

MSCI 6900- Special Problems (3 credits – offered each Fall) Advanced Operational Research Optimization Techniques

CLASS (DAY/TIME/PLACE): Day and time will be agreed upon by students and professors

INSTRUCTOR: Professors: Robert Pavur, Arunachalam Narayanan (Chalam), and Javier Rubio Herrero and (***jointly taught*** – instructors teach an approximately equal amount of time)

Zoom links: Pavur: <https://unt.zoom.us/my/pavur>

Narayanan: <https://unt.zoom.us/my/chalamunt>

Rubio Herrero: <https://unt.zoom.us/my/herrero>

OFFICE: Primary Instructor of Record – Dr. Arunachalam (Chalam) Narayanan, – BLB 379J

OFFICE PHONE: ITDS Dept. 565-3140

The student is expected to engage in critiquing main stream research in the operational research literature. A review of the literature to identify issues addressed by current research articles will enhance the student's preparation for comprehensive graduate exams as well as the student's preparation for a proposal that will lead to a dissertation. Student is required to meet weekly with the instructor and discuss and reflect on current research topics as well as working through the underlying theory. Student will obtain the following skills during this course.

Course Objectives and Goals:

1. Exposure to rigorously presented operational research methodology that appear in the literature.
2. Cultivate an ability to address research questions with mathematical models and interpret results as applied to real world problems affecting supply chain management.
3. Use specialized techniques to solve data analysis with predictive modeling to explore interrelationships between predictors and predicted variables.
4. Identify research in optimization, operational research in supply chain management, and analytical methodology to make contributions to the management science/operations management literature.

COVID-19 Protocol:

If you are experiencing cough, shortness of breath or difficulty breathing, fever, or any of the other possible symptoms of COVID-19 (<https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider. While attendance is an important, your own health, and those of others in the community, is more important.

Part I: Analytical Predictive Modeling - Professor Robert Pavur

Aug 24, Aug 31, Sept 7, Sept 14, (Tuesdays – 1 to 3pm – if agreed upon by Students)

- a. Lasso and ridge regression
- b. Kuhn Tucker conditions for optimization
- c. Quantile Regression
- d. Spatial analysis

Part II: Inventory Modeling - Professor Chalam Narayanan

Sept 23, Sept 30, Oct 7, Oct 14, Oct 21, (Thursdays – 1 to 3pm – if agreed upon by Students)

- a. Inventory review – continuous and periodic, Economic Order Quantity (EOQ) and Extensions to EOQ
- b. Coordinated Replenishment Policies
- c. Planning Inventory policies for multiple locations
- d. Decision making in revenue management modeling

Part III: Revenue Management - Professor Javier Rubio Herrero

Oct 28, Nov 4, Nov 11, Nov 18, Dec 2, (Thursdays – 1 to 3pm – if agreed upon by Students)

- a. Newsvendor Problems - basics
- b. Newsvendor Problems - extensions
- c. Metaheuristics – Evolutionary algorithms – foundations
- d. Metaheuristics – Evolutionary algorithms – extensions and applications

STUDENT RESEARCH PRESENTATIONS – Thurs Dec 9 11-2pm (one hour each)

Students are expected to prepare a research study presentation as their course project. More details about the presentations will be provided during the semester. Students should include techniques and methodology learned in course within the presentation.