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| **Assurance of Student Learning Report**  **2023-2024** | | |
| *Replace this with your College Name* | | *Replace this with your Department Name* |
| *Replace this with your Program Name and Reference Number* | | |
| *Replace this with the program director and/or assessment coordinator* | | |
| ***Is this an online program***?  Yes  No | Please make sure the Program Learning Outcomes listed match those in CourseLeaf . Indicate verification here  Yes, they match! (If they don’t match, explain on this page under **Assessment Cycle)** | |

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| ***Use this page to list learning outcomes, measurements, and summarize results for your program. Detailed information must be completed in the subsequent pages. Add more Outcomes as needed.*** | | | |
| **Program Student Learning Outcome 1: Write computer programs to utilize and analyze large datasets.** | | | |
| **Instrument 1** | **Assignment 2 in CS 555.** | | |
| **Instrument 2** | **Assignment 4 in CS 555.** | | |
| **Based on your results, check whether the program met the goal of Student Learning Outcome 1.** | | **Met** | **Not Met** |
| **Program Student Learning Outcome 2:**  **Understand the statistical approaches taken when dealing with large sample sizes.** | | | |
| **Instrument 1** | **Assignment 5 in CS 555.** | | |
| **Based on your results, check whether the program met the goal of Student Learning Outcome 2.** | | **Met** | **Not Met** |
| **Program Student Learning Outcome 3: Understand the statistical approaches taken when dealing with multiple variables.** | | | |
| **Instrument 1** | **Assignment 8 in the CS 555.** | | |
| **Based on your results, check whether the program met the goal of Student Learning Outcome 3.** | | **Met** | **Not Met** |
| **Program Student Learning Outcome 4: Combine domain expertise with programming and statistical skills to analyze large domain‐specific datasets.** | | | |
| **Instrument 1** | **Term project in CS 555.** | | |
| **Based on your results, check whether the program met the goal of Student Learning Outcome 4.** | | **Met** | **Not Met** |

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| **Program Student Learning Outcome 1** | | | | | | | |
| **Program Student Learning Outcome** | **Write computer programs to utilize and analyze large datasets.** | | | | | | |
| **Measurement Instrument 1** | Students are required to use Python or other programs to retrieve data from large-sized data files, manipulate the data for data analytics, and output analytic results. | | | | | | |
| **Criteria for Student Success** | Students achieve an intermediate or higher level. | | | | | | |
| **Program Success Target for this Measurement** | | | 80% of students achieve an intermediate or higher level. | | **Percent of Program Achieving Target** | 100% | |
| **Methods** | Students are required to write Python programs to read a large dataset and perform data analysis. All four students in the class were assessed according to the rubric O1-1. | | | | | | |
| **Measurement Instrument 2** | Students are required to use Python built-in methods to obtain analytic results. | | | | | | |
| **Criteria for Student Success** | Students achieve an intermediate or higher level. | | | | | | |
| **Program Success Target for this Measurement** | | **80%** | | **Percent of Program Achieving Target** | | **100%** | |
| **Methods** | Students are required to write Python programs to read a large dataset and perform data wrangling. Three out of four students in the class were assessed according to the rubric O1-2. **One student didn’t turn in the assignment.** | | | | | | |
| **Based on your results, highlight whether the program met the goal Student Learning Outcome 1.** | | | | | | **Met** | **Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** | | | | | | | |
| **Results**: All the results are expected. Python program was used in CS 555. Data input, output, and pre-processing were examined in relation to the certificate learning outcome.  **Conclusions**: All the datasets used in this course contain thousands of data instances with multiple features, and the assessment methods work. No change is needed.  **\*\*IMPORTANT - Plans for Next Assessment Cycle**: This outcome will be assessed when CS 555 is offered next time. | | | | | | | |

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| **Program Student Learning Outcome 2** | | | | | |
| **Program Student Learning Outcome** | **Understand the statistical approaches taken when dealing with large sample sizes.** | | | | |
| **Measurement Instrument 1** | Students are required to use hypothesis testing and confidence interval to explore dataset. | | | | |
| **Criteria for Student Success** | Students achieve an intermediate or higher level. | | | | |
| **Program Success Target for this Measurement** | | 80% | **Percent of Program Achieving Target** | 100% | |
| **Methods** | Students are required to perform multiple hypothesis testing using a given confidence level. Three out of four students in the class were assessed according to the rubric O2. **One student didn’t turn in the assignment.** | | | | |
| **Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 2.** | | | | **Met** | **Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** | | | | | |
| **Results**: : All the results are expected. Python program was used in CS 555. Data input, output, and pre-processing were examined in relation to the certificate learning outcome.  **Conclusions**: All the datasets used in this course contain thousands of data instances with multiple features, and the assessment methods work. No change is needed.  **Plans for Next Assessment Cycle**: This outcome will be assessed when CS 555 is offered next time. | | | | | |

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| **Program Student Learning Outcome 3** | | | | | |
| **Program Student Learning Outcome** | **Understand the statistical approaches taken when dealing with multiple variables.** | | | | |
| **Measurement Instrument 1** | **Build a relationship between independent and dependent variables with a machine learning model. Evaluate the selected model.** | | | | |
| **Criteria for Student Success** | Students achieve an intermediate or higher level. | | | | |
| **Program Success Target for this Measurement** | | 80% | **Percent of Program Achieving Target** | 100% | |
| **Methods** | A large dataset is given. Students are required to build a machine learning model and evaluate the model. Students are allowed to use open-source libraries, such as scikit-learn. Three out of four students in the class were assessed according to the rubric O3. **One student didn’t turn in the assignment.** | | | | |
| **Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 3.** | | | | **Met** | **Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** | | | | | |
| **Results**: : All the results are expected. Python program was used in CS 555. Data input, output, and pre-processing were examined in relation to the certificate learning outcome.  **Conclusions**: All the datasets used in this course contain thousands of data instances with multiple features, and the assessment methods work. No change is needed.  **Plans for Next Assessment Cycle**: This outcome will be assessed when CS 555 is offered next time. | | | | | |

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| **Program Student Learning Outcome 4** | | | | | |
| **Program Student Learning Outcome** | **Combine domain expertise with programming and statistical skills to analyze large domain‐specific datasets** | | | | |
| **Measurement Instrument 1** | Compare multiple machine learning algorithms in terms of algorithmic performance. | | | | |
| **Criteria for Student Success** | Students achieve an intermediate or higher level. | | | | |
| **Program Success Target for this Measurement** | | 80% | **Percent of Program Achieving Target** | 100% | |
| **Methods** | Students are given a large dataset. Data exploration, visualization, and data cleaning are required. Students are required to build multiple machine-machine learning models. These models are evaluated using use at least two evaluation metrics. Students are required to compare mode’s performance and perform statistical analysis. Three out of four students in the class were assessed according to the rubric O4. **One student didn’t turn in the project.** | | | | |
| **Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 4.** | | | | **Met** | **Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** | | | | | |
| **Results**: : All the results are expected. Python program was used in CS 555. Data input, output, and pre-processing were examined in relation to the certificate learning outcome.  **Conclusions**: All the datasets used in this course contain thousands of data instances with multiple features, and the assessment methods work. No change is needed.  **Plans for Next Assessment Cycle**: This outcome will be assessed when CS 555 is offered next time. | | | | | |

