Texas State University
Outcomes Report

General Information	
Academic Year:	2022-2023
College:	Business
Department:	Information Systems and Analytics
Program:	Data Analytics and Information Systems
Program Code:	52.13
Outcome Type:	Student Learning (GR)
Degree:	Masters
Coordinator/Contact:	Jaymeen Shah
Status:	Data Entry Closed

Mission Statement

The Master of Science in Data Analytics and Information Systems (MSDAIS) program is a flexible, part-time program focused on preparing students for successful careers in data analytics related professions. The MSDAIS program emphasizes data analytics, information technology, and technical skills required for careers in data analytics.

Evidence of Improvement

The MSDAIS program goal is that during the academic year 80% or more of the students will meet or exceed the standards of scoring 80% or better on each learning outcome. For AY 2022-2023, this goal was achieved with only one assessment data point falling short of the desired 80% mark. The outcome summary provided for the past two semesters show students are meeting or exceeding the performance standards in most of the courses.

Note: Cell values in the assessment summary table indicate percentage of students in each course meeting or exceeding the performance standards for that learning outcome. If a learning outcome has more than one performance areas, the cell value is the average of the percentage of students in each performance area meeting or exceeding the performance standards.

The most significant performance improvements were evident in learning outcome #2, method 2 and learning outcome #5, method 1. For learning outcome #2, method 2, the percentage of students meeting or exceeding the performance standards increased from 76.9% in 2021-2022 to 100% in 2022-2023, and in learning outcome #5, method 1, the percentage of students meeting or exceeding the performance standards increased from 64.3% in 2021-2022 to 94.5% in 2022-2023. These significant improvements were achieved due to improved performance in QMST 5335 – Forecasting & Simulation course. This improvement in student performance was attained by following the action plan instructor developed last year to provide

students project for analyzing and using data to simulate a complex system for decision-making as individual project instead of team project and assign it early in the semester to give students more time to work on the project.

For learning outcome #5, method 1, the percentage of students meeting or exceeding the performance standards increased from 64.3% in 2021-2022 to 94.5% in 2022-2023. This improvement in student performance was achieved due to improved performance in CIS 5355 – Database Management Systems course. The instructors devoted more time in class to explain concepts for developing conceptual database design for a given scenario and provided additional out-of-class exercises to improve students' understanding in developing conceptual database design.

Student performance for other learning outcomes were comparable to performance in previous year. The overall average of student performance across all learning outcomes increased slightly from 92.1% in 2021-2022 to 92.9% in 2022-2023.

Action Plan

In AY 2022-2023, the subcomponent listed below of learning outcome #5, method 2 missed the 80% target of exceeding or meeting the expectations. Action plan for this learning outcome is given below.

(1) Learning Outcome #5 – Design and implement data management strategies.

Method 2:

CIS 5355 – Database Management Systems.

The percentage of students meeting or exceeding the performance for learning outcome #5, method 2, was 82.2%. The percentage of students meeting or exceeding expectations for the subcomponent developing conceptual database design for a given scenario was 59.0%. To improve student performance for this subcomponent of method 2, instructors plan to do the following:

(a) Devote more class time to explain concepts of developing conceptual database design.

(b) Discuss more conceptual database design examples in class and provide additional out-of-class assignments to develop conceptual database design for a given business scenario.

These actions will improve performance in this subcomponent of learning outcome #5, method 2.

Outcome 1	
Category:	Student Learning Outcome

Students will demonstrate critical thinking skills necessary to define and solve problems.

The **standards** of performance for the methods below are:

- Scores of 90% correct or better will indicate that the student exceeds expectations

- Scores greater than 80% correct but less than 90% correct will indicate that the student meets expectations
- Scores less than 80% correct will indicate that the student failed to meet expectations.

It is **expected** that 80% of students enrolled in the course during the academic year will meet or exceed the standards on each learning outcome.

Outcome 1 - Method 1

1A. In QMST 5334, Statistical Methods for Business, the assessment technique/rubric for outcome 1 is as follows. Four short-answer items in exams will be used to assess students' ability to define problems and apply appropriate statistical techniques. Excellent scores will have correct use of statistical techniques and interpretation of results. Acceptable scores will have some errors in technique used or interpretation of results. Unacceptable scores will have major errors in use of techniques and interpretation of results.

1B. In CIS 5357, Computing for Data Analytics, the assessment technique/rubric for outcome 1 is as follows. An exam problem will require students to define problem and develop code to implement solution for the given problem. Excellent scores will have correctly implemented the solution for the given problem. Acceptable scores will have some error in the code implementation. Unacceptable scores will have major errors and the code may not work for the problem.

Outcome 1 - Method 1 - Result

Outcome 1 - Method 1 - Result

SUMMARY STATISTICS FOR OUTCOME #1 IN QMST 5334 - Statistical Methods for Business FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Define problems	Exceeds	43	100.00	6	100.00	49	100.00
	Meets	0	0.00			0	0.00
	Failed to meet	0	0.00			0	0.00
	Total	**43**	**100.00**	**6**	**100.00**	**49**	**100.00**
Apply appropriate statistical techniques	Exceeds	43	100.00	6	100.00	49	100.00
	Meets	0	0.00			0	0.00
	Failed to meet	0	0.00			0	0.00
	Total	**43**	**100.00**	**6**	**100.00**	**49**	**100.00**

Percentage of MSDAIS students who met or exceeded expectations for *defining problems*: 100%

Percentage of MSDAIS students who met or exceeded expectations for *applying appropriate statistical techniques*: 100%

Explanation of Results: In QMST 5334 - Statistical Methods for Business, 100% of the MSDAIS students met or exceeded the standards for defining problems and applying appropriate statistical techniques for method #1 of this learning outcome, thus exceeding the performance expectation for the year. It is positive that all MSDAIS students successfully defined problems and used appropriate statistical techniques to solve business problems. Combining MBA and MSDAIS students in a section seemed to have positive effect on student performance. In addition, the face-to-face teaching and same professor teaching QMST 5334 during the academic year seem to have helped in improved performance. Finally, the focus of analytical skills for MBA and MSDAIS students are not identical which is a challenge for professor teaching QMST 5334.

