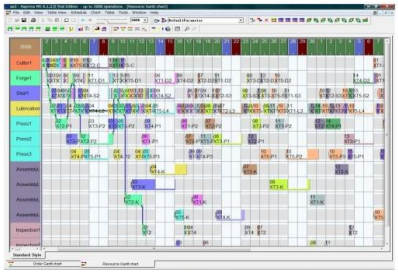
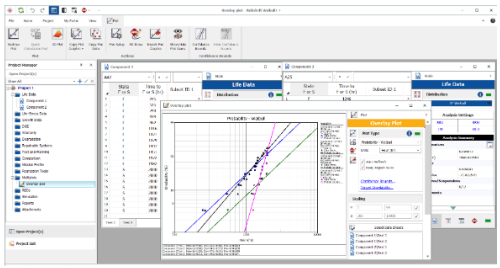
Dr. Mehmet R. Taner

Research Areas:

- **Analysis and optimization of production and logistics systems:** Particular application areas Dr. Taner's research focuses on are machine and shop scheduling, hub location, design of logistics networks and warranty cost analysis. These studies mainly use exact and heuristic techniques for discrete optimization to solve scheduling and logistics problems, and applied probability, statistics and reliability techniques to address warranty cost analysis problems.





Research Collaborators:

- Dr. Elif Zeynep Serper (TED University)
- Dr. Bahar Y. Kara (Bilkent University)
- Dr. Oya Karaşan (Bilkent University)

Students and Post-docs:

- Yiğit Şan Yayalar (TED University, MS, co-advisor with Dr. Elif Zeynep Serper, ongoing)
- Fatma Şirvan (Bilkent University, MS, 2013)
- Feyza Güliz Şahinyazan (Bilkent University, MS, co-advisor with Bahar Y. Kara, 2012)
- Nurcan Bozkaya (Bilkent University, MS, co-advisor with Dr. Osman Alp, 2012)

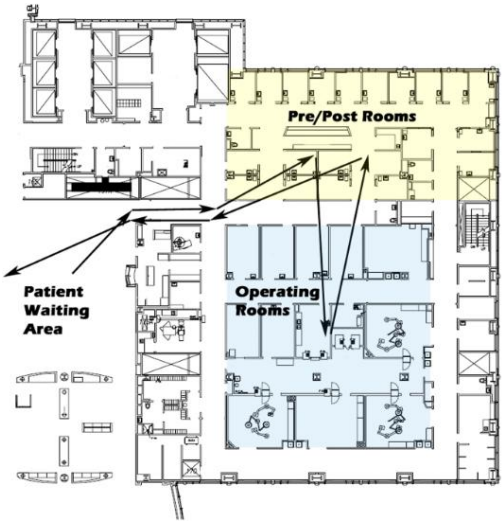
Relevant Courses:

- IE 413 Operations Scheduling
- IE 519 Operations Scheduling
- IE 464 Distributions Logistics
- IE 527 Logistics

Dr. Serhat Gül

Research Areas:

- **Operations research methods in healthcare systems:** Dr. Gül's research focuses on modeling and solution approaches to enhance patient flow within healthcare institutions. This includes planning and scheduling surgeries in operating rooms, and managing chemotherapy operations in hospital infusion units. To address these complex challenges, they utilize stochastic optimization techniques.



Research Collaborators:

- Dr. Senay Solak (University of Massachusetts Amherst)
- Dr. Melih Çelik (University of Bath)
- Dr. Elvan Gökalp (University of Birmingham)
- Dr. Özlem Karsu (Bilkent University)
- Dr. Meral Azizoğlu (METU)
- Dr. Tonguç Ünlüyurt (Sabancı University)

Students and Post-docs:

- Dr. Arsham Atashi Khoei (University of Bath)
- Batuhan Çelik (MS, Bilkent University, co-advisor with Dr. Özlem Karsu, 2024)
- Nur Banu Demir (MS, METU, co-advisor with Dr. Melih Çelik, 2019)
- Günsu Dağıstanlı (PhD, METU, co-advisor with Dr. Meral Azizoğlu, ongoing)
- Sırma Karakaya (PhD, Özyeğin University, research project supervisor)
- Ege Dilan Özyüksel (MS, Sabancı University, co-advisor with Dr. Tonguç Ünlüyurt, 2023)
- Aslı Baytar (BS, Bilkent University, co-advisor with Dr. Özlem Karsu, ongoing)

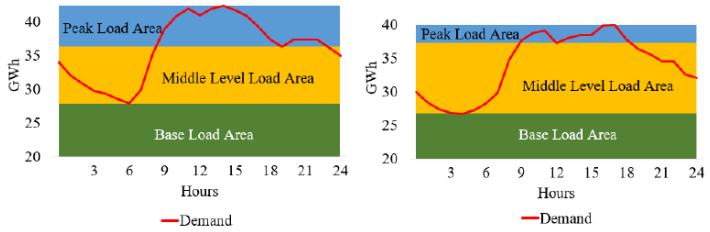
Relevant Courses:

- IE 482 Decision Making in Health Care

Dr. Meltem Peker Sarhan

Research Areas:

- **Energy System Modeling and Optimization:** Dr. Peker's research focuses on developing modeling and solution approaches to ensure the sustainability of energy systems. Her researches involve various mechanisms such as utilizing renewable energy sources, demand-side participation and battery systems.
- **Distribution Network Design and Logistics Optimization:** Dr. Peker's research focuses on developing sustainable distribution network designs by creating mathematical models and solution methods.



