

Student Learning Outcomes Assessment
Academic Year: 2017-2018
Department: Mathematics and Computer Science
Program: BS Mathematics

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
2018	<p>Mathematics, Objective 4: Graduates will be able to demonstrate understanding of mathematical proof by</p> <p>a. applying the structure and results of existing proofs to establish new mathematical results</p> <p>b. employing a variety of established logical techniques to write a mathematical proof</p> <p>c. distinguishing between valid and invalid/incomplete logical reasoning</p>	<p>Ten embedded questions in tests and homework, given in MATH 411 (Real Analysis), MATH 421 (Abstract Algebra), and MATH 370 (Discrete Mathematics II). Two questions from MATH 270 and one from MATH 421 are repeats from the last assessment of this objective (from 2012) to aid in calibrating relative results.</p> <p>All questions were scored to agreement of two faculty members, on a range of 0–5 (see Rubric, in Appendix)</p>	<p>Scores (averages):</p> <p>All questions: 4.06/5 (2012 results: 3.04/5)</p> <p>From MATH 421: (A11-A15) 4.29; 85.7% were ≥ 4</p> <p>From MATH 411: (An1-An3) 4.06; 71% were ≥ 4</p> <p>From MATH 370: (D1-D3) 3.96; 73.1% were $\geq 4^*$</p> <p>For 4a (modifying existing), only five questions applied; for these: 4.07; 73.8% were ≥ 4</p> <p>Common questions to 2012: (2018 score/2012 score)</p> <p>D1: (3.6 in '18; 2.6 in '12)</p> <p>D2: (4.3 in '18; 4.5 in '12)*</p> <p>A3/4: (4.5 in '18; 1.6 in '12)</p>	<p>Senior surveys (ranking 0–4); collective from 2016–2018 (post implementation of changes to curriculum, including MATH 290)</p>	<p>Averages:</p> <p>4a: 3.43</p> <p>4b: 3.86</p> <p>4c: 3.71</p>

<p>Impression</p>	<p>This is the first evaluation since the 2012 report noting significant weakness in Objective 4, continuing from a similar observation in 2008. Changes made after 2008 did not seem to have produced a significant change, and so a series of additional changes, including tweaks to curriculum in MATH 275, a common book on proof techniques in upper-level courses, a change in prerequisites for the senior seminar, and ultimately a new course, MATH 290 (Foundations of Mathematical Proof), first offered in Spring 2016, and required for the BS subsequently.</p> <p>The new direct measure assessments show a marked improvement over the 2012 report results. With the exception of one questions (D2; see “Limitations” below), all repeated questions showed an improvement, and responses to the Algebra question (A13/4) were significantly better (4.5 average vs. 1.6 average in 2012). The average results over scores on all problems given in 2018 was 4.06, vs. 3.04 for the average over all problems reported in 2012. We note that 4.06/5 is a quite reasonable average score, indicating students were mostly correct in their proof attempts. Additionally, 74.1% of all 2018 responses were a 4 or better.</p> <p>The weakest scores in the ten questions given this time were questions with an average of 3.5 (problem A11), 3.6 (problems An2 and D1). These included a moderately difficult proof involving induction in Abstract Algebra, a proof on sequences from Real Analysis, and a review problem on divisibility in Discrete II. (It is possible that students felt rushed on the last problem; see “Limitations” below.) However, even these weaker score are not terrible results.</p> <p>Additionally, we note that students responding to the senior survey questions in all areas of proofs, responding with averages of 3.43/4, 3.86/4, and 3.71/4 in the period since the course was first offered in 2016. However, this is not much different from the result in surveys given in the 2013–2015 surveys, which had averages of 3.57/4, 3.42/4, and 3.42/4. (Students do seem slightly more confident on the second and third points in 2016-2018. Both periods include seven surveys.)</p> <p>As a whole, we feel these results demonstrate that the last round of interventions, including the introduction of the new course MATH 290, has a been a resounding success, and we have majorly improved our students’ understanding of proof.</p>
<p>Limitations</p>	<p>Regarding starred (*) values above: On one question (D2), a student respondent complained about not having enough time given and made no attempt. The administering professor granted that it is possible students felt rushed, but did feel that students had sufficient time for the level of the problems. This may affect two questions, D1 and D2, which were given in Discrete II. We note that D2 is the only of the repeat questions where students this year performed on average below the 2012 results (4.3 in 2018 vs. 4.5 in 2012).</p> <p>Otherwise, we consider this approach a useful measure.</p>
<p>Proposed Action Item: Assessment Tool</p>	<p>The assessment tool is appropriate and should be continued. Some care should be taken to be sure students who attempt a problem in classes do not feel rushed to complete it. We should continue to calibrate against previous assessments by reusing questions when possible.</p>