SUMMARY STATISTICS FOR OUTCOME #1 IN CIS 5357 - Computing for Data Analytics FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Define problem	Exceeds	24	52.2	22	81.5	46	63.0
	Meets	15	31.6	5	18.5	20	27.4
	Failed to meet	7	15.2	0	0.0	7	9.6
	Total	**46**	**100.0**	**27**	**27**	**73**	**100.0**
Develop code to implement solution for the given problem	Exceeds	24	52.2	22	81.5		63.0
	Meets	15	31.6	5	18.5		27.4
	Failed to meet	7	15.2	0	0.0		9.6
	Total	**46**	**100.0**	**27**	**100.0**		**100.0**

Percentage of MSDAIS students who met or exceeded expectations for defining problems: 90.4%

Percentage of MSDAIS students who met or exceeded expectations for developing code to implement solution for the given problem: 90.4%

Explanation of Results: In CIS 5357 - Computing for Data Analytics, 90.4% of the MSDAIS students met or exceeded the standards for defining problems and developing code to implement solution for the given problem for method #1 of this learning outcome, thus exceeding the performance expectation for the year. It is positive that 90.4% of the MSDAIS students successfully defined problems and developed code to implement solution for the given problems.

Action Plan -

1. For QMST 5334 - Statistical Methods for Business: (a) Continue to use in-class exercises and out-of-class assignments as it positively affected

student performance. (b) The course coordinator will communicate with the instructors teaching QMST 5334 at the beginning of each semester regarding important concepts students need to learn in the course and for Method 1.
2. For CIS 5357 - Computing for Data Analytics: (a) Continue to devote additional class time and use examples to demonstrate the process of defining problem and then developing code to implement a solution for the defined problem. (b) Continue to give additional out-of-class assignments to provide students with more practice in defining business problems and developing code to implement a solution for the defined problems as it has helped in improving student understanding.

Outcome 1 - Method 2

2A. In QMST 5334, Statistical Methods for Business, the assessment technique/rubric for outcome 1 is as follows. A project that will require students to define problem and use appropriate technique(s) to solve the problem. Excellent scores will have correct use of statistical techniques and interpretation of results. Acceptable scores will have some errors in technique used or interpretation of results. Unacceptable scores will have major errors in use of techniques and interpretation of results.
2B. In CIS 5357, Computing for Data Analytics, the assessment technique/rubric for outcome 1 is as follows. An out-of-class assignment will require students to define problem and develop code to implement solution for the problem. Excellent scores will have implemented the solution for the given problem. Acceptable scores will have some error in the code implementation. Unacceptable scores will have major errors and the code may not work for the problem.

Outcome 1 - Method 2 - Result

Outcome 1 - Method 2 - Result

SUMMARY STATISTICS FOR OUTCOME #1 IN QMST 5334 - Statistical Methods for Business FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Define problem	Exceeds	37	86.05	6	100	43	37
	Meets	6	13.95	0	0.00	6	6
	Failed to meet	0	0.00	0	0.00	0	0
	Total	**43**	**100.00**	**6**	**100.00**	**49**	**43**
Use appropriate technique(s) to solve the problem	Exceeds	37	86.05	6	100	43	37
	Meets	6	13.95	0	0.00	6	6
	Failed to meet	0	0.00	0	0.00	0	0
	Total	**43**	**100.00**	**6**	**100.00**	**49**	**43**

Percentage of MSDAIS students who met or exceeded expectations for defining problems:100%
Percentage of MSDAIS students who met or exceeded expectations for applying appropriate statistical techniques: 100%
Explanation of Results: In QMST 5334 - Statistical Methods for Business, 100% of the MSDAIS students met or exceeded the standards for defining problems and applying appropriate statistical techniques for method #2 of this learning outcome, thus exceeding the performance expectation for the year. It is positive that all MSDAIS students successfully defined problems and used appropriate statistical techniques to solve business problems. Combining MBA and MSDAIS students in a section seemed to have positive effect on student performance in the areas of defining problem, use of appropriate statistical technique, and project presentation. In addition, the face-to-face teaching and same professor teaching QMST 5334 during the academic year seem to have helped in improved performance. Finally, the instructor emphasized certain important methods and approaches for defining problems, and students attending class regularly and working hard to raise performance above expectation in QMST 5334.

SUMMARY STATISTICS FOR OUTCOME #1 IN CIS 5357 - Computing for Data Analytics FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Define problem	Exceeds	14	30.4	27	100.0	41	56.2
	Meets	32	69.6	0	0.0	32	43.8
	Failed to meet	0	0.0	0	0.0	0	0.0
	Total	**46**	**100.0**	**27**	**100.0**	**73**	**100.0**
Develop code to implement solution for the given problem	Exceeds	14	30.4	27	100.0	41	56.2
	Meets	32	69.6	0	0.0	32	43.8
	Failed to meet	0	0.0	0	0.0	0	0.0
	Total	**46**	**100.0**	**27**	**100**	**73**	**100.0**

Percentage of MSDAIS students who met or exceeded expectations for defining problems: 100.0%
Percentage of MSDAIS students who met or exceeded expectations for developing code to implement solution for the given problem: 100%
Explanation of Results: In CIS 5357 - Computing for Data Analytics, 100% of the MSDAIS students met or exceeded the standards for defining problems and developing code to implement solution for the given problem for method #2 of this learning outcome, thus exceeding the performance

expectation for the year. It is positive that all MSDAIS students successfully defined problems and developed code to implement solution for the given problems. Students' performance for method #2 was slightly better than for method #1, which indicates students' performance for defining the problem and then developing code to implement solution is better in absence of time pressure (one week for assignment vs. about three hours for examination).

Action Plan -

1. For QMST 5334 - Statistical Methods for Business: (a) Continue to assign project team comprised of students from different graduate programs (e.g., MBA and MSDAIS). (b) The course coordinator will communicate with the instructors teaching QMST 5334 at the beginning of each semester regarding important concepts students need to learn in the course and for Method 1.
2. For CIS 5357 - Computing for Data Analytics: (a) Continue to devote additional class time to demonstrate the process of defining problem and then developing code to implement a solution for the defined problem using examples. (b) Continue to give additional out-of-class assignments to provide students with more practice in defining problems and developing code to implement a solution for the defined problem.

Outcome 2

Category: Student Learning Outcome

Demonstrate analytical skills to develop data-driven solutions for problems.

The **standards** of performance for the methods below are:

- Scores of 90% correct or better will indicate that the student exceeds expectations
- Scores greater than 80% correct but less than 90% correct will indicate that the student meets expectations
- Scores less than 80% correct will indicate that the student failed to meet expectations.

It is **expected** that 80% of students enrolled in the course during the academic year will meet or exceed the standards on each learning outcome.

Outcome 2 - Method 1

1A. In QMST 5336, Analytics, the assessment technique/rubric for outcome 2 is as follows. Five data-based problems in exams will be used to assess students' ability to identify a problem and apply appropriate analytical methods to solve the problem. Excellent scores will correctly identify a problem and properly apply analytical methods to solve the problem. Acceptable scores will have some errors in identifying a problem or applying analytical methods. Unacceptable scores will have major errors in identifying a problem or applying analytical methods to solve the problem.

