Industrial Engineering, Graduate, MSIE, Tampa

Assessment Cycle: 2019 Reporting

Overall Review: Report Approved COMPLIANT

Mission Statement

The mission of the IMSE Department is to:

- Assure student success through a high quality education which integrates the latest research and practices of the field;
- Pursue excellence in interdisciplinary research and innovation;
- Engage with the profession and the community.

Goal 1: Discipline-Specific Knowledge

Our graduates will demonstrate problem solving skills in three core areas of industrial engineering:
deterministic operations research, stochastic operations research, and statistical experimental design.

1a. Student Learning Outcome Statement
Audit Review: AC

IMSE MSIE graduates will demonstrate the ability to understand and formulate mathematical and statistical models to address real-world problems.

1b. Method of Assessment
Audit Review: AC

For each MSIE graduate, the ability to understand and formulate mathematical and statistical models to address real-world problems is rated using a rubric, based on a written assignment, by three reviewers in the areas of deterministic operations research, stochastic operations research, and statistical experimental design. For each graduate, the ability is rated using a scale from 1 (poor) to 5 (excellent). The ratings are averaged across all raters to obtain the mean rating value for the student. Fleiss' Kappa measure of inter-rater reliability is computed to determine the degree of consensus among the reviewers. Any significant rater disagreement is resolved via a group discussion and, if needed, by accepting the rating agreed upon by the majority of the reviewers. The rubric was developed by the IMSE graduate committee and approved by the IMSE faculty.

1c. Performance Targets
Audit Review: AC

70% of majors will obtain the mean rating value of 4.0 or higher. The following ranges for Fleiss' Kappa measure of inter-rater reliabilitys are used: 0.8 - 1 = strong, 0.6 - 0.8 = good, 0.4 - 0.6 = moderate, 0.2 - 0.4 = fair, 0 - 0.2 = poor. Any significant rater disagreement is resolved via a group discussion and, if needed, by accepting the rating agreed upon by the majority of the reviewers.

1d. Assessment Results
Audit Review: AC

Based on the data of 26 MSIE graduates, 76.9% of them met the performance target (mean rating value of 4.0 or higher) for this learning outcome. Fleiss' Kappa measure of inter rater reliability was 0.544, which indicates a moderate degree of concordance among the raters.

1e. Use of Assessment Results
Audit Review: AC

The assessment results exceeded the performance target. This was the third annual cycle where a new assessment rubric/assignments have been used for this learning outcome. Originally, it was planned to use the rubric for at least two periods (2017 and 2018) to gather more accurate data and possibly recalibrate the rubric/assignments before identifying any trends and specific areas for improvement. Some recalibration of the assignments was done after the first year.

In the first cycle (2017), 83.3% of graduates met the performance target; in the second cycle (2018), 78.6% of graduates met the target. Overall, during the three-year period, the target was met in every year but the percentages have declined from 83.3% to 76.9%.

Continuous Improvements: by analyzing this trend, the following observations have been made:

1) While the students have shown a good understanding of linear programming, they had difficulties in using integer programming techniques. Therefore, the following changes are planned to improve students' integer programming skills:

a) dedicate two-three extra class sessions and provide more examples of integer programming (this can be done by removing optional topics of game theory and multi-objective optimization).

b) increase the number of homework assignments (from one to two) on integer programming.

2) While the students have demonstrated a good understanding of the role of linear statistical models in describing the relationships among variables in real-world datasets, there is there is room for improving their ability to select appropriate models for specific applications. Therefore, the adoption of

the following exercises and instruction methods are expected to enhance student's ability to choose suitable statistical models for diverse applications:

a) emphasize the distinctions between statistical models and increase the number of illustrative examples used in lectures.

b) add one major assignment per topic where the choice of the correct statistical model is difficult.

Plan Review Comments

Report Review Comments

2a. Student Learning Outcome Statement *Audit Review: AC*

IMSE MSIE graduates will demonstrate the ability to use modern engineering techniques, software, and tools to find solutions to engineering problems.

2b. Method of Assessment *Audit Review: AC*

For each MSIE graduate, the ability to use modern engineering techniques, software, and tools to find solutions to engineering problems is rated using a rubric, based on a written assignment, by three reviewers in the areas of deterministic operations research, stochastic operations research, and statistical experimental design. For each graduate, the ability is rated using a scale from 1 (poor) to 5 (excellent). The ratings are averaged across the reviewers to obtain the mean rating value for the student. Fleiss' Kappa measure of inter-rater reliability is computed to determine the degree of consensus among the reviewers. Any significant rater disagreement is resolved via a group discussion and, if needed, by accepting the rating agreed upon by the majority of the reviewers.

