## **NDSE 306: Systems Simulation (3 credits)**

This course introduces basic concepts of discrete-event simulation modeling and analysis. Topics include event- scheduling versus process-interaction approach, as well as random number and random variate generation, inverse transformation and other selected techniques, input data analysis and goodness-of-fit tests, specific computer simulation languages, and analysis of simulation output and model validation. ***(****Prerequisite****:*** MATH 260***)***

**Course Learning Outcomes:**

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

A1. Explain principles and concepts employed in the field of systems simulation.

A2. Design and/or carry out statistically valid and efficient simulation experiments.

A3. Apply discrete-event simulation modeling languages to solve a variety of industrial design and decision problems.

B1. Present solutions obtained using modelling and simulation.

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

**Course Learning Materials:**

* Simulation Modelling and Analysis by Averill M. Law. McGraw-Hill. 5th Edition (2015).
* 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 Learning Content:**

1. Definitions, concepts, and applications of simulation
2. Description of discrete systems
3. Simulation of discrete systems
4. Random Number and Random Variate Generation
5. Inverse Transformation Method and other techniques
6. Input Data Analysis and Goodness-of- Fit Tests
7. Harnessing Predictive power
8. A review of Computer Simulation Languages
9. Analysis of Simulation Output and Model Validation
10. System simulation often involves collaboration bridges disciplines