1B. In CIS 5357, Computing for Data Analytics, the assessment technique/rubric for outcome 2 is as follows. One problem given in exam will assess student's ability to develop and data-driven solution for practical scenarios. Excellent scores will have correctly implemented the data-driven solution for the given problem. Acceptable scores will have some errors in the code implementation. Unacceptable scores will have major errors in implementation and the code may not work for the problem.

Outcome 2 - Method 1 - Result

Outcome 2- Method 1 - Result.

SUMMARY STATISTICS FOR OUTCOME #2 IN QMST 5336 - Analytics FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Identify and apply appropriate analytical methods to solve problems	Exceeds	39	73.6%	11	57.9%	50	69.4%
	Meets	8	15.1%	4	21.1%	12	16.7%
	Failed to meet	6	11.3%	4	21.1%	10	13.9%
	Total	**53**	**100**	**19**	**100**	**72**	**100**

Percentage of MSDAIS students who met or exceeded expectations for identifying and applying appropriate analytical methods to solve problems: 86.1%

Explanation of Results: In QMST 5336 - Analytics, more than 80% of the MSDAIS students met or exceeded the standards for identifying and applying appropriate analytical methods for method 1 of this learning outcome, thus, achieving the performance expectations for learning outcome #2 for the year. It is positive that more than 80% of the MSDAIS students understand the analytical methods discussed in class and are able to identify and use appropriate analytical methods to solve given five real-world scenarios. Examples of exam questions included identifying the command least likely to handle missing data; identifying measures highly sensitive to outlier, and determining appropriate data variable type for a data set. Providing students detailed lecture notes, out-of-class assignments related to topics such as performing descriptive analytics in Python, and reviewing the key concepts in group meetings to prepare for the exam have assisted in improved student performance.

SUMMARY STATISTICS FOR OUTCOME #2 IN CIS 5357 - Computing for Data Analytics FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%

Develop a data-driven solution for practical scenario	Exceeds	20	44.4	12	44.4	32	44.4
	Meets	17	37.8	12	44.4	29	40.3
	Failed to meet	8	17.8	3	11.1	11	15.3
	Total	**45**	**100.0**	**27**	**99.9**	**72**	**100.0**

Percentage of MSDAIS students who met or exceeded expectations for developing data-driven solution for practical scenario: 84.7%
Explanation of Results: In CIS 5357 - Computing for Data Analytics, more than 80% of the MSDAIS students met or exceeded the standards for developing data-driven solution for the given practical scenario for method 1 of this learning outcome, thus, achieving the performance expectations for learning outcome #2 for the year. It is positive that more than 80% of the MSDAIS students successfully developed data-driven solution for the given practical scenario. Students' performance for this learning outcome indicates they have mastered concepts of data-driven application development and are able to develop data-driven applications within time constraints of an examination. Providing students additional resources to review Python and application development concepts discussed in class and out-of-class assignments to practice data-driven solutions development have positively affected student performance.
Action Plan:
1. For QMST 5336 - Analytics: (a) Continue to provide detailed notes and review key concepts about analytical methods discussed in class and their applications. (b) Continue to provide additional assignments to improve students' understanding of analytical methods.
2. For CIS 5357 - Computing for Data Analytics: (a) Continue to provide students additional resources to review Python and data-driven solution development concepts. (b) Continue to given out-of-class assignments to students to assess and improve students' understanding of developing data-driven solutions. (c) Continue to devote time to demonstrate and explain appropriate approach for developing data-driven solution.

Outcome 2 - Method 2

2A. In CIS 5357, Computing for Data Analytics, the assessment technique/rubric for outcome 2 is as follows. An out-of-class project will require students to extract/collect data for a problem, read the data, and implement data-driven solution to provide insights for the problem. Excellent scores will have implemented the solution and provided insights for the given problem. Acceptable scores will have some error in the code implementation for the solution or insights provided. Unacceptable scores will have major errors in the code implementation and insights provided, and the code may not work for the problem.
2B. In QMST 5335, Forecasting & Simulation, the assessment technique/rubric for outcome 2 is as follows. Three projects will require students to develop data-driven solutions for practical problems. First project will require students to use appropriate forecasting methods to develop forecasts for given data. Second project will require students to use simulation for evaluating different scenarios. Third project will require students to analyze and use data to simulate a complex system for decision making. For the first project, excellent scores will have correct selection and implementation of appropriate forecasting method. Acceptable scores will have some errors in the implementation of forecasting method. Unacceptable scores will have major errors in selection and implementation of forecasting method. For the second and third projects, excellent scores will have correctly implemented solution and interpreted results. Acceptable scores will have some errors in interpretation of results. Unacceptable scores will have major errors in the implemented simulation and interpretation of results.

Outcome 2 - Method 2 - Result

Outcome 2- Method 2 - Result.

SUMMARY STATISTICS FOR OUTCOME #2 IN CIS 5357 - Computing for Data Analytics FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Extract/collect data for a problem	Exceeds	46	100.0	9	33.3	55	75.3
	Meets	0	0	14	51.9	14	19.2
	Failed to meet	0	0	4	14.8	4	5.5
	Total	**46**	**100.0**	**27**	**100.0**	**73**	**100.0**
Read data and implement data-driven solution to provide insights for the problem	Exceeds	46	100.0	9	33.3	55	75.3
	Meets	0	0.0	14	51.9	14	19.2
	Failed to meet	0	0.0	4	14.8	4	5.5
	Total	**46**	**100.0**	**27**	**100.0**	**73**	**100.0**

Percentage of MSDAIS students who met or exceeded expectations for extracting data for a given problem: 94.5%
Percentage of MSDAIS students who met or exceeded expectations for reading data and implementing data-driven solution to provide insights for the given problem: 94.5%
Explanation of Results: In CIS 5357 - Computing for Data Analytics, more than 80% of the MSDAIS students met or exceeded the standards for extracting and reading data, and implementing data-driven solution to provide insights for a given problem for method 2 of this learning outcome,

thus, achieving the performance expectations for learning outcome #2 for the year. It is positive that about 95% of the MSDAIS students successfully extracted and read data, and implemented data-driven solution to provide insight for the given practical problem. Students' performance for method 2 of this learning outcome indicates they have mastered concepts of extracting and reading data, and implementing data-driven solution to provide insight in absence of time pressure (one week for out-of-class project vs. three hours for examination).

