

Course number and name	END 474 / Supply Chain Analytics
Credits, contact hours, categorization of credits	3 credits / 42 hours / Engineering topic
Instructor or course coordinator	Seda YANIK
Text book and other supplemental materials	• <i>Introduction to Logistics Systems Planning and Control</i>, G. Ghiani, G. Laporte, R. Musmanno, Wiley, 2003. • Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2004). <i>Managing the supply chain: the definitive guide for the business professional</i>. McGraw-Hill. • Hyndman, R. J., & Athanasopoulos, G. (2014). <i>Forecasting: principles and practice</i>, Online OpenAccess Textbooks • James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). <i>An introduction to statistical learning: with application in R</i>, New York: Springer • Chopra, S., & Meindl, P. (2012). <i>Supply Chain Management Strategy, Planning and Operation</i>, Prentice Hall, Fifth Edition. • Bertsimas and Freund, (2004) <i>Data, Models, and Decisions: The Fundamentals of Management Science, Dynamic Ideas</i>. • Albright, Winston, Zappe (2010) <i>Data Analysis and Decision Making, Cengage Learning</i>. • Winston (2003) <i>Operations Research: Applications and Algorithms, Cengage Learning</i>.

Course information	
Content	Overview of supply chains, basic concepts and approaches of the discipline. Various SC problems such as facility location, customer assignment, vehicle routing and solution techniques. Rule-based Prescriptive models (optimization), algorithms and approximations, the complexity due to uncertainty, predictive models such as regression, various case studies related to the mentioned topics.
Prerequisites	END 331 Operations Research I, END 421 Production Planning & Control
Type	Selected elective

Course learning outcomes	
Students who pass the course will be able:	
I.	Developing an understanding of the importance of SC activities and SC decision making
II.	Use quantitative operations models and techniques to evaluate the effects of SC activities in business environments
III.	Use quantitative statistics techniques to evaluate the effects of SC activities in business environments
IV.	Apply the tools and techniques gained through IE curriculum in case studies and projects

Student outcomes	Level of contribution
SO1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	Little
SO2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	Partial
SO3. An ability to communicate effectively with a range of audiences.	High
SO4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	Partial
SO5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	High
SO6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	Not applicable
SO7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	Not applicable

Week	Topics	Learning outcome(s)
1	Introduction to Logistics and Supply Chain Management	I, II, III
2	Basics of Analytics	I, II, III
3	Review of Integer and Mixed Integer Linear Programs	I, II
4	Introduction to Algorithms and Approximation Methods	I, II
5	Facility location: overview of models; covering models; center and median models and solution methods	II, IV
6	Facility location: fixed charge problems and and solution methods	II, IV
7	Facility location: integrated models and solution methods	II, IV
8	Transportation: overview of models	I, II
9	Transportation: traveling salesman problem; formulation and solution methods	II, IV
10	Transportation: vehicle routing; formulation and solution methods	II, IV
11	Introduction to Predictive models and Probability Distributions	I, III
12	Multivariate Analysis and Regression	I, III
13	Demand Forecasting	III, IV
14	Demand Forecasting and Regression Analysis in SCs	III, IV