= mostly met 2=somewhat met 1=not met 0=no opinion	Senior surveys indicated the objective was <i>mostly met</i> to <i>completely met</i> .
		CSCI 485 Senior Project in Game Development	BSCS Game 3.29		
		Aggregated Capstone Survey taken in CSCI 425 Network Systems Operation and Administration, CSCI 480 Computer Science Seminar and CSCI 408 Software Engineering.	ASCS 3.5 (4.0) BSCS Applied 3.4 (4.0) BSCS Game 3.2 (none) BSCS Network 3.6 (4.0) BSCS Theoretical 4.0 (3.7) BSCS Web 3.8 (4.0) <b>Overall</b> 3.5 (3.9)		
<b>Impression</b>	CSCI 425 Survey comments: The committee believes that these results are acceptable. In the future, artifact evaluators need to collect all of the results and remove duplicates. This should be added to the instruction sheet for the evaluators.  CSCI 485 Survey comments: The committee believes that these results are acceptable.  CSCI 408 (peer evaluations): The committee believes that these results are acceptable.  The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
<b>Limitations</b>	None				
<b>Proposed Action Item: Assessment Tool</b>	The survey should be modified to include a question asking if they have completed this survey before and if so when to avoid duplicate answers and therefore unfairly weighting the results.				
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	None.				
<b>Action Items Implemented</b>	None.				
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 4A.				

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection</b> <b>Spring-Fall 2018</b>  <b>Rubrics Applied</b> <b>Spring 2019</b>	<u>Objective 4:</u> Graduates will recognize and understand the professional, social and ethical responsibilities associated with computer science.	CSCI 485 Game (Legal/Security Reflection)	BSCS Game 3.3 (3.4)	Senior surveys: 4= completely met 3= mostly met 2=somewhat met 1=not met, 0=no opinion	Senior surveys indicated the objective was <i>somewhat met to completely met.</i>
		CSCI 496 Computer Science Internship (Legal/Security Reflection)	AS Computer Science 1.5 (2.0) BSCS Applied 1.42 (3.2) BSCS Theoretical 2.5 (none) BSCS Game 1.0 (none) BSCS Web 1.0 (2.7) BSCS Network 1.0 (none) <b>Overall</b> 1.3 (3.1)		
	Outcome B - CS students understand legal/security issues and responsibilities.	Aggregated Capstone Survey taken in CSCI 425 Network Systems Operations and Administration, CSCI 480 Computer Science Seminar, and CSCI 496 Computer Science Internship ASCS 3.5 (none) BSCS Applied 3.8 (3.4) BSCS Game 3.6 (none) BSCS Network 3.4 (3.0) BSCS Theoretical 3.5 (3.7) BSCS Web 3.6 (3.3) <b>Overall</b> 3.6(3.4)			
<b>Impression</b>	CSCI 485 Evaluator: Overall good, some good ideas to solve problems other didn't address it.  CSCI 496 Evaluator: It seems the assignment is only asking the students to report how their internship security is. Therefore it would be hard to get above a "Beginning" or "Developing" for this rubric.  The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
<b>Limitations</b>	None				
<b>Proposed Action Item: Assessment Tool</b>	CSCI 496: Recommend we switch assessed item or assignment				
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	None.				
<b>Action Items Implemented</b>	None.				
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 4B.				

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection</b> Spring-Fall 2018  <b>Rubrics Applied</b> Spring 2019	<u>Objective 4:</u> Graduates will recognize and understand the professional, social and ethical responsibilities associated with computer science.  Outcome C- CS students understand ethical/ social responsibilities.	CSCI 408 Software Engineering	BSCS Applied 4.0 (3.7) BSCS Game 3.75 (4.0) BSCS Sys Admin 4.0 (none) BSCS Theoretical 4.0 (3.7) BSCS Web 4.0 (4.0) <b>Overall</b> 3.97 (3.8)	Senior surveys: 4= completely met 3= mostly met 2=somewhat met 1=not met, 0=no opinion	Senior survey results were mixed ranging from <i>somewhat met to completely met.</i>
		CSCI 425 Network System Operation and Administration	ASCS 3.0 (none) BSCS Applied 3.5 (3.5) BSCS Game none (4.0) BSCS Sys Admin 4.0 (none) BSCS Theoretical none (4.0) BSCS Web 4.0 (4.0) <b>Overall</b> 3.8 (3.8)		
		CSCI 440 Game Design and Development (Paper on Game Ethics)	BSCS Applied 3.0 (3.2) BSCS Game 2.2 (3.3) <b>Overall</b> 2.4 (3.3)		
		Aggregated Capstone Survey Q3 taken in CSCI 425 Network System Operation and Administration, CSCI 480 Computer Science Seminar, and CSCI 496 Computer Science Internship	ASCS 3.0 (none) BSCS Applied 2.5 (3.0) BSCS Game none (4.0) BSCS Network 3.0 (4.0) BSCS Theoretical 2.7 (3.0) BSCS Web 2.5 (2.0) <b>Overall</b> 2.6 (3.0)		
<b>Impression</b>	The committee believes that these results are acceptable.  The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
<b>Limitations</b>	None				
<b>Proposed Action Item: Assessment Tool</b>	CSCI 440: The instructor should modify the assignment to focus on professional ethics.				
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	None.				
<b>Action Items Implemented</b>	None.				
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 4C.				

