Mathematical, Information and Computer Sciences

Core Competencies Assessment Report

2025-26

Core Competency Measures in MICS:

- Oral Communication: Students will be able to speak about their work with precision, clarity and organization.
- Written Communication: Students will be able to write about their work with precision, clarity and organization.
- Information Reasoning: Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand.
- Quantitative Reasoning: Students will be able to understand and create arguments supported by quantitative evidence.
- Critical Thinking:
    - Computer Science: Students will be able to apply their technical knowledge and critical thinking to solve problems.
    - Information Systems: Students will be able to apply their technical knowledge and critical thinking to solve problems.
    - Mathematics/Applied Mathematics/Data Science: Students will be able to apply their mathematical knowledge and critical thinking to solve problems.

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.

Longitudinal Data:

	Percentage of Students at 2.5 or Higher							
Oral Presentation	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
Background	95%	100%	100%	95%	100%	100%	96%	100%
Organization	100%	100%	94%	100%	94%	100%	100%	100%
Depth of Information							96%	
Bibliography							96%	
Oral Presentation Skills	95%	100%	100%	100%	100%	100%	100%	100%
Presentation Tools	100%	100%	100%	100%	100%	100%	100%	97%
Ability to Field Questions	94%	94%	100%	100%	100%	100%	96%	100%

Note that we tried using a different rubric in 2024-25.

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. We changed the expectations for this presentation and the rubric in 2025. The main changes were to move some elements about depth of information and the use of references to the oral presentation. We didn't find this change satisfactory and returned to our previous rubric.

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.

Oral Presentation Rubric

Criteria	Outstanding	High Satisfactory	Low Satisfactory	Unsatisfactory
Command of background material	☐ Clearly knows material and key facts by memory ☐ Expands on PPT slides ☐ Content appropriate for audience	☐ Clearly knows key facts with a few memory slips ☐ Some expansion on PPT slides ☐ Partial audience adaptation of content	☐ Reads some information; knows some facts from memory ☐ No expansion on PPT slide content ☐ Little audience adaptation of content	☐ Reads sentences from slides ☐ Dependent on notes ☐ Lacks audience adaptation of content
Organization	☐ Clear and concise outline ☐ Relevant graphics and key text items on slides ☐ Presentation is between 10-15 minutes	☐ Clear outline ☐ Too much information on slides (not concise) ☐ Presentation 1 minute outside of the range (10-15 minutes)	☐ Some sense of outline ☐ Too much detailed information on slides ☐ Presentation 2 minutes outside of the range (10-15 minutes)	☐ No clear outline ☐ Slides are in paragraphs; too much detailed information on one slide ☐ Presentation 3 minutes outside of the range (10-15 minutes)
Oral presentation skills	☐ Clearly has practiced several times; smooth transitions ☐ Engages audience in content multiple times and engagement is well connected to talk (questions, examples, etc.) ☐ Free of disfluencies (ah, uhm) ☐ Is clearly heard in the room and uses inflection for emphasis ☐ Engages audience through eye contact ☐ Engages audience through gestures	☐ Has practiced but transitions are not smooth ☐ Engages audience at least twice in content (questions, examples, etc.) ☐ A few disfluencies (ah, umh, er) ☐ Can be understood most of the time and uses some inflection ☐ Some engagement of audience through eye contact ☐ Some engagement of audience through gestures	☐ Has practiced presentation but cannot verbally make transitions between slides ☐ Audience engagement at least once with content (questions, examples, etc.) ☐ Many disfluencies (ah, umh, er) ☐ Can sometimes be understood and uses little inflection ☐ Infrequent eye contact ☐ Distracting gestures or mannerisms	☐ Clearly did not practice presentation; Does not anticipate content of next slide ☐ No audience involvement ☐ Disfluencies (ah, umh, er) detract from presentation ☐ Can not be heard and/or speaks in a monotone ☐ Little audience awareness or eye contact ☐ Frequent distracting gestures or mannerisms
Use of presentation tools	☐ PPT background is matched to content, legible font, seamless transitions ☐ Graphics imbedded and matched to topic, necessary hyperlinks work	☐ Appropriate PPT slide backgrounds, transitions & font ☐ Most graphics imbedded and matched to topic, most necessary hyperlinks work	☐ Distracting PPT slide backgrounds and transitions, font hard to read ☐ Some inappropriate graphics or use of PPT embellishments, necessary hyperlinks don't work	☐ No attention given to PPT slide backgrounds and transitions, font illegible ☐ 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

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.

