Computer Science Assessment Report

2021-22

Learning Outcomes for Computer Science:

1. Students will be able to write correct and robust software.
2. Students will use well-known algorithms and computational techniques to solve problems.
3. Students will analyze the interaction between hardware and software.
4. Students will be able to apply their technical knowledge and critical thinking to solve problems.
5. Students will be able to speak about their work with precision, clarity and organization.
6. Students will be able to write about their work with precision, clarity and organization.
7. Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand.
8. Students will collaborate effectively in teams.
9. Students will be able to understand and create arguments supported by quantitative evidence.
10. Students will understand the professional, ethical and social issues and responsibilities with the implementation and use of technology.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to write correct and robust software.

Outcome Measure: Annual: CSC2054 Signature Assignment. This assessment has switched to being in CSC2052 which is the first half of CSC2054. This will enable us to capture this outcome for mathematics and data science majors.

Criteria for Success: 80% of the students should have an average score of at least 2 in each of the major areas.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percentage of Class at 2 or Higher								
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019***	**2020****	**2021**
Compilation	92%	75%	100%	94%	90%	75%			
Runtime Correctness	85%	100%	62%	72%	95%	60%	45%	42%	19%
Problem Solving	100%	75%	92%	83%	80%	85%	70%	78%	69%

*Note that the instrument was changed in 2019.
**Note that 2020 was a fully remote semester due to COVID.

Conclusions Drawn from Data: The students find the run-time correctness the most challenging. This is because this is the area of programming that is the most detail oriented. The instrument was changed in 2019, the “compilation” test was removed because the rest of the work can not be evaluated if the program does not compile.

Changes to be Made Based on Data: Continue to emphasize the need to carefully de-bug computer code during development. The rubric was modified to clarify the definition of run-time correctness which has made scoring simpler (Fall 2017). To capture the data for students in mathematics, data science, and information systems, we have moved the assessment to the mid-term point in the semester. This may also be impacting the grade. The department needs to look carefully at this first “back to normal” assessment to see if we can discern why the scores have dropped off significantly.

CSC 2054 Signature Assignment

	Unsatisfactory (1)	Satisfactory (2)	Good (3)	Excellent (4)
Runtime Correctness	• Less than 60% correct	• Between 60% – 79% correctness	• 80% - 89% correct	• 90% – 100% correct
Problem Solving	• Analysis of program source code indicates that program is NOT close to working, and could NOT easily be modified to work given additional time.	• Analysis of program source code indicates that the student partially understands the problem solution or understands the solution but could not efficiently translate the solution to C++ code.	• Analysis of program source code indicates that program is close to working, and could be modified to work given additional time.	• All tasks execute correctly indicating that the code is both correct and robust (can catch user input errors).

Criterion: 80% of students will average 2 in Runtime Correctness and Problem Solving.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will use the theory of algorithms and computation to solve problems.

Outcome Measure: Before 2020: Annual: ETS Major Field Test in Computer Science: Structures and Algorithms subscore. After 2021: Signature Assignment in CSC3023 Software Engineering (alternating year class).

Criteria for Success: Before 2020: The department subscore will be at the 65th percentile or higher. After 2021: 80% of the students will score at least 2.5 out of 4 on the class rubric (under development).

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data: This is the most recent 10 years of data.

Year	Percentile
2009-10	70
2010-11	90
2011-12	63
2012-13	*
2013-14	53
2014-15	90
2015-16	92
2016-17	95
2017-18	42
2018-19	36
2019-20	No score
2020-21	No score

* Sample size too small to be given indicator scores.
ETS changed the CS exam in 2011-12.

Conclusions Drawn from Data: This data is a challenge to interpret for several reasons: some years our sample size is too small for ETS to provide the subscore and our sample size is sufficiently small that the standard deviation is relatively large. We have been hitting our target most years, however we dropped after the CS exam was changed in 2011-12.