SUMMARY STATISTICS FOR OUTCOME #2 IN QMST 5335 - Forecasting & Simulation FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Use appropriate forecasting methods to develop forecasts for given data	Exceeds			45	80.4%	45	80.4%
	Meets			7	12.5%	7	12.5%
	Failed to meet			4	7.1%	4	7.1%
	Total			**56**	**100%**	**56**	**100%**
Use simulation for evaluating different scenarios	Exceeds			50	89.3%	50	89.3%
	Meets			4	7.1%	4	7.1%
	Failed to meet			2	3.6%	2	3.6%
	Total			**56**	**100%**	**56**	**100%**
Analyze and use data to simulate a complex system for decision making	Exceeds			47	83.9%	47	83.9%
	Meets			9	16.1%	9	16.1%
	Failed to meet			0	0%	0	0%
	Total			**56**	**100%**	**56**	**100%**

Percentage of MSDAIS students who met or exceeded expectations for using appropriate forecasting methods to develop forecasts for given data: 92.9%

Percentage of MSDAIS students who met or exceeded expectations for using simulation for evaluating different scenarios: 96.4%

Percentage of MSDAIS students who met or exceeded expectations for analyzing and using data to simulate a complex system for decision making: 100%

Explanation of Results: In QMST 5335 - Forecasting & Simulation, more than 80% of the MSDAIS students met or exceeded the standards for using appropriate forecasting methods to develop forecasts, using simulation for evaluating different scenarios, and analyzing and using data to simulate a complex system for decision making. The performance in these three performance areas far exceeded the desired target of 80% of the MSDAIS students enrolled in the course meeting or exceeding the standards. The changes in the timing of the last project for analyzing and using data to simulate a complex system for decision making positively affected the performance.

Action Plan:

1. For CIS 5357 - Computing for Data Analytics: (a) Continue using examples and resources used in class for explaining and demonstrating extracting and reading data, and implementing data-driven solution to provide insights for a given problem.
2. For QMST 5335 - Forecasting & Simulation: (a) The project for the performance area subcomponent for analyzing and using data to simulate a complex system for decision making will be assigned earlier in the semester as this change positively affected the performance because students had more time to complete the project. (b) No other major changes are planned as students' performance improved significantly by making changes proposed last year.

Outcome 3

Category: Student Learning Outcome

Ability to analyze large datasets and develop modeling solutions to support decision making.

The **standards** of performance for the methods below are:

- Scores of 90% correct or better will indicate that the student exceeds expectations
- Scores greater than 80% correct but less than 90% correct will indicate that the student meets expectations
- Scores less than 80% correct will indicate that the student failed to meet expectations.

It is **expected** that 80% of students enrolled in the course during the academic year will meet or exceed the standards on each learning outcome.

Outcome 3 - Method 1

1A. In QMST 5336, Analytics, the assessment technique/rubric for outcome 3 is as follows. Three problems in exam will be used to assess

students' ability of performing prediction using historical data and interpret the result to support decision making. Excellent scores will have correctly implemented prediction and interpreted results to support decision making. Acceptable scores will have some errors in applying prediction techniques or interpretation of results. Unacceptable scores will have major errors in use of prediction methods or interpretation of results for decision making.

1B. In CIS 5367, Machine Learning, the assessment technique/rubric for outcome 3 is as follows. One problem in exam will be used to assess students' ability to apply machine learning models for implementing decision systems. Excellent scores will have successfully implemented decision systems using appropriate machine learning models. Acceptable scores will have some errors in implementing the system or using appropriate machine learning models. Unacceptable scores will have major errors in implementation and use of machine learning models for the system.

Outcome 3 - Method 1 - Result

Outcome 3 - Method 1 - Result.

SUMMARY STATISTICS FOR OUTCOME #3 IN QMST 5336 - Analytics FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Analyze a dataset and interpret the result to support decision making	Exceeds	39	73.6%	11	57.9%	50	69.4%
	Meets	10	18.9%	6	31.6%	16	22.2%
	Failed to meet	4	7.5%	2	10.5%	6	8.3%
	Total	**53**	**100**	**19**	**100**	**72**	**100**

Percentage of MSDAIS students who met or exceeded expectations for analyzing a dataset and interpret the result to support decision making: 91.7%

Explanation of Results: In QMST 5336 - Analytics, more than 80% of the MSDAIS students met or exceeded the standards for analyzing datasets and interpreting results to support decision making for method #1 of this learning outcome, thus, achieving the performance expectations for learning outcome #3 for the year. It is positive that more than 80% of the MSDAIS students were able to analyze datasets and interpret results to support decision making for given real-world scenarios using appropriate analytical techniques. The problems on Exam 2 includes questions on machine learning, clustering, and regression modeling, such as evaluating the slope, adjusted r squared, model significance and criteria for linear relationship. Providing students detailed lecture notes to study these topics, practice examples for coding in Python for the prediction analysis, related out-of-class assignments that address the complete scenario requirement, and review of important concepts in group meetings have helped in improving student performance..

SUMMARY STATISTICS FOR OUTCOME #3 IN CIS 5367 - Machine Learning FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Apply machine learning models for implementing decision systems	Exceeds			51	96.2%	51	96.2%
	Meets			1	1.9%	1	1.9%
	Failed to meet			1	1.9%	1	1.9%
	Total			**53**	**100%**	**53**	**100%**

Percentage of MSDAIS students who met or exceeded expectations for applying machine learning models for implementing decision systems: 98.1%

Explanation of Results: In CIS 5367 - Machine Learning, more than 80% of the MSDAIS students met or exceeded the standards for applying machine learning methods for implementing decision systems for the given practical scenario for method #1 of this learning outcome, thus, achieving the performance expectations for learning outcome #3 for the year. It is positive that almost all MSDAIS students successfully applied machine learning models to implement decision systems for the given practical scenario. The cloud-based computing environment (Colab from Google) used to develop and implement machine learning projects worked well for the class. A recommendation systems problem based on a very large dataset (1,043,116 rows) was used for this assessment. The percentage of MSDAIS students who met or exceeded expectations slightly increased from the previous year (from 97.7% to 98.1%).

Action Plan:

1. For QMST 5336 - Analytics: (a) Continue to provide detailed notes for topics included for this assessment, review key concepts about analysis techniques discussed in class, and provide practice exercises. (b) Continue to give assignments to enhance students' ability to analyze given dataset and interpret results to support decision making.
2. For CIS 5367 - Machine Learning: (a) Continue using cloud-based Colab environment to develop and implement machine learning projects. (b)

Continue to use the recommendation systems problem for this assessment method using a new dataset.