Longitudinal Data:

	Percentage of Students at 2.5 or Higher							
Written Report	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
Bibliography and Support	89%	81%	88%	58%	81%	69%	70%	100%
Organization	100%	100%	100%	100%	88%	85%	93%	100%
Grammar and Spelling	94%	94%	94%	89%	88%	92%	56%	93%
Depth of Information	83%	94%	94%	95%	94%	62%		100%
Clarity of Writing	94%	88%	100%	89%	94%	85%	85%	93%

Note that we experimented with a different rubric in 2024-25.

Conclusions Drawn from Data: In general, the students have been performing reasonably well in writing technical reports. We saw some weakness in both references/support and depth of the information in the papers this year. However, the sample size was 13, so the “miss” of the benchmark is the performance of 2-3 students. We made significant changes in the prompt during the 2024-25 academic year. The assignment was changed to having the students write a shorter paper and also to describe the use of AI in the preparation of both their oral presentation and their paper. That assignment did not produce the desired outcome, so the assignment was modified again for the 2025-26 year. The updated assignment seems to have worked more effectively.

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. In the 2024-25 year the significant changes in the prompt were probably part of the reason that the scores were lower. We did not have student work through our usual three phases to write the paper (outline, draft and final paper) and not having those steps clearly led to weakness in the area of grammar and spelling. In 2025-26 we returned to the multistage process of paper preparation while still incorporating a structured use of AI. This assignment produced papers that we found more consistent with our expectations.

MICS Written Presentation Rubric (4/23/26)

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
Grammar and spelling	☐ No use of first-person tense	☐ Few uses of the first-person tense	☐ Several uses of the first-person tense	☐ Written in 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	☐ Highly accurate and substantive content	☐ Content is accurate, though key concepts are missing	☐ Content is flawed, and/or a significant amount of key concepts are missing	☐ Content is significantly flawed and/or content is trivial
	☐ Appropriately synthesizes information from 3 or more distinct sources	☐ Synthesis of information from two distinct sources	☐ Synthesis of information from one distinct sources	☐ Summary reporting of information without synthesis
	☐ Draws conclusions insights from synthesis	☐ At least two insights or conclusions stated	☐ At least one insight or conclusion stated	☐ No personal insights
	☐ Subject coverage is excellent	☐ Subject coverage is good	☐ Subject coverage is adequate	☐ Subject coverage is poor.
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.

Longitudinal Data:

	Percentage of Students at 2.5 or Higher							
Information Literacy	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
References (Paper)	89%	81%	94%	74%	81%	69%	92%	100%
Citation (Paper)	89%	81%	88%	74%	75%	69%	72%	100%
Synthesis	78%	81%	94%	95%	81%	92%	96%	100%
References (Talk)							96%	
Citation (Talk)							85%	

Conclusions Drawn from Data: The students are generally meeting our expectations. This is still one of the areas with which the students have some challenges particularly with citation. In 2025 we expanded the information literacy assessment to also gather data on the depth of information and the use of references in the students' oral presentations. This is because we reduced the length of the required paper and because we are trying to find new ways to assess students given the proliferation of the use of AI. In 2025-26 we returned to a more structured paper assignment that made use of AI. This seems to have been effective in helping students meet out standards.

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 both papers and their talk. We continue to work with students in giving them clear feedback about the need to do a better job with references in technical papers. Our 2025-26 approach to written and oral presentations leveraging AI, seems to have been more effective than the assignment used in the previous year.

Rubric:
Data is taken for the Written Rubric above.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to understand and create arguments supported by quantitative evidence (Quantitative Reasoning).