Changes to be Made Based on Data: The department has decided to discontinue using the ETS MFT. We are in the process of aligning this learning outcome with a signature assignment in a class.

We will begin assessing this learning outcome with a signature assignment embedded in CSC3023 Software Engineering in the Fall of 2022 (the next time that this alternating year course will be taught).

Rubric Used: Scoring done by ETS on the Major Field Test. New rubric for signature assignment under development.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will analyze the interaction between hardware and software.

Outcome Measure: Annual (CS and IS): CSC3014 Signature Assignment.

Criteria for Success: CSC3014 Assignment: 80% of the students should have an average score of at least 7.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percentage of Class at 7 or Higher									
	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Hardware/software interaction understanding	89%	82%	92%	88%	75%	69%	100%	92%	44%	62%

Conclusions Drawn from Data: Students have been able to successfully master the material in the CSC3014 assessment. For most years, the variations appear to be related to sample size. However in 2020-21 the score dropped significantly. This could be due to this assessment being part of a final exam given in the Spring of 2021 during the COVID pandemic. Students were very tired and this score may be an indication of that fact as much as an indication of their knowledge. The scores improved in 2021-22 but are still lagging behind historical values.

Changes to be Made Based on Data: Continue to require operating systems (CSC3014) of all CS and IS students. Continue to monitor results to see if the performance over the last two years is the result of COVID exhaustion or if there is something else impacting the score.

Rubric Used (CSC3014): The scoring for this assignment is purely points based.

	Unsatisfactory (1)	**Satisfactory (2)**	**Good (3)**	**Excellent (4)**
Points gained by showing understanding of software/hardware interaction in answering question	6 and below	7	8	9-10

Rubric Used (ETS): Scoring done by ETS on the Major Field Test.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to apply their technical knowledge and critical thinking to solve problems.

Outcome Measure: Alternating Year**:** CSC4093 Software Project (alternating year course). Signature Assignment related to constructing a software application.

ETS Proficiency Profile: Critical Thinking.

Criteria for Success: CSC4093: 85% of the students will score at least 70%.

ETS PP: 85% of the students will be marginal or proficient at Level 2 Reading/Critical Thinking.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percentage of Class at 70% or Higher				
	2013	**2015**	**2017**	**2019**	**2021****
Problem Solving	67%	86%	77%	86%	74%

	Percentage of Students Marginal or Proficient									
ETS Proficiency Profile	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
ETS Proficiency Profile Level 2 Mathematics	100%	100%	100%	100%	92%	82%	95%	93%	81%	90%

*****Critical thinking data is for the full department.

**2021 data was gathered during COVID when classes were taught in a hybrid manner.

Conclusions Drawn from Data: CSC4093: In 2013, 2015 and 2017 changes in the course were made. At each adjustment, the questions were updated. The data from 2021 was gathered during the COVID pandemic and students were both tired and stressed by the third semester of course disruption.

ETS: Students are in general meeting the standard for this basic skill.

Changes to be Made Based on Data: The prompt for the assignment has been modified based on student questions. We continue the need to engage in careful software development processes and the change from waterfall to agile development methodology was made in 2016-17. The next time that we will be administering the assessment in CSC4093 is the Spring of 2023. We believe that our department assessment is providing more nuanced results and that we would be better served by relying on it for our assessment as opposed to the ETS test which measures critical reading skills.