Outcome 3 - Method 2

2A. In QMST 5336, Analytics, the assessment technique/rubric for outcome 3 is as follows. An out-of-class project will require students to analyze dataset(s) using appropriate analytical methods to support data-driven decision making for a specific problem. Excellent scores indicate successfully applying appropriate analytical methods to solve a specific problem based on real-life data. Acceptable scores will have some errors in applying analytical methods to solve a specific problem based on real-life data. Unacceptable scores indicate failure to apply analytical methods to solve a specific problem based on real-life data.

2B. In CIS 5367, Machine Learning, the assessment technique/rubric for outcome 3 is as follows. One assignment will be used to assess students' ability to apply machine learning models for implementing decision systems. Excellent scores will have successfully implemented decision systems using appropriate machine learning models. Acceptable scores will have some errors in implementing the system or using appropriate machine learning models. Unacceptable scores will have major errors in implementation and use of machine learning models for the system.

Outcome 3 - Method 2 - Result

Outcome 3 - Method 2 - Result.

SUMMARY STATISTICS FOR OUTCOME #3 IN QMST 5336 - Analytics FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
Analyze data set(s) using appropriate analytical methods to support data-driven decision making for a problem		**Raw #w**	**%**	**Raw #**	**%**	**Raw #**	**%**
	Exceeds	20	37.7%	7	36.8%	27	37.5%
	Meets	33	62.3%	8	42.1%	41	56.9%
	Failed to meet	0	0.0%	4	21.1%	4	5.6%
	Total	**53**	**100**	**19**		**72**	

Percentage of MSDAIS students who met or exceeded expectations for analyzing a dataset using appropriate analytical methods to support data-driven decision making for a given problem: 94.4%.

Explanation of Results: In QMST 5336 - Analytics, more than 80% of the MSDAIS students met or exceeded the standards for analyzing datasets using appropriate analytical method and interpreting results to support decision making for a given out-of-class project for method #2 of this learning outcome, thus, achieving the performance expectations for learning outcome #3 for the year. It is positive that more than 80% of the MSDAIS students were able to analyze datasets for a given real-world problem scenario using appropriate analytical methods and interpret results to support data-driven decision making. The performance for method 2 improved as detailed lecture notes, out-of-class assignments, review of key concepts discussed in class, additional practice for coding in Python, discussion within groups and with the professor, and requirement to make oral presentations of their decision-making framework.

SUMMARY STATISTICS FOR OUTCOME #3 IN CIS 5367 - Machine Learning FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	**%**	**Raw #**	**%**	**Raw #**	**%**
Ability to apply machine learning models for implementing decision systems	Exceeds			52	98.1%	52	98.1%
	Meets			1	1.9%	1	1.9%
	Failed to meet			0	0%	0	0%
	Total			**53**	**100%**	**53**	**100%**

Percentage of MSDAIS students who met or exceeded expectations for applying machine learning models for implementing decision systems: 100%

Explanation of Results: In CIS 5367 - Machine Learning, more than 80% of the MSDAIS students met or exceeded the standards for applying machine learning models for implementing decision systems for the given practical scenario for method #2 of this learning outcome, thus, achieving the performance expectations for learning outcome #3 for the year. It is positive that all MSDAIS students successfully applied machine learning models to implement decision systems for the given practical scenario for their project. The cloud-based computing environment (Colab from Google) worked well for implementing machine learning projects. An image processing problem and classification based on deep learning (Convolutional Neural Networks) was used for this assessment. The percentage of MSDAIS students who met or exceeded expectations increased from the previous year (from 93.2% to 100%).

Action Plan:
1. For QMST 5336 - Analytics: (a) Continue to provide additional assignments to enhance students' ability to analyze datasets using appropriate analytical methods and interpret results to support data-driven decision making. (b) Continue to meet and discuss with groups regarding their projects and require oral presentations regarding their decision-making framework.
2. For CIS 5367 - Machine Learning: (a) Continue to use the image processing problem and classification for this assessment method. Find a new dataset that may include colored images. (b) Provide students additional content related to deep learning technologies. (c) Continue to use Colab for developing and implementing machine learning projects.

Outcome 4

Category: Student Learning Outcome

Apply knowledge and technical skills to perform prescriptive analytics.

The **standards** of performance for the methods below are:

- Scores of 90% correct or better will indicate that the student exceeds expectations
- Scores greater than 80% correct but less than 90% correct will indicate that the student meets expectations
- Scores less than 80% correct will indicate that the student failed to meet expectations.

It is **expected** that 80% of students enrolled in the course during the academic year will meet or exceed the standards on each learning outcome.

Outcome 4 - Method 1

1A. In QMST 5336, Analytics, the assessment technique/rubric for outcome 4 is as follows. Two problems in exams will be used to assess students' ability to use optimization and/or decision analysis for a given problem. Excellent scores will correctly formulate and solve the problem, as well as properly explain the results. Acceptable scores will have some errors in formulating, solving process, or explaining results. Unacceptable scores will have major errors in formulating, solving process, and explaining results.

1B. In QMST 5332, Optimization, the assessment technique/rubric for outcome 4 is as follows. Two exams, each with five questions will assess student's prescriptive analytics skills and knowledge, which includes formulating optimization models (e.g., linear, integer, mixed-integer) and solving optimization models using different tools (e.g., MS Excel, Matlab) for practical scenarios. Excellent scores will have correct formulation, implementation, and interpretation of results. Acceptable scores will have some errors in formulation, implementation, or interpretation of results. Unacceptable scores will have major errors in formulation, implementation, and interpretation of results.

Outcome 4 - Method 1 - Result

Outcome 4 - Method 1 - Result.

SUMMARY STATISTICS FOR OUTCOME #4 IN QMST 5336 - Analytics FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Use optimization and/or decision analysis for a scenario	Exceeds	43	81.1%	12	63.2%	55	76.4%
	Meets	3	5.7%	0	0.0%	3	4.2%
	Failed to meet	7	13.2%	7	36.8%	14	19.4%
	Total	**53**	**100**	**19**	**100**	**72**	

Percentage of MSDAIS students who met or exceeded expectations for using optimization and decision analysis for a given scenario: 80.5%.
Explanation of Results: In QMST 5336 - Analytics, more than 80% of the MSDAIS students met or exceeded the standards for using optimization and decision analysis for a given real-world scenario for method 1 of this learning outcome, thus, achieving the performance expectations for learning outcome #4 for the year. It is positive that more than 80% of the MSDAIS students successfully used optimization and decision analysis for a given scenario and correctly interpreted results. For this assessment method, students had to calculate conditional probability of event occurrence and interpret optimization results on exam. Students performance was over 80% threshold as key concepts were reviewed in group meetings to ensure students understood these difficult concepts and are prepared for the assessment, sufficient class time was devoted to discuss these topics, related assignment problems and detailed notes were provided on these topics. All these collectively helped in having more than 80% MSDAIS students met or exceeded expectations.

