Stevens Institute of Technology

School of Business

**AACSB  
ASSURANCE OF LEARNING**

**Master of Science in**

**Business Intelligence   
and Analytics**

**(BI&A)**

**LEARNING GOAL # 3**

**Students understand and can apply a broad range of business analytic techniques including optimization, conceptual data modeling, data warehousing and data mining.**

**Responsibility: Chris Asakiewicz**

End of Year 2023

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# 1. INTRODUCTION: LEARNING GOAL BI&A #3

*Students understand and can apply a broad range of business analytic techniques including optimization, conceptual data modeling, data warehousing and data mining.*

This goal is assessed in the “practicum” course BIA 686 Applied Analytics (or one of the industry-specific practicum course) which is a required course in the BI&A curriculum. This learning goal requires students to think analytically and to synthesize material from other courses in the curriculum.

The assessment takes place in the form of a comprehensive exam administered in the first week of the practicum course. Prior to 2017, the exam was composed of short questions developed by faculty members who teach earlier courses in the BI&A curriculum. In 2017, the comprehensive exam was enhanced. The enhancement consisted of having 10 questions associated with each of the 5 traits be evaluated, for a total of 50 questions each worth 2 points.

In 2022, there was a significant change made to the assessment process. Previously, the intent was to assess knowledge gained through specific courses in the program. In 2022, this assessment was coupled with an assessment of the students ability to apply that knowledge to specific types of business problems. Giving a better assessment of the students ability to effectively apply what they’ve learned.

The new scoring range for the comprehensive exam is as follows:

* Poor – Score Range 00 to 70
* Good – Score Range 71 to 80
* Excellent – Score Range 81 to 100

# 2. LEARNING OBJECTIVES AND TRAITS

|  |  |
| --- | --- |
|  | **BI&A Learning Goal - 3: Objectives and Traits** |
| **BIA 3** | Students understand and can apply a broad range of business analytic techniques including optimization, conceptual data modeling, data warehousing and data mining. |
| **Learning Objectives** |  |
| **Objective 1:** | *Students demonstrate disciplinary understanding of the key business analytic techniques and methods used in data management and data mining, process analytics and optimization, as well as multivariate analysis.* |
| **Traits** |  |
| Trait 1: | The student demonstrates an understanding of Web Analytics (BIA660) or Social Network Analytics (BIA658) |
| Trait 2: | The student demonstrates an understanding of Business Intelligence and Data Integration (MIS633) |
| Trait 3: | The student demonstrates an understanding of Process Analytics and Optimization (BIA650) |
| Trait 4: | The student demonstrates an understanding of Data Analytics and Machine Learning (MIS637) |
| Trait 5: | The student demonstrates an understanding of Multivariate Data Analysis (BIA652) |

# 3. RUBRICS

**Objective 1:** *Students demonstrate disciplinary understanding of the key business analytic techniques and methods used in data management and data mining, process analytics and optimization, as well as multivariate analysis.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **BI&A LEARNING GOAL - 3: RUBRIC 1** | | | |  | |
| **BIA 3** | Students understand and can apply a broad range of business analytic techniques including optimization, conceptual data modeling, data warehousing and data mining. | | | | | |
| **Objective 1** | *Students demonstrate disciplinary understanding of the key business analytic techniques and methods used in data management and data mining, process analytics and optimization, as well as multivariate analysis.* | | | | | |
|  | **Trait** | **Poor** | **Good** | **Excellent** | | **Score** |
|  | **Value** | **0 - 70** | **71 - 80** | **81 - 100** | |  |
| Trait 1: | The student demonstrates an understanding of Web Analytics (BIA660) or Social Network Analytics (BIA658) | Limited command of business analytic techniques used in this area | Good command of business analytic techniques used in this area | Strong command of business analytic techniques used in this area | |  |
| Trait 2: | The student demonstrates an understanding of Business Intelligence and Data Integration (MIS633) | Limited command of business analytic techniques used in this area | Good command of business analytic techniques used in this area | Strong command of business analytic techniques used in this area | |  |
| Trait 3: | The student demonstrates an understanding of Process Analytics and Optimization (BIA650) | Limited command of business analytic techniques used in this area | Good command of business analytic techniques used in this area | Strong command of business analytic techniques used in this area | |  |
| Trait 4: | The student demonstrates an understanding of Data Analytics and Machine Learning (MIS637) | Limited command of business analytic techniques used in this area | Good command of business analytic techniques used in this area | Strong command of business analytic techniques used in this area | |  |
| Trait 5: | The student demonstrates an understanding of Multivariate Data Analysis (BIA652) | Limited command of business analytic techniques used in this area | Good command of business analytic techniques used in this area | Strong command of business analytic techniques used in this area | |  |