Rubric Used

We will score the questions according to the following table:

Questions	Maximum Points
1. Briefly describe the problem you were trying to solve.	0
2. Give one functional requirement by cutting and pasting from your user stories.	1
3. Give one non-functional requirement by cutting and pasting from your user stories.	1
4. From your software test plan, give one test case that you developed for each of the requirements given in #2 and #3 above. Cut and paste the two test cases from your software test document.	2
5. Attach the source code listing for the relevant portions of the code which satisfy the functional requirement given in #2 above. Please use a highlighter to highlight the relevant functions/code.	0
6. Did your final project iteration pass these two test cases? If not, why not?	0
7. Out of _____ tests in the Software Test Plan, _____ tests passed for the final project.	3
8. How many core requirements did you have in the User Stories? _____. How many were implemented in the final version of the software? _____	3
9. Explain the functionality of your final delivered code (1 point), highlighting similarities and differences with the initial problem requirements (1 point).	2
10. What programming language(s) did you use and why?	1
11. What operating system did you use and why?	1
12. What software tools (e.g. programming IDE, automated test tools, CASE tools, etc.) did you use and why?	1
13. Did you reuse software? Describe what libraries, frameworks, etc. you used and why.	1
14. Customer Satisfaction Rating.	4
	20

ETS: The score comes from ETS.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to speak about their work with precision, clarity and organization (Oral Communication).

Outcome Measure: Annual: Each student will be required to give an oral presentation on a topic in their field as a part of their participation in the Senior Seminar. The audience for this talk will include department faculty, fellow students and possibly some alumni. The students will be given the evaluation criteria in advance of their presentation and will be rated by the faculty using a rubric with a scale of 4 (outstanding) to 1 (unsatisfactory) in the following areas:

- Command of background material
- Organization
- Oral presentation skills (added as part of the new rubric in the spring of 2010)
- Use of presentation tools
- Ability to field questions from the audience

Criteria for Success: 80% of the students should have an average score of at least 2.5 in each of the major areas in the department rubric.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

Oral Presentation	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Background	100%	92%	100%	95%	100%	100%	95%	100%	100%	95%
Organization	100%	100%	100%	100%	92%	94%	100%	100%	94%	100%
Oral Presentation Skills	100%	92%	100%	95%	100%	100%	95%	100%	100%	100%
Presentation Tools	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Ability to Field Questions	100%	100%	89%	100%	100%	100%	94%	94%	100%	100%

Conclusions Drawn from Data: In general, the students have been performing reasonably well in the area of giving oral presentations. We attribute this to the fact that we intentionally have students presenting technical material in front of others starting in their freshman year.

Changes to be Made Based on Data: Over time we have increased our standards and expanded the rubric to increase clarity for students and to push them to speak at a professional level. We have been incorporating more oral presentations into classes and saw an improvement once we began doing that (before 2010). While we have been making a conversion to the AAC&U Value Rubric, it seems that this data is not being used institutionally and our focus has been on our department's rubric.

Oral Presentation Rubric Update (4/12/17)