Proposed Action Item: Program Content and Course Assessment Practices	No significant changes are proposed at this time. We will continue to introduce proof techniques in MATH 270 and MATH 275, and to refine and complete these techniques in MATH 290, to which several faculty members have been contributing. Upper level courses will continue to emphasize proofs in all forms.
Action Items Implemented	
Objective to be Assessed Next Year	Objective 1: Graduates will be able to explain the fundamental concepts of <ul style="list-style-type: none"> a. real analysis of one variable b. calculus of several variables and vector analysis c. linear algebra and the theory of vector spaces d. probability and statistics e. abstract algebra

Program: BS Mathematics, Actuarial

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
2018	Mathematics, Actuarial Track A4: Prepare for professional examinations through the Society of Actuaries and the Casualty Actuarial Society	We obtained the names of the thirteen students who graduated from the actuarial track in the time period 2013–2017. We then investigated how many had attempted and how many had passed the first actuarial exam.	Of the thirteen graduates from 2013–2017: <ul style="list-style-type: none"> • Four have passed the first exam (30.8%) • Six others responded that they had chosen not to pursue an actuarial exam. (One 2015 graduate is preparing to take the exam now.) 	Senior surveys (ranking 0–4); results from 2015–Present	Average: 3/4 (Indicating “mostly met”)

			<ul style="list-style-type: none"> • We have not been able to contact the remaining three, but public records indicate they have not passed the exam. 		
Impression	<p>Overall, only four of thirteen graduates in the time period have attempted and passed an exam, or 30.8%. (For comparison, in the 2012 Assessment report, we noted that out of seven recent graduates, 3 had passed the first exam, or about 42.9%.) The reported pass rate for the P Exam (the first actuarial exam) since 2007 is 41.3% of people who attempted the exam. We did not hear from any student who had attempted an exam and not passed, although we were unable to get a response from three of the thirteen. (So the pass rate of our students who <i>attempted</i> the exam is somewhere between 4/7 (57%) and 4/4 (100%), which is noticeably higher than the overall pass rate.)</p> <p>Several of those to whom we spoke who had not attempted an exam were nonetheless engaged in productive careers. It is worth noting that although the degree program attempts to start the preparation process for the actuarial exams, not every student will choose to pursue that career. Several of those who did not pursue exams indicated that they were engaged in fulfilling careers that made use of their analytical and statistical skills, in industries like banking and insurance.</p> <p>Student surveys on the objective have an average score of 3/4, or what is indicated on the survey as “mostly met.” However, we note that as written, the objective may be taken to indicate that a student who finishes the program is fully prepared for the first actuarial exam, and this is not true. We have always maintained that students <i>will</i> need to perform additional preparation for the exams outside of the required coursework for the program, so the responses may be an accurate response to a somewhat ambiguously worded objective.</p> <p>In short, we cannot feel that our students are not tremendously successful, or that they are not engaged in meaningful and productive careers, or that the program has failed to prepare them for those careers. However, the idea that the objective as written is not being fully met is not entirely wrong. The problem may lie more with the way objective A4 is written, than with the program itself. We do believe that for students who choose to pursue an actuarial career, the program provides appropriate beginning preparation for the first actuarial exam. This preparation is evidenced by the four successful completions (for an enormously difficult exam) we observed in this time period.</p>				
Limitations	<p>We have not been able to contact three of the thirteen students who graduated in this time period.</p> <p>There is no measure of preparation for those students (apparently a majority) who choose <i>not</i> to pursue an actuarial exam.</p>				
Proposed Action Item: Assessment Tool	<p>If the objective were modified to specify what preparation looks like for those students not pursuing an actuarial career (see below), then we can and should modify the assessment to measure that outcome. For students who do attempt the exam, it is clear that success or failure on that exam is the best direct measure of preparation for the exam.</p>				

Proposed Action Item: Program Content and Course Assessment Practices	Some thought needs to be given to the phrasing of this objective to more accurately reflect the following facts: First, not every student who graduates from the program needs to choose to pursue the actuarial exams. Second, the program <i>by itself</i> is not intended to provide complete preparation for the exams; students will need to study beyond their coursework to be fully prepared for the exam.
Action Items Implemented	None at this time.
Objective to be Assessed Next Year	Data collection (only) for both: A2. Apply statistical models for description, prediction, and inference based on data samples A5. Gain an understanding of professional opportunities and responsibilities of the future actuary