SUMMARY STATISTICS FOR OUTCOME #4 IN QMST 5332 - Optimization FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Apply prescriptive analytics skills and knowledge	Exceeds	16	%40	3	60%	19	%42.2
	Meets	17	%42.5	0	0%	17	%37.8
	Failed to meet	7	%17.5	2	40%	9	%20
	Total	**40**	**100%**	**5**	**100%**	**45**	**100%**

Percentage of MSDAIS students who met or exceeded expectations for applying prescriptive analytics skills and knowledge: 80%
Explanation of Results: In QMST 5332 - Optimization, 80% of the MSDAIS students met or exceeded the standards for applying prescriptive analytics to given real-world scenarios for method 1 of this learning outcome, thus, achieving the performance expectations for learning outcome #4 for the year. It is positive that 80% of the MSDAIS students successfully applied prescriptive analytics for given scenarios and correctly interpreted results.
Action Plan:
1. QMST 5336 - Analytics: (a) Continue to provide detailed notes and additional related assignments to enhance students' comprehension of the use of optimization and decisional analysis for given scenarios. (b) Continue to meet in groups with students and devote additional time to review key optimization and decision analysis concepts.
2. QMST 5332 - Optimization: (a) Use current approach with minor or no change.

Outcome 4 - Method 2

2A. In QMST 5336, Analytics, the assessment technique/rubric for outcome 4 is as follows. An out-of-class project will be used to assess students' ability to use appropriate prescriptive analytics to support data-driven decision making in a given scenario. Excellent scores will demonstrate strong capacity of using appropriate prescriptive analytics to support real-life decision making. Acceptable scores will have some errors in performing prescriptive analytics or interpreting results to support decision making. Unacceptable scores will have major errors in performing prescriptive analytics or interpreting results in decision making.
2B. In QMST 5332, Optimization, the assessment technique/rubric for outcome 4 is as follows. A project will assess student's ability to apply prescriptive analytics skills and knowledge to analyze practical optimization problems and their solution concepts. Excellent scores will have correct formulation, analysis, and interpretation of problems and concepts. Acceptable scores will have some errors in formulation, analysis, or interpretation of problems and concepts. Unacceptable scores will have major errors in formulation, analysis, and interpretation of problems and concepts.

Outcome 4 - Method 2 - Result

Outcome 4 - Method 2 - Result.
SUMMARY STATISTICS FOR OUTCOME #4 IN QMST 5336 - Analytics FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
Use appropriate prescriptive analytics to support data-driven decision making for a scenario		**Raw #**	**%**	**Raw #**	**%**	**Raw #**	**%**
	Exceeds	19	35.8%	11	57.9%	30	41.7%
	Meets	26	49.1%	4	21.1%	30	41.7%
	Failed to meet	8	15.1%	4	21.1%	12	16.7%
	Total	**53**	**100**	**19**	**100**	**72**	**100**

Percentage of MSDAIS students who met or exceeded expectations for using appropriate prescriptive analytics to support data-driven decision making for a scenario: 83.3%.
Explanation of Results: In QMST 5336 - Analytics, more than 80% of the MSDAIS students met or exceeded the standards for using appropriate prescriptive analytics techniques to support data driven decision-making for a given real-world scenario for method 2 of this learning outcome, thus, achieving the performance expectations for learning outcome #4 for the year. It is positive that more than 80% of the MSDAIS students successfully used prescriptive analytics to support data-driven decision making for a given scenario and correctly interpreted results. Student performance above the 80% threshold was achieved by providing students with detailed project guidelines, during the semester meet regularly with students to check and discuss regarding the semester project, tutorials during office hours, and ensuring team members are contributing to the semester team project for applying appropriate prescriptive analytics to make data-driven decisions for a scenario.
SUMMARY STATISTICS FOR OUTCOME #4 IN QMST 5332 - Optimization FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	**%**	**Raw #**	**%**	**Raw #**	**%**
Ability to apply prescriptive analytics skills and knowledge to analyze practical optimization problems and their solution concepts	Exceeds	27	67.5%	4	80%	31	68.9%
	Meets	13	32.5%	1	20%	14	31.1%
	Failed to meet	0	0%	0	0%	0	

	Total	**40**	**100%**	**5**	**100%**	**45**	**100%**

Percentage of MSDAIS students who met or exceeded expectations for their ability to apply prescriptive skills and knowledge to analyze practical optimization problems and solution concepts for scenarios: 100%

Explanation of Results: In QMST 5332 - Optimization, more than 80% of the MSDAIS students met or exceeded the standards for applying prescriptive analytics skills and knowledge to analyze practical optimization problems and solution concepts for given real-world scenarios for method 2 of this learning outcome, thus, achieving the performance expectations for learning outcome #4 for the year. It is positive that all MSDAIS students successfully applied prescriptive analytics skills and knowledge to analyze practical optimization problems and solution concepts for given scenarios.

Action Plan :

1. For QMST 5336 - Analytics: (a) Continue to provide detailed project guidelines and schedule regular meetings with project teams to discuss and answer questions regarding the project and check project progress. (b) Ensure all team members are actively contributing to the project. (c) Provide necessary tutorials during office-hours.
2. For QMST 5332 - Optimization; (a) Use current approach with minor or no changes.

Outcome 5

Category: Student Learning Outcome

Design and implement data management strategies.

The **standards** of performance for the methods below are:

- Scores of 90% correct or better will indicate that the student exceeds expectations
- Scores greater than 80% correct but less than 90% correct will indicate that the student meets expectations
- Scores less than 80% correct will indicate that the student failed to meet expectations.

It is **expected** that 80% of students enrolled in the course during the academic year will meet or exceed the standards on each learning outcome.

Outcome 5 - Method 1

1A. In CIS 5355, Database Management Systems, the assessment technique/rubric for outcome 5 is as follows. CIS 5355 will use exam-embedded questions. Two components assessed include ability to design and implement database and query database to retrieve data for a business scenario. For the first component, two exam questions will be used to assess students' ability to develop conceptual database design and implement a relational database schema for given business data management requirements. For the second component, five exam questions will require students to write Structure Query Language (SQL) statements to generate required business information. For the first component, excellent scores will have correct conceptual database design and implementation of database schema. Acceptable scores will have some errors in the conceptual database design or implementation of relational schema. Unacceptable scores will have major errors in database design and implementation of relational schema. For the second component, excellent scores will have correct SQL statements that generates required business information. Acceptable scores will have some errors in the SQL statements. Unacceptable scores will have major errors in the SQL statements that do not execute or generates incorrect information.

