Course Name:
System Engineering

<table>
<thead>
<tr>
<th>Course Number: 20-189</th>
<th>Credit: 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program: Undergraduate</td>
<td>Course Type: Technical elective</td>
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<tr>
<td>Prerequisite: Numerical Analysis in Civil Engineering</td>
<td>Corequisite: -</td>
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</tbody>
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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: هدايت ذکایی آشتیانی و حسین تقی زادة کاخک