Criteria	Outstanding	High Satisfactory	Low Satisfactory	Unsatisfactory
Command of background material	☐ Clearly knows material and key facts by memory	☐ Clearly knows key facts with a few memory slips	☐ Reads some information; knows some facts from memory	☐ Reads sentences from slides
	☐ Expands on PPT slides	☐ Some expansion on PPT slides	☐ No expansion on PPT slide content	☐ Dependent on notes
	☐ Content appropriate for audience	☐ Partial audience adaptation of content	☐ Little audience adaptation of content	☐ Lacks audience adaptation of content
Organization	☐ Clear and concise outline	☐ Clear outline	☐ Some sense of outline	☐ No clear outline
	☐ Relevant graphics and key text items on slides	☐ Too much information on slides (not concise)	☐ Too much detailed information on slides	☐ Slides are in paragraphs; too much detailed information on one slide
	☐ Presentation is between 10-15 minutes	☐ Presentation 1 minute outside of the range (10-15 minutes)	☐ Presentation 2 minutes outside of the range (10-15 minutes)	☐ Presentation 3 minutes outside of the range (10-15 minutes)
Oral presentation skills	☐ Clearly has practiced several times; smooth transitions	☐ Has practiced but transitions are not smooth	☐ Has practiced presentation but cannot verbally make transitions between slides	☐ Clearly did not practice presentation; Does not anticipate content of next slide
	☐ Engages audience in content multiple times and engagement is well connected to talk (questions, examples, etc.)	☐ Engages audience at least twice in content (questions, examples, etc.)	☐ Audience engagement at least once with content (questions, examples, etc.)	☐ No audience involvement
	☐ Free of disfluencies (ah, uhm)	☐ A few disfluencies (ah, umh, er)	☐ Many disfluencies (ah, umh, er)	☐ Disfluencies (ah, umh, er) detract from presentation
	☐ Is clearly heard in the room and uses inflection for emphasis	☐ Can be understood most of the time and uses some inflection	☐ Can sometimes be understood and uses little inflection	☐ Can not be heard and/or speaks in a monotone
	☐ Engages audience through eye contact	☐ Some engagement of audience through eye contact	☐ Infrequent eye contact	☐ Little audience awareness or eye contact
	☐ Engages audience through gestures	☐ Some engagement of audience through gestures	☐ Distracting gestures or mannerisms	☐ Frequent distracting gestures or mannerisms
Use of presentation tools	☐ PPT background is matched to content, legible font, seamless transitions	☐ Appropriate PPT slide backgrounds, transitions & font	☐ Distracting PPT slide backgrounds and transitions, font hard to read	☐ No attention given to PPT slide backgrounds and transitions, font illegible
	☐ Graphics imbedded and matched to topic, necessary hyperlinks work	☐ Most graphics imbedded and matched to topic, most necessary hyperlinks work	☐ Some inappropriate graphics or use of PPT embellishments, necessary hyperlinks don't work	☐ Distracting use of embellishments, graphics not connected to topic
Ability to field questions	☐ Able to answer questions clearly and without hesitation and prepared material to answer anticipated questions	☐ Can answer all questions with some hesitation	☐ Able to answer half of the questions with hesitation	☐ Unable to answer any questions

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to write about their work with precision, clarity and organization (Written Communication).

Outcome Measure: Annual: Each student will be required to write a paper on a topic in their field as a part of their participation in the Senior Seminar. The audience for this talk will include department faculty, fellow students and possibly some alumni. The students will be given the evaluation criteria in advance of their presentation and will be rated by the faculty using a rubric with a scale of 4 (outstanding) to 1 (unsatisfactory) in the following areas:

- Bibliography and other supporting documentation
- Organization
- Grammar and spelling
- Depth of information
- Clarity of writing

Note that the department has a mapping between its rubric and the AAC&U Written Communication Value Rubric.

Annual: ETS Proficiency Profile.

Criteria for Success: 80% of the students should have an average score of at least 2.5 in each of the major areas in the department rubric. This translates to 80% of the students being above a 3.5 in the AAC&U rubric.

ETS: 85% of our students will be marginal or proficient on the Level 2 Writing test.

Our translation from our data to the AAC&U is included. Our department continues to provide the students with our departmental rubric because it has been developed over many years and works effectively with our majors.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

Written Report	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Bibliography and Support	100%	100%	100%	89%	100%	76%	89%	81%	88%	58%
Organization	100%	100%	100%	100%	92%	94%	100%	100%	100%	100%
Grammar and Spelling	100%	92%	89%	84%	100%	88%	94%	94%	94%	89%
Depth of Information	91%	77%	78%	89%	85%	76%	83%	94%	94%	95%
Clarity of Writing	91%	77%	78%	89%	85%	88%	94%	88%	100%	89%

	Percentage at Marginal or Proficient									
Written ETS	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
ETS Proficiency Profile Writing Level 2	60%	85%	100%	89%	85%	76%	84%	93%	88%	66%

Conclusions Drawn from Data: In general, the students have been performing reasonably well in writing technical reports. We still have some weaknesses in the quality of their writing and the use of their source material. The sample size for ETS in the first year was extremely small so we are not particularly concerned about the fact that the score was below the benchmark. The balance of the ETS scores are at or near benchmark (due to small sample sizes, the difference can often be a single person).