**Criterion: Score below 70 is “below expectations”; between 71 and 80 is “meets expectations”; and greater than 81 is “exceeds expectations”.**

# 4. ASSESSMENT PROCESS

|  |  |  |
| --- | --- | --- |
| **Where and when measured?** | **How measured?** | **Criterion** |
| A web-based comprehensive exam comprising short questions from prior BI&A courses is administered at the beginning of each practicum course.  At mid-term an additional assessment is administered. This assessment is related to the students ability to apply their knowledge to solving actual business problems. | Questions submitted by each course owner are graded and results tallied.  Sampling: All students in the BI&A program are assessed. | 85% of students get a grade of GOOD or better on the final project as measured by the rubric for this learning goal. |

# 5. RESULTS OF LEARNING GOAL ASSESSMENT - INTRODUCTION

The results of the initial learning goal assessments carried out to date are included below.

**Explanation**

Each learning goal has a number of learning objectives and performance on each objective is measured using a rubric that in turn contains a number of desired “traits”. Students are scored individually on each trait.

The grading sheets for each student are used to develop a Summary Results Sheet for each learning goal objective. A selection of these Summaries is included below.

The first table in the Summary Results Sheet for a learning objective and trait gives the counts of students falling in each of the three categories:

- Does not meet expectations  
- Meets expectations  
- Exceeds expectations

The right-hand column in the table is used to record the average score of the students on each trait. This table provides an indication of the relative performance of students on each trait.

The second table on each sheet provides the counts of students who fall in each of the above three categories for the overall learning objective.

The person doing the assessment provides explanatory comments and recommendations on the bottom of the Results Summary Sheet. The recommendations improve content or pedagogy changes for the next time the course is given.

# 6A. RESULTS OF ASSESSMENT: Fall 2021

**LEARNING GOAL # 3: Students understand and can apply a broad range of business analytic techniques including optimization, conceptual data modeling, data warehousing and data mining.**

**LEARNING OBJECTIVE # 1: Students demonstrate disciplinary understanding of the key business analytic techniques and methods used in web or social network analytics, data management and data mining, process analytics and optimization, as well as multivariate analysis.**

**ASSESSMENT DATE: ASSESSOR:**

**NO. OF STUDENTS TESTED: COURSE: BIA 686**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Number of Students** | | |  |
| **Learning Goal Traits** | **Not Meet Expectat-ions** | **Meet Expectat-ions** | **Exceed Expectat-ions** | **Avg. Grade on Trait** |
| The student demonstrates an understanding of Web Analytics (BIA660) or Social Network Analytics (BIA658) | 25 | 9 | 14 | 68.06 |
| The student demonstrates an understanding of Business Intelligence and Data Integration (MIS633) | 25 | 9 | 14 | 68.06 |
| The student demonstrates an understanding of Process Analytics and Optimization (BIA650) | 25 | 9 | 14 | 68.06 |
| The student demonstrates an understanding of Data Analytics and Machine Learning (MIS637) | 25 | 9 | 14 | 68.06 |
| The student demonstrates an understanding of Multivariate Data Analysis (BIA652) | 25 | 9 | 14 | 68.06 |
| **Average Grade (Maximum 100)** | | | |  |

Does not meet expectations 0-70; meets 71-80; exceeds 81-100

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Not meet Expectations** | **Meets Expectations** | **Exceeds Expectations** |
| **Total Students by Category** *(Based on Average score across all traits)* | **25** | **9** | **14** |
| **Students meeting or exceeding expectations:** | | **23 out of 48** | |

**COMMENTS:**

In 2021, performance on the knowledge assessment was far below expectations.