Outcome Measure:
MTH3083 Mathematical Probability and Statistics Signature Assignment (Mathematics, Applied Mathematics, and Data Science Majors). Assessed in even numbered springs.

ISS4014 Database and Web Signature Assignment (Computer Science, Information Systems and Data Science Majors). Assessed in odd numbered falls.

Previous: Annual: Each student will participate in the ETS Proficiency Profile exam.

Criteria for Success: 80% of the students will score a 2 or higher on the 5-point rubric for MTH3083 and 2.5 or higher on the 4-point rubric for ISS4014

Previous: 90% of the students will be Marginal or Proficient at Level 2.

Longitudinal Data:

ISS4014:

	Percentage of Class at 2.5 or Higher						
	2015-16	2017-18	2019-20	2021-22	2023-24	2024-25	2025-26
Relevant Information Chosen	88%	89%	88%	76%	88%	80%	85%
Query Correctness	48%	41%	83%	82%	79%	80%	60%

This class became annual in 2024.

MTH3083:

	MTH3083 Percentage of the Class with Average Score of 2 or Higher		
	2022-23	2023-24	2025-26
Students will be able to formulate a mathematical model from a verbal description of a problem.	100%	75%	89%
Students will be able to construct solutions to problems using computational techniques.	100%	67%	78%
Students will be able to interpret visual data.	20%	50%	67%

Due to low enrollment, this class was not taught in 2024-25.

Previous:

	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. In spring of 2023 we pilot tested the new assessment in MTH3083 and the results were mixed. We repeated it in 2024 and 2025 and still have mixed results. We have moved to using an assessment in ISS4014 to assess quantitative reasoning. Students in that class often have some challenges with query correctness. The student scores are improving but there are still some challenges.

Changes to be Made Based on Data: We do not believe that the ETS exam was accurately measuring student quantitative ability in the department disciplines. In the 2022-23 academic year we began measuring quantitative reasoning in the following classes:
Computer Science, Information Systems and Data Science: ISS4014 Data Base Systems and Web Integration. We are making use of an ongoing assessment so have past values that have been inserted here. For Mathematics, Applied Mathematics and Data Science: MTH3083 Mathematical Probability and Statistics. We are monitoring the new assessment to see what adjustments we need to make in either the assessment or the curriculum. We need to evaluate the MTH3083 assessment to determine if the scores are the result of a poorly worded assignment or if there is an issue with students quantitative reasoning, particularly when it comes to interpreting visual data. We suspect that the problem may be how the question is being asked.

Rubrics:

ETS Proficiency Profile (no rubric involved)
ISS4014: Rubric below
MTH3083: Rubric below

ISS4014 Rubric Used

	Unsatisfactory (1)	Satisfactory (2)	Good (3)	Excellent (4)
Recognition of relevant information	3 errors (an error is defined as missing a relevant database field or listing an irrelevant field)	2 errors (an error is defined as missing a relevant database field or listing an irrelevant field)	1 error (an error is defined as missing a relevant database field or listing an irrelevant field)	All relevant database fields are listed and no irrelevant fields are listed for both queries
Query correctness	3 mistakes in the 2 queries	2 mistakes in the 2 queries	1 mistake in the 2 queries	No mistakes in the two queries

MTH3083 Rubric

	Unsatisfactory (0)	Low Satisfactory (1)	Satisfactory (2)	High Satisfactory (3)	Outstanding (4)
Students will be able to formulate a mathematical model from a verbal description of a problem.	Completely incorrect	Missed more than one key step or concept	Missed one key step or concept	Made a minor error	Completely correct
Students will be able to construct solutions to problems using computational techniques.	Completely incorrect	Missed more than one key step or concept	Missed one key step or concept	Made a minor error	Completely correct
Students will be able to interpret visual data.	Completely incorrect	Missed more than one key step or concept	Missed one key step or concept	Made a minor error	Completely correct

Assessment Data Mathematical, Information and Computer Sciences

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

Outcome Measure: CSC4093 Software Project (alternating year course taught in odd numbered springs). Signature Assignment related to constructing a software application.