1B. In CIS 5364, Data Warehousing, the assessment technique/rubric for outcome 5 is as follows. One exam question will be used to assess students' ability to develop data warehouse design for given business data analysis requirements. Excellent scores will have correct data warehouse design to support data analysis requirements. Acceptable scores will have some errors in the data warehouse design. Unacceptable scores will have major errors in the data warehouse design which causes data management and analysis issues.

Outcome 5 - Method 1 - Result

Outcome 5 - Method 1 - Result.

SUMMARY STATISTICS FOR OUTCOME #5 IN CIS 5355 - Database Management Systems FOR AY 2022-2023.

Performance Area	**Performance**	**Fall 2022**		**Spring 2023**		**Total (Fall 2022 + Spring 2023)**	
		Raw #	**%**	**Raw #**	**%**	**Raw #**	**%**
Develop conceptual database design for a scenario	Exceeds	25	55.6%	11	39.3%	36	49.3%
	Meets	17	37.8%	16	57.1%	33	45.2%
	Failed to meet	3	6.6%	1	3.6%	4	5.5%
	Total	45	100%	**28**	**100%**	73	100%
Implement a relational database schema for a business scenario	Exceeds	18	40%	11	39.3%	29	39.7%
	Meets	22	48.9%	16	57.1%	38	52.1%
	Failed to meet	5	11.1%	1	3.6%	6	8.2%
	Total	45	100%	**28**	**100%**	73	100%

Write Structured Query Language statements to generate required information for a scenario	Exceeds	39	87%	20	71.4%	59	80.8%
	Meets	2	4%	7	25.0%	9	12.3%
	Failed to meet	4	9%	1	3.6%	5	6.9%
	Total	45	100%	**28**	**100%**	73	100%

Percentage of MSDAIS students who met or exceeded expectations for developing conceptual database design for a given scenario: 94.5
Percentage of MSDAIS students who met or exceeded expectations for implementing relational database schema for a business scenario: 91.8
Percentage of MSDAIS students who met or exceeded expectations for writing Structured Query Language statements to generate required information for a scenario: 93.1
Explanation of Results: In CIS 5355 - Database Management Systems, more than 80% of the MSDAIS students met or exceeded the standards for conceptual database design, implementing relational database schema for a business scenario, and writing Structured Query Language (SQL) statements to generate required information for a scenario. It is positive that more than 80% of the MSDAIS students met or exceeded the requirements for developing conceptual database design, implementing relational database schema for a given scenario, and write SQL statements to generate required information for a scenario. Based on the above results, instructor found that student performance is the best for conceptual database design, followed by SQL statements, and implement relational schema.

SUMMARY STATISTICS FOR OUTCOME #5 IN CIS 5364 - Data Warehousing FOR AY 2022-2023.

Performance Area	**Performance**	**Fall 2022**		**Spring 2023**		**Total (Fall 2022 + Spring 2023)**	
		Raw #	**%**	**Raw #**	**%**	**Raw #**	**%**
Develop data warehouse design for a scenario	Exceeds			35	64.8%	35	64.8%
	Meets			18	33.3%	18	33.3%
	Failed to meet			1	1.9%	1	1.9%
	Total			**54**	**100%**	54	100%

Percentage of MSDAIS students who met or exceeded expectations for their ability to develop data warehouse design for a given scenario: 98.1%
Explanation of Results: In CIS 5364 - Data Warehousing, more than 80% of the MSDAIS students met or exceeded the standards for their ability to develop data warehouse design for a given practical scenario for method 1 of this learning outcome, thus, achieving the performance expectations for learning outcome #5 for the year. It is positive that significantly more than 80% of the MSDAIS students successfully developed data warehouse design for given scenario. The use of SAP BW/4HANA for implementing data warehouse design enhanced students' understanding of data warehouse design and implementation.
Action Plan:
1. For CIS 5355 - Database Management Systems: (a) devote more time in class to explain concepts and do in-class exercises for writing SQL statements to implement relational database schema for a given scenario. (b) Provide additional out-of-class exercises to improve students understanding of database design and implementation, and enhance their ability to write SQL statements to generate required information for a given scenario.
2. For CIS 5364 - Data Warehousing: (a) Continue to use detailed notes and in-class examples to ensure students understand data warehouse design concepts and can design data warehouse for a given scenario. (b) Continue to use SAP BW/4HANA or SAP Data Sphere to implement data warehouse to enhance students' understanding of data warehouse design and implementation.

Outcome 5 - Method 2

2A. In CIS 5355, Database Management Systems, the assessment technique/rubric for outcome 5 is as follows. Two components assessed include ability to design and implement database and query database to retrieve data for a business scenario. For the first component, two out-of-class assignment questions will be used to assess students' ability to develop conceptual database design and implement a relational database schema for given business data management requirements. For the second component, five assignment questions will require students to write Structure Query Language (SQL) statements to generate required business information. For the first component, excellent scores will have correct conceptual database design and implementation of database schema. Acceptable scores will have some errors in the conceptual database design or implementation of relational schema. Unacceptable scores will have major errors in database design and implementation of relational schema. For the second component, excellent scores will have correct SQL statements that generates required business information. Acceptable scores will have some errors in the SQL statements. Unacceptable scores will have major errors in the SQL statements that do not execute or generates incorrect information.
2B. In CIS 5364, Data Warehousing, the assessment technique/rubric for outcome 5 is as follows. One assignment question will be used to assess students' ability to develop data warehouse design for given business data analysis requirements. Excellent scores will have correct data warehouse design to support data analysis requirements. Acceptable scores will have some errors in the data warehouse design. Unacceptable scores will have major errors in the data warehouse design which causes data management and analysis issues.

Outcome 5 - Method 2 - Result

Outcome 5 - Method 2 - Result.