**REMEDIAL ACTIONS:**

One significant change for 2022, was the revision of MIS 633, Business Intelligence and Data Integration to include a hands-on lab. Similar efforts to build in a model of “learn” and “practice” go a long way to helping students understand how to “apply” what they’ve learned to actual business problems.

# 6B. RESULTS OF ASSESSMENT: Fall 2022

**LEARNING GOAL # 3: Students understand and can apply a broad range of business analytic techniques including optimization, conceptual data modeling, data warehousing and data mining.**

**LEARNING OBJECTIVE # 1: Students demonstrate disciplinary understanding of the key business analytic techniques and methods used in web or social network analytics, data management and data mining, process analytics and optimization, as well as multivariate analysis.**

**ASSESSMENT DATE: ASSESSOR:**

**NO. OF STUDENTS TESTED: COURSE: BIA 686**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Number of Students** | | |  |
| **Learning Goal Traits** | **Not Meet Expectat-ions** | **Meet Expectat-ions** | **Exceed Expectat-ions** | **Avg. Grade on Trait** |
| The student demonstrates an understanding of Web Analytics (BIA660) or Social Network Analytics (BIA658) | 8 | 19 | 48 | 83.33 |
| The student demonstrates an understanding of Business Intelligence and Data Integration (MIS633) | 8 | 19 | 48 | 83.33 |
| The student demonstrates an understanding of Process Analytics and Optimization (BIA650) | 8 | 19 | 48 | 83.33 |
| The student demonstrates an understanding of Data Analytics and Machine Learning (MIS637) | 8 | 19 | 48 | 83.33 |
| The student demonstrates an understanding of Multivariate Data Analysis (BIA652) | 8 | 19 | 48 | 83.33 |
| **Average Grade (Maximum 100)** | | | |  |

Does not meet expectations 0-70; meets 71-80; exceeds 81-100

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Not meet Expectations** | **Meets Expectations** | **Exceeds Expectations** |
| **Total Students by Category** *(Based on Average score across all traits)* | **8** | **19** | **48** |
| **Students meeting or exceeding expectations:** | | **69 out of 77** | |

**COMMENTS:**

In 2022, the combined assessments (knowledge and application) combined the demonstration of understanding by solving problems in a variety of business domains.

**REMEDIAL ACTIONS:**

By combining the assessment, there was a significant improvement in student performance as seen in the scores for the individual assessments (see Appendix B). The average score for the knowledge assessment was 67.89 out of 100 (below expectations) and the average score for the application assessment was 83.33 out of 100 (exceeds expectations).

# 6C. RESULTS OF ASSESSMENT: Fall 2023

**LEARNING GOAL # 3: Students understand and can apply a broad range of business analytic techniques including optimization, conceptual data modeling, data warehousing and data mining.**

**LEARNING OBJECTIVE # 1: Students demonstrate disciplinary understanding of the key business analytic techniques and methods used in web or social network analytics, data management and data mining, process analytics and optimization, as well as multivariate analysis.**

**ASSESSMENT DATE: ASSESSOR:**

**NO. OF STUDENTS TESTED: COURSE: BIA 686**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Number of Students** | | |  |
| **Learning Goal Traits** | **Not Meet Expectat-ions** | **Meet Expectat-ions** | **Exceed Expectat-ions** | **Avg. Grade on Trait** |
| The student demonstrates an understanding of Web Analytics (BIA660) or Social Network Analytics (BIA658) | 0 | 4 | 49 | 92.4 |
| The student demonstrates an understanding of Business Intelligence and Data Integration (MIS633) | 0 | 4 | 49 | 92.4 |
| The student demonstrates an understanding of Process Analytics and Optimization (BIA650) | 0 | 4 | 49 | 92.4 |
| The student demonstrates an understanding of Data Analytics and Machine Learning (MIS637) | 0 | 4 | 49 | 92.4 |
| The student demonstrates an understanding of Multivariate Data Analysis (BIA652) | 0 | 4 | 49 | 92.4 |
| **Average Grade (Maximum 100)** | | | |  |