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
2018 (Continued data collection only)	Mathematics Pure and Actuarial Tracks, Objective 3: Graduates will be able to interpret and solve mathematical problems by a. selecting appropriate mathematical tools ... c. communicating the results in written and oral form	3a and c: Continued data collection of students in a group problem solving session. This year, we changed from an invitational “Pizza and Problem Solving” session to using a session in the Senior Seminar in mathematics.	<ul style="list-style-type: none"> • 3a: Students mostly continue to identify good approaches. Weaker students do not fully identify the problem. • 3c: Most were able to articulate their arguments, and present results. Struggling students again were stuck at the start. 	Senior surveys (ranking 0–4); results from 2015-2018	Average: 3a: 4.0 3c: 3.6
Impression	We are continuing data collection because we have conducted these sessions for the past two years by inviting students for a problem solving session with an offer of pizza, and response rates have been very low. (We have only had two students each year.) This year we observed in Senior Seminar instead, and observed thirteen students. 3a: Similar to previous years. Students identified relevant topics and mostly made progress. Some moved into unproductive approaches, but most seemed to identify these. Students who struggled got stuck at the beginning: They				

	<p>generally failed to clearly identify or be able to explain what the problem was asking. (See Appendix: “Problem Solving Observation for Objective 3.”)</p> <p>3c: We noted last year that some of the students struggled to express themselves in problem-solving sessions, but this year (with a larger sample), we noted that most students seemed to do well either in formal presentation or informal working groups.</p>
Limitations	The seminar provides a larger “captive audience” for assessing this objective, but it requires the faculty member running the seminar being willing to use a class period for this assessment activity.
Proposed Action Item: Assessment Tool	The seminar setting was much more successful than the invitation. We should continue to observe in this setting as often as possible.
Proposed Action Item: Program Content and Course Assessment Practices	Although this year is primarily for continued data collection for this objective, we do note that the less successful students failed to identify what the problem was asking. We should emphasize this first stage of problem solving (as described by George Pòlya) throughout mathematics classes.
Action Items Implemented	None at this time.
Objective to be Assessed Next Year	<p>Objective 1: Graduates will be able to explain the fundamental concepts of</p> <ul style="list-style-type: none"> a. real analysis of one variable b. calculus of several variables and vector analysis c. linear algebra and the theory of vector spaces d. probability and statistics e. abstract algebra

Program: Computer Science

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	Objective 1. Graduates will be able to apply the tools, theory and practices of computer science.	CSCI 330 Object Oriented Programming	BSCS Applied 3.5 (3.8) BSCS Theoretical 3.0 (none) BSCS Game 3.6 (3.1) BSCS Web 4.0 (4.0) BSCS Network 3.5 (4.0) Overall 3.5 (3.4)	Senior surveys: 4= completely met, 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	Even though the response rate was low, Senior surveys remain strong for this outcome, ranging from <i>mostly met</i> to <i>completely met</i>
	Outcome A.--CS students apply programming skills to meet specifications.	CSCI 385 Data Structures and Algorithm Analysis	BSCS Applied 2.9 (2.1) BSCS Theoretical 2.0 (3.2) BSCS Game 2.7 (3.0) BSCS Web 3.0 (2.0) BSCS Network 3.4 (2.5) Overall 2.9 (2.5)		
Impression	In the CSCI 330 course, the results are good. The results in the CSCI 385 came back up because second assignment was used as artifact, so students could respond to feedback from first assignment. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	Instructor change for the course requiring significant work on content and assessment practices.				
Proposed Action Item: Assessment Tool	None.				
Proposed Action Item: Program Content and Course Assessment Practices	Move assessment to the spring semester to allow more flexibility in collecting data. To adjust for this, the faculty member collecting data in the spring is requested to monitor the number of repeating students.				
Action Items Implemented	Second assignment, rather than first assignment collected for CSCI 385. The Faculty met during the Summer of 2018 to discuss the programming sequence. As a result of this discussion a number of adjustments were made to CSCI 130 and CSCI 230. These courses are entering the approval pipeline in September 2018.				
Objective to be Assessed Next Year	Data is collected yearly for Outcome 1A				

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	<u>Objective 1.</u> Graduates will be able to apply the tools, theory and practices of computer science. Outcome B -- CS students develop web applications to meet specifications.	CSCI 423 Website Engineering	BSCS Web Overall	Senior surveys: 4= completely met, 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	None
<div style="background-color: black; color: white; padding: 10px; display: inline-block;"> Scheduled for collection, but artifacts could not be recovered </div>					
Impression	Artifacts were scheduled for collection, however it was not possible for the faculty member teaching the course to recover the artifacts for assessing this objective. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	None.				
Proposed Action Item: Assessment Tool	None.				
Proposed Action Item: Program Content and Course Assessment Practices	None.				
Action Items Implemented	None.				
Objective to be Assessed Next Year	Data is collected every other year for Outcome 1B – next scheduled Spring 2019				

