Institutional Effectiveness
2024-2025

Program: Computer Science MS
College and Department: College of Engineering, Computer Science
Contact: Gerald Gannod
Mission:

Our mission is to be widely recognized for enabling students to have a global impact through innovative and quality programs, through research that emphasizes collaborative partnerships, and by enabling the success of a diverse student, faculty, and alumni community.

Attach Curriculum Map (Educational Programs Only):
Attached Files: See Appendix 1

PG 1: Breadth and depth of knowledge

Define Outcome:
PG 1: The student should gain a breadth of knowledge in the discipline and depth in the specific area of his/her specialization.

Assessment Methods:
Since our curriculum requires both breadth and depth, we believe completing the MS program with a 3.25 breadth GPA and a 3.5 depth GPA or better demonstrates success in these areas. We will track the percentage of students finishing with these GPA attainment levels each year. Our target percentage is at least 70%. We will use this metric to evaluate not only the effectiveness of instruction, but also the quality and background of students accepted into the program, which may result in refinement of the acceptance criteria and process.

Criteria for Success (Thresholds for Assessment Methods):
The student should achieve at least a 3.25 GPA in breadth of knowledge in the discipline and a 3.5 GPA in the specific (depth) area of his/her specialization.

Link to 'Tech Tomorrow' Strategic Plan:
1.A Experiential Learning,2.A Technology Infused Programs

Results and Analysis:
In the 2024–2025 academic year, faculty and audience submitted a total of **22 responses** to the Master's Defense Survey, which assessed student performance across key program learning outcomes. These responses reflect aggregated evaluations and may include multiple entries per student.

For **specialization mastery (Q4)**, 14 responses (63.6%) rated students as demonstrating *excellent* mastery, while 7 (31.8%) rated them as *basic*, and 1 response (4.5%) indicated *marginal* mastery. No responses indicated a lack of mastery.

For **application of core principles to advanced problems (Q5)**, the distribution was identical: 14 responses (63.6%) marked *excellent*, 7 (31.8%) *basic*, and 1 (4.5%) *marginal*.

In the area of **oral communication (Q6)**, 8 responses (36.4%) assessed the presentation as *excellent*, 13 (59.1%) as *solid graduate-level*, and 1 (4.5%) as *below graduate-level* in some aspects.

For **written communication**, based on a smaller pool of **10 responses**:

- **Grammatical quality (Q8)** received 5 ratings (50%) of *excellent* and 5 (50%) of *solid*.
- **Technical writing quality (Q9)** was rated *excellent* in 1 response (10%) and *good* in 9 responses (90%).

Overall, the data suggest that most students are consistently rated at or above expectations across specialization knowledge, advanced problem-solving ability, and communication skills, both oral and written.

See the attachment for further details.

Attached Files: See Appendix 2

Use of Results to Improve Outcomes:
Given the high percentage of ratings at or above expectations across all outcomes, no further changes are currently planned. Ongoing monitoring of response trends and student performance will guide future refinements to program requirements and support.

PG 2: Graduates Will Undertake Research, and Publish Their Work

Define Outcome:
PG 2: Graduates of the program undertake research, and/or publish their work in peer-reviewed journals and conferences.

Assessment Methods:
Provide evidence of former graduate students' mentoring and research accomplishments:
Students who go into academia and do research will produce various forms of accomplishments: mentoring students, research, grants, publish papers, etc. To capture this information, information from these students' academic websites will be collected to include the following: number of graduate students mentored; number of external research grants as PI or co-PI; and number of peer-reviewed publications.

Criteria for Success (Thresholds for Assessment Methods):
This is the first time we have started collecting this information. As such, thresholds for each of the following will be set to equal to the number of students that go into academia, which at this time is unknown (because it has never been collected in the past):

- number of graduate students mentored
- number of external research grants as PI or co-PI
- number of peer-reviewed publications

The justification for these criteria is that in academia, the success of a CS professor, at any institution requiring research, is measured in one's ability to procure grants, publish papers, and mentor graduate students. Tenure is primarily based on these metrics.

Link to 'Tech Tomorrow' Strategic Plan:
2.B Research, Scholar, Intellect, and Creativity

Results and Analysis:
Over the past six academic years, the number of MS students graduating with at least one research publication or presentation has remained consistently strong. In many cases, students produced multiple research outputs, demonstrating a high level of engagement with scholarly work. This sustained achievement highlights the effectiveness of the program's existing mentorship and research support structures.

