Operations research is a scientific approach to decision making that seeks to best design and operate a system, usually under conditions requiring the allocation of scarce resources. Operations research saves lives, saves money, and solves problems. Operations research models are used daily to optimize systems from several industries:

- Logistics, transportation, and supply chain
- Financial systems
- Manufacturing
- Health care, medicine, and public health
- Oil, chemical, and mining industries
- Food and energy systems
- Agriculture
- Military and defense.

This course will study modeling and solution methods of some classical operations research models such as linear, integer, and network programming.

**Modeling**

- Model and solve complex systems using commercial and open-source software (e.g. CPLEX, Gurobi, COIN-OR, etc.)
  - Blending and production process problems
  - Inventory and multi-period decision problems
  - Transportation and transshipment problems
  - Traveling salesman and vehicle routing problems
  - Knapsack and multiple knapsack problems
  - Assignment and matching problems
  - Covering, node packing, and bin packing problems
  - Facility location, fixed charge, and network problems

**Solution Methods**

- The simplex method for linear programming
  - Understand the mechanisms and theory of the simplex method to solve linear programs
  - Evaluate the sensitivity of linear programs
  - Understand and apply duality theory to solve linear programs
- The branch and bound algorithm for integer programming

Do you want to learn more about the impact of operations research? Visit [https://youtu.be/9-MITCoka-Q](https://youtu.be/9-MITCoka-Q)