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2016 Rubrics Applied Spring 2017	<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	BSCS Applied 2.8 BSCS Theoretical 3.0 BSCS Web 2.0 BSCS Network 3.8 Overall 3.0	Senior surveys: 4= completely met, 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	No graduates
Impression	This marked the first cycle in which artifacts were collected from this capstone course in network and system administration. It appears that the students in this track are performing at a good level. The CS faculty recognize the difficulties involved with a part-time faculty member developing assessment instruments and collecting artifacts. The efforts by this person were exceptional! The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	Scripting and documentation need to be pushed.				
Proposed Action Item: Assessment Tool	None.				
Proposed Action Item: Program Content and Course Assessment Practices	Course content changes will include: 1) Develop assignments which require repeated tasks spread across time, 2) Rewrite CSCI 311 to increase emphasis of scripting especially of repeated tasks, and 3) Emphasize “documenting the process” in CSCI 280, possibly introduction of basic script writing.				
Action Items Implemented	None.				
Objective to be Assessed Next Year	Data is collected every other year for Outcome 1C – next scheduled Spring 2018				

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2016 Rubrics Applied Spring 2017	<u>Objective 1.</u> Graduates will be able to apply the tools, theory and practices of computer science. Outcome D -- CS students produce game systems.	CSCI 485 Senior Project in Game Development	Non CS Students 2.0 BSCS Game 3.3 Overall 3.1	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> .
Impression	This marked the first cycle in which artifacts were collected from this capstone course in the game development track. It appears that the students in this track are performing at a good level. If there is consideration for seeking accreditation of this track, there will need to be two direct measures of assessment for this objective in the future, and this outcome will need some revision. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	The outcome, as is, makes it difficult to measure artifacts.				
Proposed Action Item: Assessment Tool	The outcome will be 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 (due October 1, 2017).				
Proposed Action Item: Program Content and Course Assessment Practices	AI (CSCI 370) should become a prerequisite for this course.				
Action Items Implemented	Major curriculum review is presently being done to prepare the track for accreditation.				
Objective to be Assessed Next Year	Data is collected every other year for Outcome 1D – next scheduled Spring 2018				

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	<u>Objective 1.</u> Graduates will be able to apply the tools, theory and practices of computer science.	CSCI 380 Operating Systems	AS Computer Science 3.0 BSCS Applied 1.4 BSCS Theoretical 3.4 BSCS Game 2.7 BSCS Network 4.0 BSCS Web 2.5 Overall 2.6	Senior surveys: 4= completely met, 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	Senior surveys indicate objectives were <i>mostly met to completely met.</i>
	Outcome E -- CS students demonstrate a theoretical understanding of computing systems.	CSCI 475 Data Communications and Networking	BSCS Applied 2.5 (2.7) BSCS Theoretical 3.2 (3.8) BSCS Game none (3.3) BSCS Web 4.0 (none) BSCS Network 2.8 (none) Overall 3.0 (3.0)		
Impression	Results are as expected for both CSCI 380 – Operating Systems and CSCI 475 – Data Communications and Networking. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	The instructor for CSCI 380 had not taught the course in nearly ten years. The committee recognizes that faculty who infrequently teach courses under assessment will most likely produce some variation in assessment results.				
Proposed Action Item: Assessment Tool	None.				
Proposed Action Item: Program Content and Course Assessment Practices	More emphasis needs to be placed on modeling in CSCI 408.				
Action Items Implemented	The description of the rubric for CSCI 410 was revised and will be implemented in Assess18.				
Objective to be Assessed Next Year	Data is collected yearly for Outcome 1E, but in different courses				
Curriculum Recommendations for Objective 1	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. The changes have been made to the courses and they will be presented to the department for approval this fall. During this assessment cycle, the committee recognizes that there could be wide variations in assessment scores when a faculty member has been assigned a course that they have not taught in a very long time. Additionally, it was decided that artifacts would not be collected each semester in CSCI 330, but rather only during the spring offering.				