See attached table.
Attached Files: See Appendix 3

Use of Results to Improve Outcomes:

Based on the consistently strong outcomes, the program has formalized its expectations for research engagement. Beginning this year, MS students are required to submit at least one research paper for publication or presentation as part of their degree requirements. This change is intended to maintain and further strengthen the culture of research within the program.

SLO 1: Demonstrate knowledge of techniques, methods, and disciplines

Define Outcome:
SLO 1: The student should demonstrate knowledge of the techniques, methods, and disciplines of computer science research.

Assessment Methods:
Score on Oral Defense and Thesis/Project Assessment Form –Thesis/Project presentations and reports provide evidence of student research and communication skills. At an M.S. student's defense (thesis and project only), committee and audience members submit an Oral Defense and Thesis/Project Assessment Form. These results are tabulated and stored on the MS Teams server each semester. Each area of evaluation is on a scale of 1 to 4, with 4 being excellent, 3 being good, 2 being an area that could use improvement, and 1 being a weak evaluation.

Criteria for Success (Thresholds for Assessment Methods):
We have set our desired level of attainment at 3.0 (good) for each area, as any score of 3.0 or higher is considered having attained that skill and not in need of improving.

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SLO 2: Progress and Graduate

Define Outcome:
SLO 2: The student should progress and graduate in a timely fashion.

Assessment Methods:
Time to degree completion - Timely graduation is important for students and for the responsible use of department resources. Students going beyond 2.5 years for their M.S. should be an exception. Note that we use the 2.5-year measure due to the fact that many graduate students defend late in their intended semester of graduation and will miss the defense deadline for graduation. As such, while a student successfully defends their thesis or project in one semester, they are listed as a graduate of the following semester. We will use this metric to determine the process for matriculating students through the program, including the clarification of key milestones and periodic demonstrations of progress.

Criteria for Success (Thresholds for Assessment Methods):
Our desired level of attainment is 80% graduating within 2.5 years. Given the diversity of students in our program (full-time, part-time, working, remote, etc.), achieving 80% should be considered noteworthy. Note that we are NOT including direct-admit PhD students who are also pursuing their M.S. degree because their timelines can be very different.

Link to 'Tech Tomorrow' Strategic Plan:
3.A Efficiency and Effectiveness

Results and Analysis:
Out of 16 students, 13 (81.25%) graduated within 2.5 years (5 semesters or fewer). This demonstrates that most students are completing their degrees in a timely manner. The few cases requiring 6 or more semesters are considered outliers and may reflect individual circumstances rather than systemic issues.

Use of Results to Improve Outcomes:
The results affirm the effectiveness of current program structures. To better support all students, especially outliers, we plan to implement improved tracking of student success. This includes administering periodic surveys to identify potential challenges early and enable timely advising and intervention.

Summative Evaluation:

Student performance in the MSCS program during the 2024–2025 academic year reflects high levels of achievement across key learning outcomes. In areas such as specialization mastery and application of core principles, over 63% of evaluations rated student performance as excellent, with no reports of inadequate mastery. Oral communication skills were similarly strong, with nearly all students rated at or above graduate level expectations. Written communication, while solid overall, showed slightly more variation, with most students rated between 'good' and 'excellent.' Research engagement remains a program strength, as a high proportion of students graduate with at least one publication or presentation, often more. Furthermore, 81.25% of students are completing their degrees within 2.5 years, indicating effective program structure and advising. However, internal reviews revealed a lack of centralized tracking, which has resulted in administrative challenges, inconsistent reporting, and gaps in milestone documentation, particularly during accreditation and annual assessments.

Assessment Plan Changes:

To address the challenges identified in the assessment, the Department recommends the development and implementation of a centralized graduate student tracking system. This system would enable more effective monitoring of student progress from enrollment through graduation, capturing key milestones such as committee evaluations, research productivity, funding sources, and post-graduation outcomes. The shift away from manual tracking methods is necessary to eliminate inconsistencies and gaps in reporting, which have posed difficulties during annual reviews and accreditation processes. In addition to improved tracking, the Department plans to introduce periodic surveys designed to identify academic or personal challenges early in the student lifecycle. These tools will support more proactive and targeted advising, helping students stay on track for timely degree completion. Recognizing the program’s sustained success in fostering student research, the Department also intends to maintain and, where possible, enhance mentorship and structural support that encourages scholarly output. Finally, while current learning outcome assessments indicate strong student performance, the Department will continue refining these evaluations, especially in areas such as written communication, to ensure comprehensive and consistent quality across all dimensions of the MSCS program.