2c. Performance Targets *Audit Review: AC*

70% of majors will obtain the mean rating value of 4.0 or higher. The following ranges for Fleiss' Kappa measure of inter-rater reliabilitys are used: 0.8 - 1 = strong, 0.6 - 0.8 = good, 0.4 - 0.6 = moderate, 0.2 - 0.4 = fair, 0 - 0.2 = poor. Any significant rater disagreement is resolved via a group discussion and, if needed, by accepting the rating agreed upon by the majority of the reviewers.

2d. Assessment Results *Audit Review: AC*

Based on the data of 26 MSIE graduates, 65.4% of them met the performance target (mean rating value of 4.0 or higher) for this learning outcome. Fleiss' Kappa measure of inter -rater reliability was 0.529, which indicates a moderate degree of concordance among the raters.

2e. Use of Assessment Results *Audit Review: AC*

In this cycle, the assessment results did not meet the performance target. This was the third annual cycle where a new assessment rubric/assignments have been used for this learning outcome. Originally, it was planned to use the rubric for *at least two periods* (2017 and 2018) to gather more accurate data and possibly recalibrate the rubric/assignments before identifying any trends and specific areas for improvement. Some recalibration of the assignments was done after the first year.

In the first cycle (2017), 86.7% of graduates met the performance target; in the second cycle (2018), 81.6% of graduates met the target. Overall, during the three-year period, the target was met in two years and not met in the last year, whereas the percentages have declined from 86.7% to 65.4%.

Continuous Improvements: by analyzing this negative trend, it has been confirmed that a general lack of computer programming skills and diverse background in prior knowledge of probability and statistics creates challenges in introducing modern computational tools like R. The following efforts are expected to address the current deficiency in achieving this outcome (also based on students' feedback to increase the number of computer programming/software sessions in our classes):

1) add at least three detailed tutorial sessions on using modern scripting languages like R and hands-on data analysis sessions to help improve the ability of students to use modern tools for computational and graphical statistics.

2) include at least two extra sessions of MATLAB with an additional coverage of commercial optimization solvers such as CPLEX and Gurobi (this can be done by removing optional topics of game theory and multi-objective optimization).

Plan Review Comments

Report Review Comments

3a. Student Learning Outcome Statement   *Audit Review: AC*

IMSE MSIE graduates will demonstrate the ability to analyze and interpret solutions.

3b. Method of Assessment   *Audit Review: AC*

For each MSIE graduate, the ability to analyze and interpret solutions is rated using a rubric, based on a written assignment, by three reviewers in the areas of deterministic operations research, stochastic operations research, and statistical experimental design. For each graduate, the ability is rated using a scale from 1 (poor) to 5 (excellent). The ratings are averaged across the reviewers to obtain the mean rating value for the student. Fleiss' Kappa measure of inter-rater reliability is computed to determine the degree of consensus among the reviewers. Any significant rater disagreement is resolved via a group discussion and, if needed, by accepting the rating agreed upon by the majority of the reviewers.

3c. Performance Targets   *Audit Review: AC*

70% of majors will obtain the mean rating value of 4.0 or higher. The following ranges for Fleiss' Kappa measure of inter-rater reliabilitys are used: 0.8 - 1 = strong, 0.6 - 0.8 = good, 0.4 - 0.6 = moderate, 0.2 - 0.4 = fair, 0 - 0.2 = poor. Any significant rater disagreement is resolved via a group discussion and, if needed, by accepting the rating agreed upon by the majority of the reviewers.

3d. Assessment Results   *Audit Review: AC*

Based on the data of 26 MSIE graduates, 69.2% of them met the performance target (mean rating value of 4.0 or higher) for this learning outcome. Fleiss' Kappa measure of inter¬-rater reliability was 0.443, which indicates a moderate degree of concordance among the raters.

3e. Use of Assessment Results   *Audit Review: AC*

In this cycle, the assessment results almost met the performance target. This was the third annual cycle where a new assessment rubric/assignments have been used for this learning outcome. Originally, it was planned to use the rubric for *at least two periods* (2017 and 2018) to gather more accurate data and possibly recalibrate the rubric/assignments before identifying any trends and specific areas for improvement. Some recalibration of the assignments was done after the first year.

In the first cycle (2017), 83.3% of graduates met the performance target; in the second cycle (2018), 82.1% of graduates met the target. Overall, during the three-year period, the target was met in two years and not met in the last year, whereas the percentages have declined from 83.3% to 69.2%. This result is similar to that of SLO 2.

Continuous Improvements: the following changes are planned to improve students' skills for analyzing and interpreting solutions:

1) include at least one question related to solution analysis and interpretation in all homework assignments in certain core courses.

2) add more exercises that focus on discussing results of optimization models, stochastic models, and statistical analysis rather than just providing numerical answers.

Plan Review Comments

Report Review Comments

Assessment Methods

Course Related Assessments

Course Embedded Assignment

Cumulative Assessments

Performance Related Assessments

External-course Assessments

Standard Assessments