



**Course Name:**

System Engineering

<b>Course Number:</b> 20-189	<b>Credit:</b> 3
<b>Program:</b> Undergraduate	<b>Course Type:</b> Technical elective
<b>Prerequisite:</b> Numerical Analysis in Civil Engineering	<b>Corequisite:</b> -

**Course Description (Objectives):**

**Course Content (outline):**

- Introduction, model classification, linear programming formulation, geometrical method, classification of mathematical programming models.
- Solving linear program, simplex method.
- Sensitivity analysis, shadow prices, reduced costs, variation in the objective coefficients and the right-hand-side values.
- Definition of the dual problem, finding the dual in general, duality properties.
- Network models, minimum cost network flow problem, special network models, shortest path, maximal flow, transportation, and critical path method, solving the minimum cost flow problem.

**References:**

- Applied Mathematical Programming, Bradley, Hax, and Magnanti
- برنامه ریزی ریاضی کاربردی ترجمه: هدایت ذکایی آشتیانی و حسین تقی زاده کاخک.