Criteria for Success: CSC4093: 80% of the students will score at least 70%.

Longitudinal Data:

	Percentage of Class at 70% or Higher					
	2014-15	2016-17	2018-19	2020-21	2022-23	2024-25
Problem Solving and Critical Thinking	86%	77%	86%	74%	85%	95%

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 the spring of 2021 was gathered during the COVID pandemic and students were both tired and stressed by the third semester of course disruption. The students are meeting our standards. The class will next be taught in 2026-29.

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. We are seeing consistent patterns in data and will continue to monitor outcomes.

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

Assessment Data Mathematical, Information and Computer Sciences

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

Outcome Measure: ISS4014 Database and Web Signature Assignment (Computer Science, Information Systems and Data Science Majors). Assessed in odd numbered falls.

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

Longitudinal Data:

	Percentage of Class at 2.5 or Higher						
	2015-16	2017-18	2019-20	2021-22	2023-24	2024-25	2025-26
Relevant Information Chosen	88%	89%	88%	76%	88%	80%	85%
Query Correctness	48%	41%	83%	82%	79%	80%	60%

Conclusions Drawn from Data: ISS4014 Assignment: The students are typically meeting our benchmarks. In 2019-20 the assignment was modified a bit to be clearer for students and we saw a marked improvement in scores since that year, however students are still struggling a bit with query correctness.

Changes to be Made Based on Data: We have been spending more time in class emphasizing queries.

Rubric Used

	Unsatisfactory (1)	Satisfactory (2)	Good (3)	Excellent (4)
Recognition of relevant information	3 errors (an error is defined as missing a relevant database field or listing an irrelevant field)	2 errors (an error is defined as missing a relevant database field or listing an irrelevant field)	1 error (an error is defined as missing a relevant database field or listing an irrelevant field)	All relevant database fields are listed and no irrelevant fields are listed for both queries
Query correctness	3 mistakes in the 2 queries	2 mistakes in the 2 queries	1 mistake in the 2 queries	No mistakes in the two queries

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to apply their mathematical knowledge and critical thinking to solve problems (Mathematics, Applied Mathematics, Data Science).

Outcome Measure: Signature assignment in MTH2033 Linear Algebra (assessed in odd numbered springs)

Previous:
ETS Proficiency Profile – Reading/Critical Thinking (Annual).

Criteria for Success: 80% of the students will be at a 2.5 or higher on the rubric.

Previous:
ETS Proficiency Profile: 85% of the students will be marginal or proficient at Level 2

Longitudinal Data:

	Percentage of Students at 2.5 or Higher		
	2022-23	2023-24	2024-25
Computing Eigenvalues	71%	100%	75%
Understanding Mutually Orthogonal	71%	100%	88%

	Percentage of Students Marginal or Proficient								
ETS Proficiency Profile	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
ETS Proficiency Profile Level 2 Critical Thinking	92%	100%	84%	92%	76%	79%	80%	88%	79%

The department discontinued the use of the ETS Proficiency Profile in the fall of 2022.

Conclusions Drawn from Data: The students consistently met our expectations using the ETS PP. We became concerned about the consistency of the questions in the ETS MFT and resulted in the department discontinuing the use of that measure. In spring of 2023 we pilot tested the new assessment in MTH2033. The students nearly met our benchmark; if one more student had been successful, we would have crossed the threshold. In 2024, the students met our benchmark and in 2025, missing the benchmark was a matter of a single student.

Changes to be Made Based on Data: None at this time. We will continue to monitor the use of our new assessment.

Rubric Used:
See the next page.

MTH2033 Signature Assignment Rubric

Students will be able to apply their mathematical knowledge and critical thinking to solve problems (CC:CT)

	Unsatisfactory (1)	Low Satisfactory (2)	High Satisfactory (3)	Outstanding (4)
Computing Eigenvectors	More than one major error including completely incorrect.	Made a major error	Made a minor error	Completely correct
Understanding mutually orthogonal	More than one major error including completely incorrect.	Made a major error	Made a minor error	Completely correct