Research Collaborators:

- Dr. Ayşe Selin Kocaman (Bilkent University)
- Dr. Bahar Y. Kara (Bilkent University)
- Dr. James Campbell (University of Missouri)
- Dr. Charalampos Patsios (Newcastle University)
- Dr. Timur Sayfutdinov (Xi'an Jiaotong-Liverpool University)
- Dr. Okan Dükkancı (European University Viadrina)
- Dr. Ilias Sarantakos (Hypertech SA)

Students and Post-docs:

- **Tolga Karabaş** (PhD, METU, co-advisor with Dr. Mustafa Kemal Tural, ongoing)

Relevant Courses:

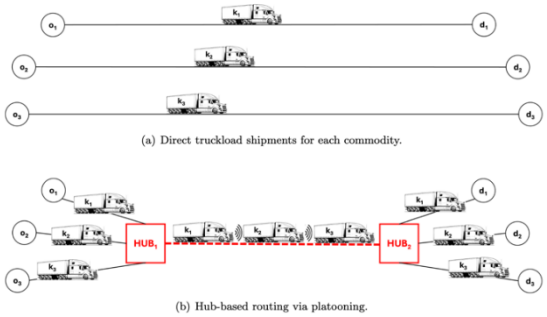
- IE 412 Facility Location and Layout

Dr. Elif Zeynep Serper

Research Areas:

- **Optimization of Sustainable and Smart Transportation & Logistics Networks**

Dr. Serper's research focuses on integrating autonomous and conventional systems into sustainable and smart transportation and logistics networks. She develops modeling and solution approaches using deterministic and stochastic optimization methods, particularly in areas such as autonomous truck platooning, hub location, network design, and route optimization.



(a) Direct truckload shipments for each commodity.

(b) Hub-based routing via platooning.

Figure 1: An illustration of direct and platoon-based transportation for three commodities.

Her research aims to enhance the sustainability of transportation and logistics systems by improving energy efficiency and reducing carbon emissions. By employing decision-making techniques under uncertainty, she seeks to strengthen the resilience of logistics networks and maximize operational efficiency in alignment with environmental sustainability goals.

Additionally, she works on network design and optimization for the efficient management of reverse logistics processes.

- **Optimization for Wireless Sensor Networks (WSNs)**

Dr. Serper's research also focuses on designing wireless sensor networks (WSNs) to maximize their lifespan while ensuring delay awareness. By integrating multi-criteria decision-making (MCDM) approaches into optimization processes, she develops mathematical models and optimization techniques aimed at extending network lifetime while minimizing delays.

Her studies contribute to improving WSN performance in applications such as smart grids and large-scale monitoring systems. Furthermore, she develops solutions to enhance sustainability through network topology updates.

Research Collaborators:

- Dr. Mehmet R. Taner (TED University)
- Dr. Sibel Alumur Alev (University of Waterloo)
- Dr. Ayşegül Altın Kayhan (TOBB University of Economics and Technology)

Students and Post-docs:

- Yiğit Şan Yayalar (TED University, MS, co-advisor with Dr. Elif Zeynep Serper, ongoing)

Relevant Courses:

- IE 536 Network Flow Problems

Dr. Ece Zeliha Demirci Kaplan

Research Areas:

- **Condition based maintenance scheduling:** Dr. Demirci studies maintenance scheduling for non-identical, deteriorating machines. A restless bandit approach is applied to address this problem on a practical scale.

- **Incentive/subsidy design for socially responsible operations/products:** Dr. Demirci examines optimal incentive mechanisms to motivate supply chain participants to take socially responsible actions.

Research Collaborators:

- Dr. Geert-Jan Van Houtum (Eindhoven University of Technology)
- Dr. Joachim Arts (Luxembourg Centre for Logistics and Supply Chain Management)
- Dr. Emre Nadar (Bilkent University)

Students and Post-docs:

- Zeynep Ece Livaoğlu (Bilkent University, Senior Student)

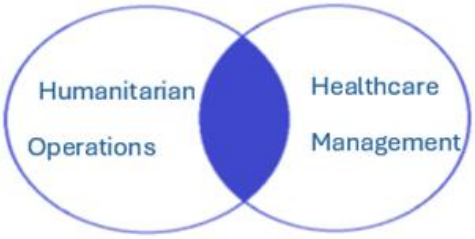
Relevant Courses:

- IE 461 Supply Chain Management
- IE 581 Sustainable Processes

Dr. Sırma Karakaya

Research Areas:

Applying operation reseach to healthcare systems during disasters: Dr. Karakaya's research area focuses on healthcare challenges that arise during disasters. She proposes novel mathematical formulations to address the unpredictable effects of disasters on healthcare operations. Her aim is to guide decision-makers in developing policies that will enhance healthcare management in the context of disaster preparedness and response.



Research Collaborators:

- Dr. Serhat Gül (TED University)

Relevant Courses:

- IE 466 Humanitarian Logistics