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	<u>Objective 2:</u> 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 2.0 (2.6) BSCS Theoretical none (2.8) BSCS Game 3.0 (2.8) BSCS Web 3.0 (2.3) BSCS Network 3.0 (3.0) Overall 2.6 (2.7)	Senior surveys: 4= completely met, 3= mostly met, 2=somewhat met 1=not met, 0=no opinion	Senior surveys are acceptable.
	Outcome A -- CS students employ critical thinking and mathematical skills.	CSCI 385 Data Structures and Algorithm Analysis (Assessment #2)	BSCS Applied 3.1 (3.3) BSCS Theoretical none (3.4) BSCS Game 3.3 (3.3) BSCS Web 3.3 (3.0) BSCS Network 3.6 (4.0) Overall 3.3 (3.3)		
Impression	The committee is satisfied with these results. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	None.				
Proposed Action Item: Assessment Tool	None.				
Proposed Action Item: Program Content and Course Assessment Practices	None.				
Action Items Implemented	None.				
Objective to be Assessed Next Year	Data is collected yearly for Outcome 2A				

Year	Objective	Direct Measure (DM)	DM Results			Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	<u>Objective 2:</u> Graduates will be able to apply critical thinking, analytical and logical skills to solve problems.	CSCI 330 Object Oriented Programming	AS Computer Science BSCS Applied BSCS Theoretical BSCS Game BSCS Web BSCS Network Overall	3.0 (none) 3.3 (3.5) 3.3 (none) 3.1 (2.8) 2.8 (3.0) 3.3 (3.5) 3.1 (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>mostly to completely 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 BSCS Theoretical BSCS Game BSCS Web BSCS Network Overall	3.0 (2.9) 3.0 (3.0) 3.0 (3.0) 4.0 (2.7) 4.0 (3.0) 3.3 (2.9)			
Impression	All students are doing consistently well on this assessment. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.						
Limitations	There was an instructor change for the course requiring significant work on content and assessment practices.						
Proposed Action Item: Assessment Tool	None.						
Proposed Action Item: Program Content and Course Assessment Practices	The committee decided to move assessment to the spring semester to allow more flexibility in collecting data. To adjust for this, the faculty member collecting data in the spring is requested to monitor the number of repeating students.						
Action Items Implemented	The artifact collected in the CSCI 385 course was changed to the second assignment – following the first, which is the linked list review. After receiving feedback, students incorporated feedback provided in the first assignment and performed better on assessment with the second assignment. The Faculty met during the Summer of 2018 to discuss the programming sequence. As a result of this discussion a number of adjustments were made to CSCI 130 and CSCI 230.						
Objective to be Assessed Next Year	Data is collected yearly for Outcome 2B.						
Curriculum Recommendations for Objective 2	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. Changes incorporating expectations in program design and testing have been made to the courses and they will be presented to the department for approval this fall. During this assessment cycle, it was decided that artifacts would not be collected each semester in CSCI 330, but rather only during the spring offering.						

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	<u>Objective 3:</u> Graduates will possess the ability to communicate in a professional manner. Outcome A - CS students produce readable and understandable documents.	CSCI 423 Website Engineering (Research Assignment)	BSCS Applied 2.9 BSCS Web 2.8 Overall 2.9	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>
		CSCI 440 Game Design and Development (Research Assignment)	BSCS Applied 1.7 BSCS Game 3.2 Overall 2.8		
		CSCI 480 Computer Science Seminar (Reflection on Work)	BSCS Applied 4.0 (2.4) BSCS Theoretical 3.7 (3.3) Overall 3.8 (2.8)		
		CSCI 480 Computer Science Seminar (Paper Proposal)	BSCS Applied 3.0 (3.0) BSCS Theoretical 3.7 (3.7) BSCS Network 2.0 (none) Overall 3.2 (3.2)		
		CSCI 496 Computer Science Internship (Work Reflection)	AS Computer Science none (3.0) BSCS Applied 4.0 (2.7) BSCS Game none (3.5) BSCS Theoretical none (3.0) BSCS Web 4.0 (3.0) BSCS Network none (3.0) Overall 4.0 (2.9)		
Impression	Students continue to do well on this assessment. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	None.				
Proposed Action Item: Assessment Tool	None.				
Proposed Action Item: Program Content and Course Assessment Practices	The committee decided to change the rubric to further define acceptable grammatical errors. The new rubric will contain the following: Good: Students writing includes minor grammatical flaws. The writing is organized and concise. Developing: Students write with grammatical flaws. The writing can be improved through some reorganization and/or improvements to the style. Beginning: Students writing includes major flawed grammar and may lack organizational or professional tone, but writing does show some knowledge of content.				

Action Items Implemented	Artifacts are no longer collected from CSCI 496 Internship.
Objective to be Assessed Next Year	Data is collected yearly for Outcome 3A.