Changes to be Made Based on Data: Over time we have increased our standards and expanded the rubric to increase clarity for students and to push them to write at a professional level. The current rubric has been in use for the last 11 years. We have instituted more formal faculty reviews of their draft papers and are trying to give more specific feedback, particularly about the use of references and that seems to be helping with the quality of the papers.

We do not believe that the ETS exam, which measures the mechanics of grammar, is the best assessment of student writing and will be moving away from it to focus on the results from our department rubric which measures writing in the discipline.

MICS Written Presentation Rubric

Criteria	Outstanding	High Satisfactory	Low Satisfactory	Unsatisfactory
Bibliography and supporting documents	☐ Multiple references from distinct reputable sources	☐ Most references from distinct reputable sources	☐ Some references from reputable sources	☐ No bibliography or all references from untrusted sites on the internet
	☐ References cited in the body of the document	☐ Some citation of references in the body of the document	☐ Limited citation of references in the body of the document	☐ No citation of references in the body of the document
Organization	☐ Conveys a central theme with all ideas connected, arrangement of ideas clearly related to topic	☐ Conveys a central idea or topic with some ideas connected to the topic	☐ Attempts to focus on an idea or topic with many ideas not connected to the topic	☐ Has little or no focus on central idea or topic
	☐ Clear introduction, body (with sections), and conclusion includes summary and closure	☐ Includes introduction, body and conclusion	☐ Introduction, body, conclusion detectable but not clear	☐ Introduction, body or conclusion absent
	☐ Includes both an abstract and table of contents	☐ Includes abstract and table of contents (one partial and one complete)	☐ Includes partial abstract and partial table of contents	☐ No abstract or table of contents
Grammar and spelling	☐ No use of the first-person tense	☐ Few uses of the first-person tense	☐ Several uses of the first-person tense	☐ Written in the first-person tense
	☐ No grammatical or spelling errors	☐ Few grammatical and spelling errors	☐ Some grammatical and spelling errors	☐ Many grammatical and spelling errors
Depth of information	☐ Appropriately synthesizes information from multiple distinct sources	☐ Synthesis of information from at least three distinct sources	☐ Synthesis of information from at least two distinct sources	☐ Summary reporting of information without synthesis
	☐ Draws conclusions and personal insights from synthesis	☐ At least two personal insights or conclusions stated	☐ At least one personal insight or conclusion stated	☐ No personal insights
	☐ Has the minimum number of pages including penalty pages; subject coverage is excellent	☐ Has the minimum number of pages including penalty pages; subject coverage is good	☐ Has the minimum number of pages including penalty pages; subject coverage is adequate	☐ Does not have the minimum number of pages including penalty pages
Clarity of writing	☐ Sentences flow	☐ Good sentence structure	☐ Occasional poor sentence structure	☐ Frequent poor sentence structure
	☐ Smooth transitions between paragraphs	☐ Adequate transitions between paragraphs	☐ Transitions between paragraphs unclear	☐ Lacked transitions between paragraphs
	☐ Any and all terms and acronyms are defined	☐ Most terms and acronyms are defined	☐ Some terms and acronyms are defined	☐ Many terms and acronyms are undefined
	☐ Provides evidence to support points	☐ Lacks support for some points	☐ Provides minimal support for points	☐ Ideas not supported

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand (Information Literacy).

Outcome Measure: Annual: Each student will be required to write a paper on a topic in their field as a part of their participation in the Senior Seminar. The audience for this talk will include department faculty, fellow students and possibly some alumni. The students will be given the evaluation criteria in advance and their paper will be rated by the faculty using a rubric with a scale of 4 (outstanding) to 1 (unsatisfactory) in the following areas:

- References: Multiple references from distinct reputable sources
- Citation: References cited in the body of the document
- Synthesis: Appropriately synthesizes information from multiple distinct sources

Criteria for Success: 80% of the students should have an average score of at least 2.5 in each of the major areas.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percentage of Students at 2.5 or Higher						
Information Literacy	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
References	95%	100%	71%	89%	81%	94%	74%
Citation	84%	92%	76%	89%	81%	88%	74%
Synthesis	84%	85%	82%	78%	81%	94%	95%

Conclusions Drawn from Data: The students are generally meeting our expectations. This is still one of the areas with which the students have the most challenges since they have some challenges with citation of information particularly if it was taken from the internet.

