## **NDSE 202: Operation Research I Linear Models (3 credits)**

The course aims to introduce a scientific approach to decision making in operations management employing the principles of linear programming. This course focuses on modeling concepts, linear programming, problem formulation, simplex and dual-simplex methods, duality and sensitivity analysis, transportation, trans-shipment and assignment problems and project scheduling and management.

***Prerequisites:*** *MATH 152 OR MATH 154*

**Course Learning Outcomes:**

By the end of the course, students will be able to:

A1. Demonstrate underpinning and advanced knowledge of operations research theories and applications.

A2. Develop linear programming models of operational problems.

B1. Solve operational problems using linear programming techniques

B2. Present optimized solutions in a language understandable to decision makers.

C1. Operate at an advanced level in variable contexts bearing team responsibility.

**Course Learning Materials:**

* Introduction to Operations Research by Frederick Hillier and Gerald Lieberman. McGraw-Hill Education; 11th edition (2020)
* Operations Research: Applications and Algorithms. Wayne L. Winston. Cengage Publishing; 4th edition (2003).

**Course Content:**

1. Introduction to Operations Research: definition, history, apps, benefits, features
2. Linear Programming (LP): problem formulation, math model, solution methods
3. Solution methods: try-and-error, graphical method
4. Introduction to Simplex Method
5. Simplex methods in different forms
6. Solving LP problems with Simplex
7. Programming in LINGO/Excel
8. Duality and Sensitivity Analysis
9. Introduction to Transportation Problems
10. Introduction to assignment problems
11. Network Optimization Models
12. CPM and PERT