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	<u>Objective 3:</u> Graduates will possess the ability to communicate in a professional manner. Outcome B - CS students design, compose, and effectively deliver professional presentations.	CSCI 440 Game Design and Development (Game Design Presentation)	BSCS Applied 3.6 BSCS Game 3.9 Overall 3.8	Senior surveys: 4= completely met 3= mostly met 2=somewhat met 1=not met 0=no opinion	Senior survey results for this outcome are acceptable and range from <i>somewhat met</i> to <i>completely met</i> .
		CSCI 475 Data Communications and Networking (App Layer Presentation)	BSCS Applied 4.0 BSCS Theoretical 3.7 BSCS Network 3.0 BSCS Web 4.0 Overall 3.6		
		CSCI 480 Computer Science Seminar (Project Final Presentation)	BSCS Applied 4.0 (not coll) BSCS Theoretical 4.0 (not coll) BSCS Network 4.0 (none) Overall 4.0		
Impression	The results here indicate that students are doing well delivering presentations, however we need to remain diligent about collecting artifacts for this objective. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	Senior survey results were mixed.				
Proposed Action Item: Assessment Tool	None.				
Proposed Action Item: Program Content and Course Assessment Practices	In future game classes, students will be evaluated individually on their individual contribution to the project. To do this, the committee recommends that the number of student presentations be increased and include regular formal progress reports by sub-teams.				
Action Items Implemented	Artifact collection is getting better, but still needs work. Collection of artifacts in CSCI 496 Internship was removed.				
Objective to be Assessed Next Year	Data is collected yearly for Outcome 3B.				
Curriculum Recommendations for Objective 3	Students are performing well in on this objective, but it is important for faculty to continue collecting viable presentation artifacts in the courses identified. The writing rubric has been adjusted to make it easier to evaluate the artifacts.				

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	<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 423 Website Engineering (Peer Evaluations)	BSCS Applied 3.8 BSCS Network 4.0 BSCS Theoretical 4.0 BSCS Web 2.6 Overall 3.5	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 mostly met.</i>
		CSCI 496 Computer Science Internship (Work Log Files)	AS Computer Science 4.0 (none) BSCS Applied 4.0 (3.4) BSCS Game none (3.0) BSCS Theoretical none (3.5) BSCS Web 4.0 (4.0) BSCS Network 4.0 (3.0) Overall 4.0 (3.4)		
		Aggregated Capstone Survey taken in CSCI 423 Website Engineering, CSCI 480 Computer Science Seminar, and CSCI 496 Computer Science Internship	AS Computer Science 4.0 (none) BSCS Applied 4.0 (3.4) BSCS Game none (4.0) BSCS Theoretical 3.7 (3.8) BSCS Web 4.0 (3.5) BSCS Network 4.0 (4.0) Overall 3.9 (3.6)		
Impression	In practice, students appear to understand their professional responsibilities. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	Senior surveys seem to indicate they may not understand their professional responsibilities.				
Proposed Action Item: Assessment Tool	The committee recommends that the results of the survey be summarized by program only. There is no reason to record the course in which the capstone survey was conducted. The capstone survey question should be modified to include something that allows the student to explain their role in a group. This should allow the responses to better match the rubric and demonstrate the objective we want to measure. The new question will be: Consider the last team assignment that you completed, either in any class during your academic career or during your internship experience. What was your role? How did your team function? Were there conflicts that needed to be resolved? What was your role in resolving any conflicts? Explain how you fulfilled, or failed to fulfill your responsibilities to the team.				
Proposed Action Item: Program Content and Course Assessment Practices	The capstone survey should only be conducted in CSCI 480, 485 and 496. This should help eliminate duplicates.				
Action Items Implemented	None.				
Objective to be Assessed Next Year	Data is collected yearly for Outcome 4A.				