Changes to be Made Based on Data: We found that we needed to be very specific about our expectations for the use and citation of information in papers. As we have improved the rubric, the students have improved. We continue to work with students in giving them clear feedback about the need to do a better job with references in technical papers.

Rubric: Next Page.

MICS Information Literacy Presentation Rubric

Criteria	Outstanding	High Satisfactory	Low Satisfactory	Unsatisfactory
Bibliography and supporting documents	☐ Multiple references from distinct reputable sources ☐ References cited in the body of the document	☐ Most references from distinct reputable sources ☐ Some citation of references in the body of the document	☐ Some references from reputable sources ☐ Limited citation of references in the body of the document	☐ No bibliography or all references from untrusted sites on the internet ☐ No citation of references in the body of the document
Organization	☐ Conveys a central theme with all ideas connected, arrangement of ideas clearly related to topic ☐ Clear introduction, body (with sections), and conclusion includes summary and closure ☐ Includes both an abstract and table of contents	☐ Conveys a central idea or topic with some ideas connected to the topic ☐ Includes introduction, body and conclusion ☐ Includes abstract and table of contents (one partial and one complete)	☐ Attempts to focus on an idea or topic with many ideas not connected to the topic ☐ Introduction, body, conclusion detectable but not clear ☐ Includes partial abstract and partial table of contents	☐ Has little or no focus on central idea or topic ☐ Introduction, body or conclusion absent ☐ No abstract or table of contents
Grammar and spelling	☐ No use of the first-person tense ☐ No grammatical or spelling errors	☐ Few uses of the first-person tense ☐ Few grammatical and spelling errors	☐ Several uses of the first-person tense ☐ Some grammatical and spelling errors	☐ Written in the first-person tense ☐ Many grammatical and spelling errors
Depth of information	☐ Appropriately synthesizes information from multiple distinct sources ☐ Draws conclusions and personal insights from synthesis ☐ Has the minimum number of pages including penalty pages; subject coverage is excellent	☐ Synthesis of information from at least three distinct sources ☐ At least two personal insights or conclusions stated ☐ Has the minimum number of pages including penalty pages; subject coverage is good	☐ Synthesis of information from at least two distinct sources ☐ At least one personal insight or conclusion stated ☐ Has the minimum number of pages including penalty pages; subject coverage is adequate	☐ Summary reporting of information without synthesis ☐ No personal insights ☐ Does not have the minimum number of pages including penalty pages
Clarity of writing	☐ Sentences flow ☐ Smooth transitions between paragraphs ☐ Any and all terms and acronyms are defined ☐ Provides evidence to support points	☐ Good sentence structure ☐ Adequate transitions between paragraphs ☐ Most terms and acronyms are defined ☐ Lacks support for some points	☐ Occasional poor sentence structure ☐ Transitions between paragraphs unclear ☐ Some terms and acronyms are defined ☐ Provides minimal support for points	☐ Frequent poor sentence structure ☐ Lacked transitions between paragraphs ☐ Many terms and acronyms are undefined ☐ Ideas not supported

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will collaborate effectively in teams.

Outcome Measure: Alternating year: CSC324 Signature Assignment – evaluation of group while working on a project (before 2015-16) and ISS3042 Project Management – evaluation of group while working on a project (2016-17 and beyond).

Alternating year: MTH3052 Signature Assignment – evaluation of group while working on a project.