Does not meet expectations 0-70; meets 71-80; exceeds 81-100

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Not meet Expectations** | **Meets Expectations** | **Exceeds Expectations** |
| **Total Students by Category** *(Based on Average score across all traits)* | **0** | **4** | **49** |
| **Students meeting or exceeding expectations:** | | **53 out of 53** | |

**COMMENTS:**

In 2023, the combined assessments (knowledge and application) combined the demonstration of understanding by solving problems in a variety of business domains.

**REMEDIAL ACTIONS:**

By combining the assessment, there was a significant improvement in student performance as seen in the scores for the individual assessments (see Appendix C). The average score for the knowledge assessment was 57.1 out of 100 (below expectations) and the average score for the application assessment was 92.4 out of 100 (exceeds expectations).

# 7A. OUTCOMES: BIA LEARNING GOAL # 3 AFTER ROUNDS OF ASSESSMENT

**After First Round Review Fall 2021**

**Observations:**

**Remedial Actions**

The following table shows the average scores on the “Applying Analytics” goal objective over time.

|  |  |  |  |
| --- | --- | --- | --- |
| **Fall 2021** | **Not meet Expectations** | **Meets Expectations** | **Exceeds Expectations** |
| **Total Students by Category** *(Based on Average score across all traits)* | **25** | **9** | **14** |
| **Average by Category** *(Based on Average score across all traits)* | **51.12** | **75.67** | **93.43** |
| **Students meeting or exceeding expectations:** | | **23 out of 48** | |

# 7B. OUTCOMES: BIA LEARNING GOAL # 3 AFTER ROUNDS OF ASSESSMENT

**After Second Round Review Fall 2022**

**Observations:**

**Remedial Actions**

The following table shows the average scores on the “Applying Analytics” goal objective over time.

|  |  |  |  |
| --- | --- | --- | --- |
| **Fall 2022** | **Not meet Expectations** | **Meets Expectations** | **Exceeds Expectations** |
| **Total Students by Category** *(Based on Average score across all traits)* | **8** | **19** | **48** |
| **Average by Category** *(Based on Average score across all traits)* | **66.88** | **79.21** | **87.71** |
| **Students meeting or exceeding expectations:** | | **67 out of 75** | |

# 7C. OUTCOMES: BIA LEARNING GOAL # 3 AFTER ROUNDS OF ASSESSMENT

**After Third Round Review Fall 2023**

**Observations:**

**Remedial Actions**

The following table shows the average scores on the “Applying Analytics” goal objective over time.

|  |  |  |  |
| --- | --- | --- | --- |
| **Fall 2023** | **Not meet Expectations** | **Meets Expectations** | **Exceeds Expectations** |
| **Total Students by Category** *(Based on Average score across all traits)* | **0** | **4** | **49** |
| **Average by Category** *(Based on Average score across all traits)* | **0** | **77.5** | **93.6** |
| **Students meeting or exceeding expectations:** | | **53 out of 53** | |

# 8A. CLOSE LOOP PROCESS – CONTINUOUS IMPROVEMENT RECORD

**Assurance of Learning**

**Assessment/Outcome Analysis**

**Close Loop Process - Continuous Improvement Record**

**Program:** Master of Science in Business Intelligence & Analytics

**Goal 3:** Students understand and can apply a broad range of business analytic techniques including optimization, conceptual data modeling, data warehousing and data mining

**Goal Owner:** Chris Asakiewicz

**Where Measured:** A web-based comprehensive exam comprising short questions from prior BI&A courses is administered at the beginning of each practicum course. At mid-term an additional assessment is administered. This assessment is related to the students ability to apply their knowledge to solving actual business problems.

**How Measured:** Questions submitted by each course owner are graded and results tallied.

Sampling: All students in the BI&A program are assessed.