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection</b> <b>Spring-Fall 2018</b>  <b>Rubrics Applied</b> <b>Spring 2019</b>	<u>Objective 4:</u> Graduates will recognize and understand the professional, social and ethical responsibilities associated with computer science.	One assessment for this criterion was obtained from a tabulation of service participation by graduating seniors by department members. The other assessment will come from the capstone survey in CSCI 480 – Computer Science Seminar, CSCI 485 – Project in Game Development and CSCI 496 – Computer Science Internship:	ASCS 2.5 (3.0) BSCS Applied 2.67 (2.5) BSCS Game 2.0 (none) BSCS Network 3.17 (3.0) BSCS Theoretical 3.0 (2.7) BSCS Web 4.4 (1.3) <b>Overall 2.76 (2.5)</b>	Senior surveys: 4= completely met 3= mostly met 2=somewhat met 1=not met, 0=no opinion	Senior survey results a little low where all indicated <i>somewhat met</i> . About the same as last assessment with the exception of Web track students.
	Outcome D - CS students understand the value of CS professionals participating in, and promoting, community service.	Spring 2018 / Fall 2018 Community Participation Percentages (n=37)	ASCS: 50% (0%) BSCS Applied: 53% (50%) BSCS Game: 60% (100%) BSCS Network: 83% (0%) BSCS Theoretical: 50% (50%) BSCS Web: 100% (25%) <b>Overall: 65%</b>		
<b>Impression</b>	None  The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
<b>Limitations</b>					
<b>Proposed Action Item: Assessment Tool</b>	The committee believes that this assessment item is not meaningful and should be removed.				
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	None.				
<b>Action Items Implemented</b>					
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 4D.				
<b>Curriculum Recommendations for Objective 4</b>	<b>Overall the results are satisfactory. The committee realizes there are some issues with student responses or the way the questions are asked. The committee is still trying to address issues involving assessment of this objective. Same as last assessment for this criteria, students will not address the questions on the capstone survey as completely as they might when writing answers to homework assignments or exam questions.</b>				



Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection Spring-Fall 2018</b>  <b>Rubrics Applied Spring 2019</b>	<u>Objective 5:</u> Graduates will recognize the need for continuous learning.  Outcome A - CS students recognize the value of memberships in the professional organizations.	CSCI 480 Software Engineering (Reflection on Learning)	BSCS Applied 3.67 (4.0) BSCS Theoretical 4.0 (4.0) Overall 3.75 (4.0)	Senior surveys: 4= completely met 3= mostly met 2=somewhat met 1=not met, 0=no opinion	Not measured in the senior survey
		CSCI 496 Computer Science Internship (Portfolio – Reflection on Learning)	ASCS 3.33 (4.0) BSCS Applied 3.5 (3.9) BSCS Game 3.0 (3.0) BSCS Network 3.0 (4.0) BSCS Theoretical 3.5 (none) BSCS Web 3.69 (4.0) <b>Overall</b> 3.4 (3.9)		
		Aggregated Capstone Survey taken in CSCI 425 Network System Operation & Administration, CSCI 480 Computer Science Seminar, and CSCI 496 Computer Science	ASCS 4.0 (none) BSCS Applied 3.6 (3.3) BSCS Game none (3.3) BSCS Theoretical 4.0 (3.7) BSCS Web 4.0 (2.5) BSCS Network 4.0 (3.5) <b>Overall</b> 3.8 (3.4)		
<b>Impression</b>	The results for this assessment were very good. The committee believes that these results are acceptable.  The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
<b>Limitations</b>					
<b>Proposed Action Item: Assessment Tool</b>	None.				
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	The committee believes that this should be assessed in Software Engineering and in the face to face capstone course in Web, Cyber and Systems tracks.				
<b>Action Items Implemented</b>					
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 5A.				