Criteria for Success: 80% of the students should have an average score of at least 2.5 in each of the major areas.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percent of students with average at least 2.5				
	Fall 2012 CSC324	**Fall 2014 CSC324**	**Fall 2016 ISS342***	**Fall 2018 ISS342**	**Fall 2020 ISS3042**
Contributes to team meetings	86%	80%	90%	100%	100%
Encourages team members	93%	84%	N/A	100%	100%
Contributes individually outside of team meetings	93%	88%	86%	100%	100%
Attitude	100%	96%	N/A	100%	100%
Fosters constructive team climate	100%	92%	N/A	100%	100%
Responds to conflict	100%	100%	90%	100%	100%

*Note that the full group work rubric will be used in future years.

	MTH352 Percent of students with average at least 2.5				
	Spring 2013	**Spring 2015**	**Spring 2017**	**Spring 2019**	**Spring 2021**
Contributes to team meetings	91%	86%	100%	100%	100%
Encourages team members	91%	93%	100%	100%	100%
Contributes individually outside of team meetings	82%	93%	100%	100%	100%
Attitude	100%	100%	100%	100%	100%
Fosters constructive team climate	91%	100%	100%	100%	100%
Responds to conflict	91%	100%	100%	100%	100%

Conclusions Drawn from Data: The students are performing well as member of teams.

Changes to be Made Based on Data: Continue to make use of group activities throughout the curriculum.

MICS Teamwork Rubric

Definition

Teamwork is behaviors under the control of individual team members (effort they put into team tasks, their manner of interacting with others on team, and the quantity and quality of contributions they make to team discussions.)

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet unsatisfactory (cell one) level performance.

The purpose of this is to evaluate individual team members. Although no team member will ever see your evaluation of them, please take it seriously.

Directions:

- **Do not put your own name anywhere on this form, the evaluations are to be anonymous.**
- **Please write the name of the person you are evaluating here ……._____**
- **Please fill out one copy of this form for every person who was on your team, including one for yourself.**
- **For each row, place a checkmark in the box that best describes your teammate's performance.**

	Outstanding	High Satisfactory	Low Satisfactory	Unsatisfactory
Contributes to team meetings	□ Helps the team move forward by articulating the merits of alternative ideas or proposals.	□ Offers new suggestions to advance the work of the group.	□ Shares ideas but does not advance the work of the group.	□ Sits quietly in team meetings and does not contribute.
Encourages members of the team	□ Actively seeks to find opportunities to encourage all members of the team.	□ Offers encouragement to all members of the team.	□ Offers words of encouragement to friends.	□ Does not offer word of encouragement to anyone.
Individual contributions outside of team meetings	□ Completes all assigned tasks by deadline; work accomplished is thorough. Proactively helps other team members complete their assigned tasks.	□ Completes all assigned tasks by deadline; work accomplished is thorough.	□ Completes all assigned tasks by deadline.	□ Does not complete all assigned tasks by deadline.
Attitude	□ Demonstrates (comments, facial expressions, etc.) a negative attitude **rarely** and helps others to become more positive.	□ Demonstrates (comments, facial expressions, etc.) a negative attitude **rarely**.	□ Demonstrates (comments, facial expressions, etc.) a negative attitude **less** often than a positive attitude.	□ Demonstrates (comments, facial expressions, etc.) a negative attitude **more** often than a positive attitude.

Fosters constructive team climate	☐ Supports a constructive team climate by doing **all** of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it.	☐ Supports a constructive team climate by doing any **two** of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it.	☐ Supports a constructive team climate by doing any **one** of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it.	☐ Supports a constructive team climate by doing **none** of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it.
Responds to conflict	☐ Identifies and acknowledges conflict and acknowledges that relationships can be damaged. Seeks to restore relationships.	☐ Identifies and acknowledges conflict and acknowledges that relationships can be damaged.	☐ Identifies and acknowledges conflict but will not acknowledge that relationships can be damaged.	☐ Will not acknowledge that conflict has occurred or that relationships can be damaged.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to understand and create arguments supported by quantitative evidence, and they can clearly communicate those arguments in a variety of formats (Quantitative Reasoning).