**Closing the Loop: Actions taken on specific objectives**

|  |  |
| --- | --- |
| **Objective 1** | *Students demonstrate disciplinary understanding and application of the key business analytic techniques and methods used in web or social network analytics, data management and data mining, process analytics and optimization, as well as multivariate analysis.* |
| **When Assessed:** | *2021* |
| **Remedial**  **Action** | At mid-term an additional assessment is administered. This assessment is related to the students ability to apply their knowledge to solving actual business problems. |
| **Outcome from previous assessment:** | One significant change in 2022, was the revision of MIS 633, Business Intelligence and Data Integration to include a hands-on lab. Similar efforts to build in a model of “learn” and “practice” go a long way to helping students understand how to “apply” what they’ve learned to actual business problems. |

# 8B. CLOSE LOOP PROCESS – CONTINUOUS IMPROVEMENT RECORD

**Assurance of Learning**

**Assessment/Outcome Analysis**

**Close Loop Process - Continuous Improvement Record**

**Program:** Master of Science in Business Intelligence & Analytics

**Goal 3:** Students understand and can apply a broad range of business analytic techniques including optimization, conceptual data modeling, data warehousing and data mining

**Goal Owner:** Chris Asakiewicz

**Where Measured:** A web-based comprehensive exam comprising short questions from prior BI&A courses is administered at the beginning of each practicum course. At mid-term an additional assessment is administered. This assessment is related to the students ability to apply their knowledge to solving actual business problems.

**How Measured:** Questions submitted by each course owner are graded and results tallied.

Sampling: All students in the BI&A program are assessed.

**Closing the Loop: Actions taken on specific objectives**

|  |  |
| --- | --- |
| **Objective 1** | *Students demonstrate disciplinary understanding and application of the key business analytic techniques and methods used in web or social network analytics, data management and data mining, process analytics and optimization, as well as multivariate analysis.* |
| **When Assessed:** | *2022* |
| **Remedial**  **Action** | Looking out to 2023, it would be valuable to look at where students are weak in applying their disciplinary knowledge. This will be accomplished by breaking down the each area of application to identify specific gap areas which should be covered. |
| **Outcome from previous assessment:** | One significant change in 2022, was the revision of MIS 633, Business Intelligence and Data Integration to include a hands-on lab. Similar efforts to build in a model of “learn” and “practice” go a long way to helping students understand how to “apply” what they’ve learned to actual business problems. |

# 8C. CLOSE LOOP PROCESS – CONTINUOUS IMPROVEMENT RECORD

**Assurance of Learning**

**Assessment/Outcome Analysis**

**Close Loop Process - Continuous Improvement Record**

**Program:** Master of Science in Business Intelligence & Analytics

**Goal 3:** Students understand and can apply a broad range of business analytic techniques including optimization, conceptual data modeling, data warehousing and data mining

**Goal Owner:** Chris Asakiewicz

**Where Measured:** A web-based comprehensive exam comprising short questions from prior BI&A courses is administered at the beginning of each practicum course. At mid-term an additional assessment is administered. This assessment is related to the students ability to apply their knowledge to solving actual business problems.

**How Measured:** Questions submitted by each course owner are graded and results tallied.

Sampling: All students in the BI&A program are assessed.

**Closing the Loop: Actions taken on specific objectives**

|  |  |
| --- | --- |
| **Objective 1** | *Students demonstrate disciplinary understanding and application of the key business analytic techniques and methods used in web or social network analytics, data management and data mining, process analytics and optimization, as well as multivariate analysis.* |
| **When Assessed:** | *2023* |
| **Remedial**  **Action** | Looking out to 2024, it would be valuable to look at where students are weak in applying their disciplinary knowledge to solving actual business problems. Here Generative AI can be a valuable tool if applied appropriately. |
| **Outcome from previous assessment:** | One significant change in 2023, was the ability of students to leverage Generative AI (ChatGPT) to assist them in the application of disciplinary knowledge to business problems. |

# APPENDIX A

**Assessment**

**Fall 2021 Evaluation Results**



# APPENDIX B

**Assessment**

**Fall 2022 Evaluation Results**



# APPENDIX C

**Assessment**

**Fall 2023 Evaluation Results**

