

ISE 4510/IHE 6510 – Computer Applications in IHE

Course Description

Provides students with an overview for designing and implementing ISE-focused solutions using R. Of interest are applications of operations research, specifically of probabilities, inventory models, simulation and optimization, forecasting, data analytics, and decision support system (GUI/HTML interface).

Undergraduate/Graduate level – 3 credit hours

Graduate students enrolled in IHE 6510 are required to complete a project that is optional for undergraduate students in ISE 4510. The project is a comprehensive analysis that requires graduate students to apply in depth concepts and rigorous research to develop experience in defining, designing, building, testing, and demonstrating an R-based application pertinent to industrial and systems engineering. Graduate students must do a project that is worth 20% more of the grade than undergraduate students.

Offered both face-to-face and online

Course Learning Objectives

Students will learn to:

- Apply advanced IHE focused methods, such as forecasting, inventory, regression, statistics, simulation, and classification, with an emphasis on implementation in R and useful interpretation.
- Use the interaction of user interface and computational objects to create R-based ISE decision support systems.
- Design interactive, web-based, decision support systems using R and Shiny.

Course Learning Outcomes

Students will be able to:

- Apply advanced IHE focused methods, such as forecasting, inventory, regression, statistics, simulation, and classification, with an emphasis on implementation in R and useful interpretation.
- Use the interaction of user interface and computational objects to create R-based ISE decision support systems.
- Design interactive, web-based, decision support systems using R and Shiny.

Tentative Weekly Schedule

Whether taught in-person, online, or partially online, the course outline remains the same.

Week

Lectures

1. Intro and Syllabus Overview; Basic R syntax

2. Basic Syntax; Loops and Logic
3. Functions; Data Input ; Google Trend and Plot
4. Data Frames and Tables; Coding Practice; Weather, Map, Data
5. Coding Practice; Plotting
6. Web Interface – Shiny; Shiny Application Weather
7. Plotting - basic plot; MIDTERM 1
8. Plotting with ggplot and plotly
9. Shaping data – dplyr; Shaping data - tidyr
10. Regression
11. Supplement - Inventory Models
12. Supplement - Search and Optimization GRID Search
13. SA and Build Your Own R Package * (Float)
14. Basic Forecast and Time Series
15. MIDTERM 2