Outcome Measure: Before 2022: Annual: Each student will participate in the ETS Proficiency Profile exam. After Spring 2022: Annual: MTH3083 Mathematical Probability and Statistics Signature Assignment (Math and Data Science Majors). Alternating Year: ISS4014 Database and Web Signature Assignment (CS and IS Majors).

Criteria for Success: 90% of the students will be Marginal or Proficient at Level 2. Note that we dropped the criteria of success so that it is possible for the department to pass even if a single student misses the criteria.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percentage of Students Marginal or Proficient									
ETS Proficiency Profile	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
ETS Proficiency Profile Level 2 Mathematics	100%	100%	100%	100%	92%	82%	95%	93%	81%	90%

Conclusions Drawn from Data: Students are in general meeting our criteria. The variation often comes down to a single student because of small sample sizes. The Spring of 2021 was during COVID and students were exhausted by the time that they took the ETS exam, so this may explain the lower score for that year.

Changes to be Made Based on Data: We do not believe that the ETS exam is accurately measuring student quantitative ability in the department disciplines. Starting the 2022-23 academic year we will be measuring quantitative reasoning in the following classes:
Computer Science and Information Systems: ISS4014 Data Base Systems and Web Integration
Mathematics and Data Science: MTH3083 Mathematical Probability and Statistics

Rubrics: ETS Proficiency Profile (no rubric involved). New rubrics for signature assignments under development.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will understand the professional, ethical and social issues and responsibilities with the implementation and use of technology.

Outcome Measure: Alternating year: ISS3042 Signature Assignment (this is an alternating year course). Note that the department is in the process of developing a broader set of measures.

Criteria for Success: 80% of the students should have an average score of at least 2.5 in each of the major areas.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percent of students with average at least 2.5
	Fall 2020
Rubric Score	62%

Conclusions Drawn from Data: The students did not meet our standards on this first assessment.

Changes to be Made Based on Data: We are in the process of constructing a set of modules that will be embedded in several MICS classes with the intent that students will have multiple exposures to ethics-related issues and case studies. Our hope is that this scaffolding will ultimately support well-developed ethical responses in the classes where we gather data.

Ethics Rubric

	1	2	3	4	5
Question 1	Activity is found to be ethical and no other supporting information is provided.	Activity is found to be unethical, but the support for this behavior is limited and lacks an implied defined framework. Response is a simple, “we shouldn’t do this” with a harsh feeling.	Activity is found to be unethical and is supported by an ethical framework (explicit or clearly implied with a deontology framework). Response is a reasoned “we should do this” but is still a somewhat harsh response.	Activity is found to be unethical and is support by an ethical framework (explicitly stating a deontology framework). Response is a reasoned “we should do this” but is tempered with keeping the issue private between the two people.	Activity is found to be unethical and is supported by an ethical framework (explicitly stating a deontology framework). Response is a reasoned “we should do this” but express a clear justification and is not overly reactive and is kept private.
Question 2	The response does not identify an ethical issue with system reliability and does not clearly apply an ethical framework. The reliability issue is more of an inconvenience to users and does not create actual harm or violate a rule or law.	The response identifies an ethical issue or at least implies (clearly implied or explicitly) an ethical framework. But not both.	The response identifies an ethical issue and at least implies an appropriate ethical framework that correctly relates to the issues and contains a good explanation of why the framework applies to the issue.	The response identifies a clearly ethical issues and explicitly and correctly relates the issue to ethical framework along with explaining why the two are related.	The response identifies a clearly ethical issue and explicitly and correctly relates the issue to ethical framework along with explaining why the two are related. The response goes on to give examples of why the issue is an ethical problem.