List of Appendices:

Appendix 1: Curriculum Map
Appendix 2: PG 1 Results
Appendix 3: Research Publications

Appendix 1: Curriculum Map

Computer Science - Master's Program

Course	Title	Student Outcomes	
		SLO1	SLO2
CSC 5100	Operating Systems	X	X
CSC 5200	Computer Networks	X	X
CSC 5220	Data Mining/Machine Learning	X	X
CSC 5240	Artificial Intelligence	X	X
CSC 5260	Advanced Data Science	X	X
CSC 5320	Computer Architecture	X	X
CSC 5400	Analysis of Algorithms	X	X
CSC 5570	IT Security	X	X
CSC 5575	Info Assurance & Cryptography	X	X
CSC 5580	Software Reverse Engineering	X	X
CSC 5585	Software and Systems Security	X	X
CSC 5760	Parallel Programming	X	X
CSC 5770	Distributed & Cloud Computing	X	X
CSC 6220	Data Mining	X	X
CSC 6230	Machine Learning	X	X
CSC 6240	Math/Theory-Machine Learning	X	X
CSC 6260	Advanced Topics in A.I.	X	X
CSC 6400	Advanced Analysis of Algorithms	X	X
CSC 6575	Internet Security	X	X
CSC 6580	Advanced Reverse Engineering	X	X
CSC 6585	Secure Software Development	X	X

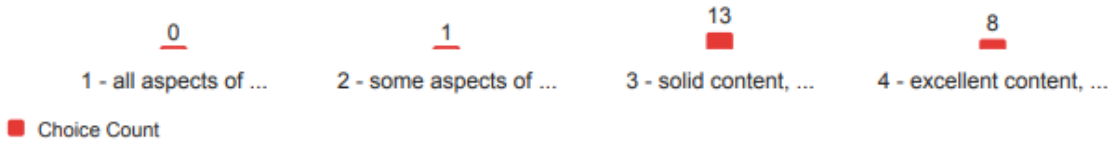
CSC 6730	Advanced Networking	X	X
CSC 6740	Parallel/Distributed Algorithm	X	X
CSC 6780	Distributed Computing	X	X
CSC 6910	Computer Science Seminar	X	X
CSC 6980	Masters Project	X	X
CSC 6990	Research & Thesis	X	X

Appendix 2: PG 1 Results

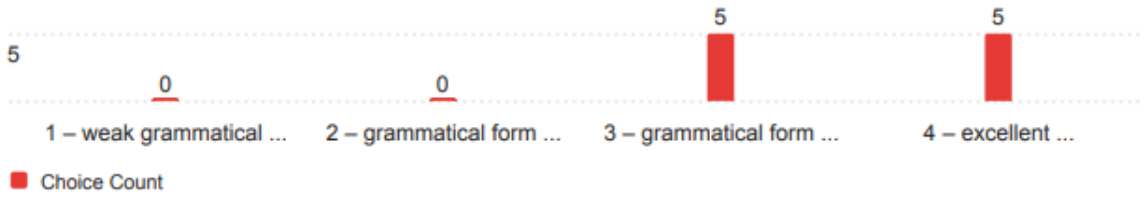
Q4 - Each M.S. candidate is expected to demonstrate mastery of the basic principles of at least one of the specializations of CS. Please assess this candidate using the following scale:

Q5 - Each M.S. candidate is expected to be able to apply these basic principles to solve advanced problems in their chosen specialization. Please assess this candidate using the following scale:

Q6 - Graduates of the M.S. program in Computer Science will be able to communicate their ideas effectively with their technical peers and with others outside their discipline. Please assess this candidate's oral presentation using the following scale:



Q8 - Graduates of the M.S. program in Computer Science will display grammatical quality in their writing. Please assess this candidate's quality of written English using the following scale:



Q9 - Graduates of the M.S. program in Computer Science will display technical quality in their writing. Please assess this candidate's technical writing content using the following scale:

Appendix 3: Research Publications

Academic Year	No. of Graduates	Graduates with Research Output (Publication or Presentation, %)
2019-20	18	11 (61.11%)
2020-21	12	8 (66.7%)
2021-22	25	14 (56%)
2022-23	20	13 (65%)
2023-24	20	8 (40%)
2024-25	16	11 (68.75%)
Total	111	65 (58.56%)