Year	Objective	Direct Measure (DM)	DM Results			Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	<u>Objective 4:</u> Graduates will recognize and understand the professional, social and ethical responsibilities associated with computer science. Outcome B - CS students understand legal/security issues and responsibilities.	CSCI 480 Computer Science Seminar (Assignment)	BSCS Applied	4.0	(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 mostly met.</i>
		CSCI 496 Computer Science Internship (Legal/Security Reflection)	AS Computer Science	2.0	(none)		
		Aggregated Capstone Survey taken in CSCI 423 Website Engineering, CSCI 480 Computer Science Seminar, and CSCI 496 Computer Science Internship	BSCS Applied	3.4	(3.5)		
			BSCS Theoretical	4.0	(4.0)		
			Overall	4.0	(3.5)		
			BSCS Applied	2.0	(none)		
			BSCS Applied	3.2	(4.0)		
			BSCS Theoretical	none	(4.0)		
			BSCS Game	none	(4.0)		
			BSCS Web	2.7	(3.7)		
			BSCS Network	none	(4.0)		
			Overall	3.1	(4.0)		
			BSCS Applied	3.4	(3.5)		
			BSCS Game	none	(3.5)		
			BSCS Theoretical	3.7	(2.8)		
			BSCS Web	3.3	(none)		
			BSCS Network	3.0	(4.0)		
			Overall	3.4	(3.4)		
Impression	The results were good. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.						
Limitations	Reviewer indicates there still might be issues with the artifacts. For instance, in one case, students see security as a serious issue, but assume no responsibility. In other cases, students discussed security in practice, but could not indicate why it was used. Senior survey results are mixed.						
Proposed Action Item: Assessment Tool	None.						
Proposed Action Item: Program Content and Course Assessment Practices	As the new game courses are introduced, students should begin to develop multiplayer games as well as beginning to collect data related to game usage. This change should allow for additional discussion of security.						
Action Items Implemented	The capstone survey has been modified for Assess18.						
Objective to be Assessed Next Year	Data is collected yearly for Outcome 4B.						

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results	
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	<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 423 Website Engineering	Scheduled, but artifacts not collected		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 mostly met.</i>
		CSCI 440 Game Design and Development (Paper on Game Ethics)	BSCS Applied 3.2 BSCS Game 3.3 Overall 3.3			
		Aggregated Capstone Survey taken in CSCI 423 Website Engineering, CSCI 480 Computer Science Seminar, and CSCI 496 Computer Science Internship	AS Computer Science 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) Overall 2.6 (3.0)			
Impression	Students did well on the homework assignments, but a little lower on the capstone survey. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.					
Limitations	The assessor is concerned that the “short answer” nature of the capstone survey does not allow an appropriate application of the rubric. Senior survey results were mixed.					
Proposed Action Item: Assessment Tool	The nature of the capstone survey is such that students will supply short answers and the committee expects the scores to be lower than those artifacts which are graded homework assignments.					
Proposed Action Item: Program Content and Course Assessment Practices	None.					
Action Items Implemented	None.					
Objective to be Assessed Next Year	Data is collected yearly for Outcome 4C.					

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	<u>Objective 4:</u> Graduates will recognize and understand the professional, social and ethical responsibilities associated with computer science.	Aggregated Capstone Survey taken in CSCI 423 Website Engineering, CSCI 480 Computer Science Seminar, and CSCI 496 Computer Science Internship	AS Computer Science 3.0 (none) BSCS Applied 2.5 (2.0) BSCS Game none (3.0) BSCS Network 3.0 (3.0) BSCS Theoretical 2.7 (2.4) BSCS Web 1.3 (1.0) Overall 2.5 (2.2)	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>
	Outcome D - CS students understand the value of CS professionals participating in, and promoting, community service.	Spring 2017 / Fall 2017 Community Participation Percentages (N=15)	AS Com Science: 0% (0%) BSCS Applied: 50% (67%) BSCS Game: 100% (50%) BSCS Theoretical: 50% (no grads) BSCS Web: 25% (100%) BSCS Network: 0% (no grads) Overall: 40% (64%)		
Impression	The aggregate results for the Capstone Survey improved slightly and are satisfactory. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	The value of participation in community service is not taught anywhere in the curriculum, however faculty encourage students to participate. There is no mechanism for students to respond to the capstone survey and provide argument for NOT participating in community service. The committee believes that this group of students were somewhat unique and that this measurement is at a one year low. The committee will watch this closely in the future.				
Proposed Action Item: Assessment Tool	None.				
Proposed Action Item: Program Content and Course Assessment Practices	None.				
Action Items Implemented	Capstone Survey now includes a statement asking those who oppose community service to justify their opposition.				
Objective to be Assessed Next Year	Data is collected yearly for Outcome 4D.				