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)	Indirect Measure (IM)	IM Results
<b>Data Collection Spring-Fall 2018</b>  <b>Rubrics Applied Spring 2019</b>	<u>Objective 5:</u> Graduates will recognize the need for continuous learning.  Outcome B – CS students research and gather information pertaining to a particular topic.	CSCI 408 Software Engineering	BSCS Applied 3.4 (3.9) BSCS Game 3.5 (4.0) BSCS Theoretical 4.0 (4.0) BSCS Web 4.0 (none) BSCS Network 3.3 (none) <b>Overall 3.5 (3.9)</b>	Senior surveys: 4= completely met 3= mostly met 2=somewhat met 1=not met, 0=no opinion	Senior survey results ranged from upper <i>somewhat met</i> to <i>completely met</i> . Overall the results are close to <i>mostly me</i>
		CSCI 425 Network System Operation & Administration	BSCS Applied 3.0 (3.3) BSCS Network 2.25 (3.0) BSCS Theoretical none (4.0) <b>Overall 2.33 (3.2)</b>		
		CSCI 440 Game Design and Development (video game prototyping)	BSCS Applied 3.7 (3.0) BSCS Theoretical 3.0 (3.3) <b>Overall 3.5 (3.0)</b>		
		CSCI 480 Computer Science Seminar (Paper Proposal)	BSCS Applied 3.7 (3.0) BSCS Theoretical 3.0 (3.3) <b>Overall 3.5 (3.0)</b>		
		CSCI 485 Project Game Development (Research a Topic)	BSCS Applied 2.7 BSCS Game 3.1 <b>Overall 3.0</b>		
<b>Impression</b>	CSCI 485: Evaluator: Many of the students used highly questionable sources to form and support their arguments. Most included a well-vetted source but some did not.  For all assessments the committee believes that these results are acceptable.  The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
<b>Limitations</b>					
<b>Proposed Action Item: Assessment Tool</b>	CSCI 485: The instructor should consider including the standard verbiage relating to sources in the assignment. The instructor should consider including the standard verbiage relating to sources in the assignment.				
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	None				
<b>Action Items Implemented</b>	None				
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 5B.				

Year	Objective	Direct Measure (DM)	DM Results (parenthesis indicate last assessment score)			Indirect Measure (IM)	IM Results
<b>Data Collection Spring-Fall 2018</b>  <b>Rubrics Applied Spring 2019</b>	<u>Objective 5:</u> Graduates will recognize the need for continuous learning.	CSCI 408 Software Engineering (paper on Agile)	BSCS Applied	3.0	(3.5)	Senior surveys: 4= completely met 3= mostly met 2=somewhat met 1=not met, 0=no opinion	Again, senior surveys were good, ranging from <i>mostly met to completely met.</i>
	Outcome C – CS students analyze and evaluate information pertaining to a particular topic.	CSCI 425 Network System Operation & Administration	ASCS	2.5	(none)		
		CSCI 440 Game Design and Development (Paper on video game prototyping)	BSCS Applied	3.0	(3.0)		
			BSCS Network	2.75	(3.5)		
			BSCS Theoretical	none	(4.0)		
			BSCS Web	2.5	(none)		
<b>Overall</b>	2.67	(3.3)					
CSCI 440 Game Design and Development (Paper on video game prototyping)	BSCS Applied	4.0	(1.7)				
CSCI 480 Computer Science Seminar (Paper Proposal)	BSCS Game	2.5	(2.4)				
	<b>Overall</b>	3.0	(2.3)				
	BSCS Applied	3.0	(4.0)				
CSCI 485 Game Design and Development (Paper on impact of video games)	BSCS Theoretical	4.0	(3.0)				
	<b>Overall</b>	3.3	(3.4)				
	CSCI 485 Game Design and Development (Paper on impact of video games)	BSCS Applied	2.3				
		BSCS Game	2.9				
		<b>Overall</b>	2.8				
<b>Impression</b>	CSCI 440and CSCI 485; Evaluator comments: Many of the students who received a 2 did not cite sources The committee believes that these results are acceptable for an assessments with a few comments noted below. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.						
<b>Limitations</b>							
<b>Proposed Action Item: Assessment Tool</b>	CSCI 440 and CSCI 485: Recommendation: The instructions for the assignment should include the program standard statement. Students should be requested to support their arguments based on the evidence provided in the sources						
<b>Proposed Action Item: Program Content and Course Assessment Practices</b>	The committee discussed the length of the paper with respect to the number of sources and have decided to leave the parameters as is. The committee encourages the faculty to include more formal written reports in other classes.  CSCI 440: Same comment as 5B, use the prescribed language.						
<b>Action Items Implemented</b>	None.						
<b>Objective to be Assessed Next Year</b>	Data is collected yearly for Outcome 5C.						

<p><b>Curriculum Recommendations for Objective 5</b></p>	<p><b>As a whole, the committee is satisfied with this objective. As noted earlier care must be taken not to administer similar questions to the same students across courses. We do recognize the need to assign a value to these assessments to get better quality response. In addition the committee realizes that students are not producing the quality of research papers they should be. It appears the students need more guidance on what a research paper is.</b></p>
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