SUMMARY STATISTICS FOR OUTCOME #5 IN CIS 5355 - Database Management Systems FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Develop conceptual database design for a scenario	Exceeds	8	17.8%	16	71.4%	24	32.9%
	Meets	8	17.8%	11	25.0%	19	26.1%
	Failed to meet	29	64.4%	1	3.6%	30	41%
	Total	45	100%	**28**	**100%**	73	100%
Implement a relational database schema for a business scenario	Exceeds	21	47%	22	78.5%	43	58.9%
	Meets	16	35.2%	5	17.9%	21	28.8%
	Failed to meet	8	17.8%	1	3.6%	9	12.3%
	Total	45		**28**	**100%**	73	100%
Write Structured Query Language statements to generate required information for a scenario	Exceeds	43	95.6%	19	67.9%	62	84.9%
	Meets	2	4.4%	9	32.1%	11	15.1%
	Failed to meet	0	0.0%	0	0%	0	0%
	Total	45	100%	**28**	**100%**	73	100%

Percentage of MSDAIS students who met or exceeded expectations for developing conceptual database design for a given scenario: 59.0%
Percentage of MSDAIS students who met or exceeded expectations for implementing relational database schema for a business scenario: 87.7%
Percentage of MSDAIS students who met or exceeded expectations for writing Structured Query Language (SQL) statements to generate required information for a scenario: 100%

Explanation of Results: In CIS 5355 - Database Management Systems, for method 2, more than 80% of the MSDAIS students met or exceeded the standards for subcomponents implementing relational database schema for a business scenario and writing SQL statements to generate required information for a scenario. However, 59% of MSDAIS students met or exceeded the standards for developing conceptual database design for a given scenario. For this performance area subcomponent, result was below the desired target of at least 80% of MSDAIS students enrolled in the course meeting or exceeding the standards. Instructors plan to devote more class time on conceptual database design, do in-class exercises, and provide out-of-class assignments and practice exercises to improve students' performance for this subcomponent. Additional time spent on implementing relational database schema improved student performance for this subcomponent.

SUMMARY STATISTICS FOR OUTCOME #5 IN CIS 5364 - Data Warehousing FOR AY 2022-2023.

Performance Area	Performance	Fall 2022		Spring 2023		Total (Fall 2022 + Spring 2023)	
		Raw #	%	Raw #	%	Raw #	%
Develop data warehouse design for a scenario	Exceeds			47	87%	47	87%
	Meets			7	13%	7	13%
	Failed to meet						
	Total			**54**	**100%**	**54**	**100%**

Percentage of MSDAIS students who met or exceeded expectations for their ability to develop data warehouse design for a given scenario: 100%
Explanation of Results: In CIS 5364 - Data Warehousing, for method 2, more than 80% of the MSDAIS students met or exceeded the standards for their ability to develop data warehouse design for a given scenario for method 2 of this learning outcome, thus, achieving the performance expectations for learning outcome #5 for the year. It is positive that 100% of the MSDAIS students successfully developed data warehousing design for a given scenario. The use of SAP BW/4HANA for implementing data warehouse design enhanced students' understanding of data warehouse

design and implementation.
Action Plan:
1. For CIS 5355 - Database Management Systems: (a) devote more time in class to explain concepts of developing conceptual database design and do in-class exercises. (b) give additional out-of-class exercises to improve students' understanding and performance for the develop conceptual database design subcomponent.
2. For CIS 5364 - Data Warehousing: (a) Continue to provide detailed notes and in-class exercises to ensure students understand data warehouse design concepts and can design data warehouse for a given scenario.

Outcome 6

Goal: 1. Promote the success of all students.
Initiative: 1.3 Increase student retention and graduation rates.
The academic program will promote and realize gains in student success.

Outcome 6 - Method 1

Student retention success will be measured by observing one year retention rates of students enrolled in the academic program from their first to second year. Data will be obtained from the university's certified enrollment records at the end of the fall semester. Rates of retention success will be expected to be at or above the university average for this level of program.

Outcome 6 - Method 1 - Result

Student retention rate from one year to the second is high for the MSDAIS program. The retention rate for the first-time, full-time MSDAIS students is typically high, reaching 100% for the first year in Fall 2021. The university's first year retention rate was 83.5% in Fall 2021.

Outcome 6 - Method 2

Student graduation success will be measured by observing the number of graduates from the academic program in during the fall, spring, and summer semesters and comparing the number of graduates to the number of students enrolled in the program. Data will be obtained from the university's certified enrollment records for the fall, spring, and summer semesters. The number of graduates is expected to be at or above the university rate of graduation for this level of program.

Outcome 6 - Method 2 - Result

The number of students graduating from the degree program during the 2022-2023 fall, spring, and summer semesters along with the total number of students enrolled in the program provided the data to assess student graduation success. For the MSDAIS program, 2 years graduation rate is 80% and 3 years graduation rate is 93.3%. Twenty-two MSDAIS students graduated in Fall 2022 and twenty-one students graduated in Spring 2023. Approximately 38% of MSDAIS students graduated in AY 2022-2023.

Outcome 7

Goal: 4. Provide the necessary services, resources, and infrastructure to support the university's strategic direction.
Initiative: 4.9 Provide a diverse and inclusive environment of support to achieve the highest level of performance for all member of the campus community.
The academic program will promote and realize diversity among its student population.

Outcome 7 - Method 1

Student gender diversity will be measured by reviewing the number and percentage of male and female students enrolled in the academic program during the fall, spring, and summer semesters. Data will be obtained from the university's certified enrollment records at the end of the fall semester. Student gender diversity will be expected to be balanced (50/50).

Outcome 7 - Method 1 - Result

For the MSDAIS program only three years of data are available for analysis. In AY 2020, there were 15 female (75%) and 5 male (25%) students enrolled in the program. In AY 2021, due to strong growth in the program there were 44 female (67%) and 22 male (33%) students. In AY 2022, there were 45 female (61%) and 29 male (39%) students. The MSDAIS program has attracted significant female students in the STEM designated program.

Outcome 7 - Method 2

Student racial and ethnic diversity will be measured by observing race and ethnicity of students enrolled in the academic program during the fall, spring, and summer semesters. Data will be obtained from the university's certified enrollment records at the end of the fall semester. Student racial and ethnic diversity will be expected to mirror percentages in the population of the state of Texas.

Outcome 7 - Method 2 - Result

Three years of data exists for the MSDAIS program. In AY 2020, 10% of students were Asian, 5% Black non-Hispanic, 10% Hispanic, 70% International, and 5% White. In AY 2021, 14% of students were Asian, 9% Black non-Hispanic, 12% Hispanic, 2% Multi-racial, 41% International, and 20% White. In AY 2022, 11% of students were Asian, 5% Black non-Hispanic, 14 % Hispanic, 1% Multi-racial, 47% International, and 16%

White. These percentages do not reflect the State of Texas.

Approval History	
Approval History Event	**Approver**
Outcomes Approved Level 1	Alexander McLeod (a_m919)
Outcomes Approved Level 2	Sanjay Ramchander (s_r828)
Outcomes Audit Report Submitted	Diego Vacaflores Rivero (dv13)
Results Approved Level 1	Alexander McLeod (a_m919)
Results Approved Level 2	Sanjay Ramchander (s_r828)
Results Audit Report Submitted	Diego Vacaflores Rivero (dv13)