

## **MSCI 6900- Special Problems (3 credits – offered each Fall) Advanced Operational Research Topics**

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

Arunachalam Narayanan: <https://cob.unt.edu/user/10957#profile-main>

Javier Rubio Herrero: <https://facultyinfo.unt.edu/faculty-profile?profile=jr1078>

### **CLASS (DAY/TIME/PLACE):**

Tuesdays – 12 – 1:30pm (Every week)

Wednesdays – 12 – 1:30pm (Weeks taught by Chalam)

Mondays – 12 -1:30 pm (Weeks taught by Javier Rubio Herrero)

Place of Class: BLB 389 (near the copier room)

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 during class hours 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 (behavior and optimization methodologies) 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: **Behavioral Operations Management** – Dr. Arunachalam Narayanan

Week 1 -4 (Tuesdays and Wednesdays – 12 to 1:30pm)

**Main book:** The Handbook of Behavioral Operations (edited by Donohue, Katok and Leider)

Link : <https://www.amazon.com/Handbook-Behavioral-Operations-Research-Management/dp/1119138302>

Additional reading: Apart from papers (detailed ones provided during Week 1

- Using Laboratory Experiments to Build Better Operations Management Models By Elena Katok (available online at : <https://personal.utdallas.edu/~emk120030/FTBOMExperiments.pdf>)

Week 1 (August 30-31) : Methodology (Chapters 1,3 and 4)

Week 2 (September 6-7): Approaches to Analyzing Behavior (Chapters 5-8) – Theories popular in Behavioral Operations Management

Week 3 (September 13-14): Applications (Chapters 9,10,12 and 13)

Week 4 (September 20-21): Applications contd. (Chapters 14, 16, 17 and 18)

Part II: **Inventory Modeling** – Dr. Javier Rubio-Herrero

Week 5-8

(Mondays and Tuesdays – 12 to 1:30pm)

- a. Inventory review – continuous and periodic and Economic Order Quantity (EOQ)
- b. Newsvendor models (theory and application)
- c. Introduction to Modeling with focus on feasibility regions
- d. Extensions to Newsvendor models
- e. Behavioral experiments in Inventory models (Chapter 11 of the handbook)

Part III: **Introduction to Optimization and Heuristic Development** - Dr. Arunachalam Narayanan and Dr. Javier Rubio Herrero

Required software: Cplex (required – I will the leave the file in our one-drive) or XpressMP (free available)

Week 9 (Oct 25-26) Coordinated replenishment problem (optimization models - Chalam)

Week 10 (Nov 1-2): Transportation and network models (basic optimization models – Chalam)

Week 11 (Nov 7-8) – Metaheuristics – foundations – different types with examples (Javier)

Week 12 (Nov 14-15) – One main metaheuristic in detail based on Week 11 lecture (Javier)

Week 13/14 – Time for preparing project/paper submissions (Classes based on need)

Week 15 - STUDENT RESEARCH PRESENTATIONS — Tuesday Dec 6 11-1pm (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.

## **Grading Structure:**

Regular readings and assignments (Chalam)	- 30%
Regular readings and assignments (Javier)	- 30%
Final paper	- 35%
Active class participation	- 5%

Grading scale (A-F) for this class will be:

A = 90-100%

B = 80-89%

C = 70-79%

D = 60-69%

F = 50-59%

Note: The reading lists and assignments for each week will be provided by the respective faculty at the start of their portion.

For first class, please start by readings Chapters 1 and 2 in the textbook, see you in class on Tuesday.

## **Paper/Project requirement (More details during class)**

The student is expected to choose a topic of their choice and present a 5-minute pitch to the class on Week 10, the topic should either be related to behavior or optimization methodology.

Expectation of the paper:

1. Clear statement on the motivation of the problem and justification of need for research
2. Literature review (specifically spanning the key journals in ABDC lists – for reference see below)
3. Methodology section (Experimental design or Problem formulation)
4. Plan of action (If behavioral experiments – initial work on how to conduct experiments, possible source of data. If optimization/heuristics – basic model formulation and initial setup of experiments to run)
5. Expected outcome/results and contributions to academics and practitioner.

In essence the paper will follow a journal format and the submission without final results and end discussion is expected at the end of the semester.