Curriculum Recommendations for Objective 4	The committee is still trying to address issues involving assessment of this objective. There continues to be slight modifications to the capstone survey and its administration. Additionally, it is recognized that students will not address the questions on the capstone survey as completely as they might when writing answers to homework assignments or exam questions.
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Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	Objective 5: 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 4.0 BSCS Theoretical 4.0 Overall 4.0	Senior surveys: 4= completely met 3= mostly met 2=somewhat met 1=not met, 0=no opinion	Senior Surveys were low at <i>somewhat met.</i>
		CSCI 496 Computer Science Internship (Portfolio – Reflection on Learning)	AS Computer Science 4.0 (none) BSCS Applied 3.9 (3.5) BSCS Game none (2.5) BSCS Theoretical none (3.5) BSCS Web 4.0 (4.0) BSCS Network 4.0 (4.0) Overall 3.9 (3.5)		
		Aggregated Capstone Survey taken in CSCI 423 Website Engineering, CSCI 480 Computer Science Seminar, and CSCI 496 Computer Science Internship	AS Computer Science 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) Overall 3.8 (3.4)		
Impression	The results for this assessment were exceptional. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	Senior Survey results were interesting low.				
Proposed Action Item: Assessment Tool	None.				
Proposed Action Item: Program Content and Course Assessment Practices	The committee is somewhat at a loss to explain student survey response. Perhaps this is due to the low response rate to the senior survey. This was due in part to a change in office personnel which resulted in a failure to distribute surveys in the fall semester. The committee will discuss techniques to improve participation in this measurement. This includes: <ol style="list-style-type: none"> 1. Moving the survey on line format 2. Task the department secretary with following up on surveys which are not returned. 3. Faculty should emphasize the importance of completing the surveys. 				
Action Items Implemented	The second assessment for the Theoretical track has been moved to CSCI 408.				

Objective to be Assessed Next Year	Data is collected yearly for Outcome 5A.
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Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	Objective 5: Graduates will recognize the need for continuous learning. Outcome B – CS students research and gather information pertaining to a particular topic.	CSCI 423 Website Engineering (Research assignment)	BSCS Applied 3.0 BSCS Web 2.6 Overall 2.7	Senior surveys: 4= completely met 3= mostly met 2=somewhat met 1=not met, 0=no opinion	Senior survey results were good at <i>mostly met</i> .
		CSCI 440 Game Design and Development (Paper on Motion Capture)	BSCS Applied 2.0 BSCS Game 2.6 Overall 2.5		
		CSCI 480 Computer Science Seminar (Paper Proposal)	BSCS Applied 3.0 (3.0) BSCS Network 2.0 (none) BSCS Theoretical 3.3 (2.3) Overall 3.0 (2.8)		
Impression	The results for this cycle were satisfactory. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	Does the committee need to discuss paper length for this objective? There were difficulties applying the rubric to the written work.				
Proposed Action Item: Assessment Tool	The committee suggests the following changes to the rubric: Excellent: The student selects and effectively employs appropriate sources when discussing the tool or technology. Good: The student selects appropriate sources but only employs one or two effectively. Developing: The student collects sources some of which may not be appropriate, but employs at least one source effectively. Beginning: The student collects minimal sources or inappropriate sources or fails to employ these sources.				
Proposed Action Item: Program Content and Course Assessment Practices	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.				
Action Items Implemented	Artifacts from CSCI 480 follow the guidelines provided. Artifacts are no longer collected from CSCI 496 Internship.				
Objective to be Assessed Next Year	Data is collected yearly for Outcome 5B.				

Year	Objective	Direct Measure (DM)	DM Results	Indirect Measure (IM)	IM Results
Data Collection Spring-Fall 2017 Rubrics Applied Spring 2018	<u>Objective 5:</u> Graduates will recognize the need for continuous learning. Outcome C – CS students analyze and evaluate information pertaining to a particular topic.	CSCI 423 Website Engineering (Research assignment)	BSCS Applied 2.6 BSCS Web 2.3 Overall 2.5	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</i> to <i>completely met</i> .
		CSCI 440 Game Design and Development (Paper on Motion Capture)	BSCS Applied 1.7 BSCS Game 2.4 Overall 2.3		
		CSCI 480 Computer Science Seminar (Paper Proposal)	BSCS Applied 4.0 (2.8) BSCS Theoretical 3.0 (3.3) BSCS Network 3.0 (3.0) Overall 3.4 (3.0)		
Impression	The results for this cycle were satisfactory, and the senior surveys for this objective are good.. The scale used is: 4= excellent, 3 = good, 2= developing, 1=beginning, 0=not completed.				
Limitations	As with outcome 5B, the committee should discuss paper length requirements.				
Proposed Action Item: Assessment Tool	None.				
Proposed Action Item: Program Content and Course Assessment Practices	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.				
Action Items Implemented	Artifacts from CSCI 480 follow the guidelines provided. Artifacts are no longer collected from CSCI 496 Internship.				
Objective to be Assessed Next Year	Data is collected yearly for Outcome 5C.				
Curriculum Recommendations for Objective 5	As a whole, the committee is satisfied with the type of artifacts that are being collected and the rubric. The rubric for 5B was adjusted to more accurately reflect how evaluation of the artifacts should occur. The low responses on the Senior Surveys indicated that we need to make changes to the administration of these. Again, faculty teaching CSCI 480 CS Seminar were reminded that they should be emphasizing research and at a minimum, adopt the guidelines provided.				