## **Preferred journal in Management Science area:**

1. Journal of Operations Management (JOM)
2. Production and Operations Mgmt. (POM)
3. Decision Sciences (DS)

4. Manufacturing & Service Operations Mgmt. (MSOM)
5. Management Science (MS)
6. Operations Research (OR)
7. European Journal of Operational Research (EJOR)
8. International Journal of Production Research (IJPR)
9. Omega: International Journal of Management Science (Omega)
10. Journal of Business Logistics (JBL)
11. International Journal of Operations and Production Management (IJOPM)
12. International Journal of Production Engineering (IJPE)
13. Journal of the Operational Research Society (JORS)
14. Annals of Operations Research (ANOR)
15. Journal of Supply Chain Management (JSCM)
16. Journal of Humanitarian Logistics and SCM
17. International Journal of Physical Distribution and Logistic Mgmt. (IJPDLM)
18. Interfaces (INFORMS)
19. Computers and Operations Research (COR)
20. Mathematical and Computer Modeling (MCM)
21. Production & Inventory Management Journal (P&IM)
22. Journal of Service Research (JSR)
23. Transportation Science
24. Transportation Research (All parts)
25. IIE: Transactions
26. Naval Research Logistics (NRL)
27. Journal of the Operational Research Society (JORS)
28. Computers and Industrial Engineering
29. Journal of Purchasing and Supply Management
30. International Journal of Logistics Management (IJLM)
31. Journal of Behavioral Decision Making
32. System Dynamics Journal

**The list is not exhaustive, but these are journals to look for**

## UNT Policies

### Academic Integrity Policy

Academic Integrity Standards and Consequences. According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University. For this course, the ITDS ethics statement clearly delineates what activities are considered as violation, including some examples. An academic integrity violation will lead to a "F" grade in this course.

### ADA Policy

UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the [ODA website](https://disability.unt.edu/) (<https://disability.unt.edu/>).

The College of Business Administration complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disability. If you have an established disability as defined in the "Act" and would like to request accommodation, please contact the ODA and your instructor (Dr. Chalam) as soon as possible: the instructor's office hours and phone number are in the syllabus.

### Prohibition of Discrimination, Harassment, and Retaliation (Policy 16.004)

The University of North Texas (UNT) prohibits discrimination and harassment because of race, color, national origin, religion, sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law in its application and admission processes; educational programs and activities; employment policies, procedures, and processes; and university facilities. The University takes active measures to prevent such conduct and investigates and takes remedial action when appropriate.

### Emergency Notification & Procedures

UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.

### Retention of Student Records

Student records pertaining to this course are maintained in a secure location by the instructor of record. All records such as exams, answer sheets (with keys), and written papers submitted during the duration of the course are kept for at least one calendar year after course completion. Course work completed via the Canvas online system, including grading information and comments, is also stored in a safe electronic environment for one year. Students have the right to view their individual record; however, information about student's records will not be divulged to other individuals without proper written consent. Students are encouraged to review the Public Information Policy and the Family Educational Rights and Privacy Act (FERPA) laws and the University's policy. See UNT Policy 10.10, Records Management and Retention for additional information.

### Acceptable Student Behavior

Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. Visit UNT's [Code of Student Conduct](https://deanofstudents.unt.edu/conduct) (<https://deanofstudents.unt.edu/conduct>) to learn more.

### Sexual Assault Prevention

UNT is committed to providing a safe learning environment free of all forms of sexual misconduct, including sexual harassment sexual assault, domestic violence, dating violence, and stalking. Federal laws (Title IX and the Violence Against Women Act) and UNT policies prohibit discrimination on the basis of sex, and therefore prohibit sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking, and/or sexual assault, there are campus resources available to provide support and assistance. UNT's Survivor Advocates can assist a student who has been impacted by violence by filing protective orders, completing crime victim's compensation applications, contacting professors for absences related to an assault, working with housing to facilitate a room change where appropriate, and connecting students to other resources available both on and off campus. The Survivor Advocates can be reached at [SurvivorAdvocate@unt.edu](mailto:SurvivorAdvocate@unt.edu) or by calling the Dean of Students Office at 940-565- 2648. Additionally, alleged sexual misconduct can be non-confidentially reported to the Title IX Coordinator at [oeo@unt.edu](mailto:oeo@unt.edu) or at (940) 565 2759.