

Course number and name	END 332 / Operation Research II
Credits, contact hours, categorization of credits	3 credits / 42 hours / Engineering topic
Instructor or course coordinator	Y. İlker TOPCU, Özgür KABAK
Text book and other supplemental materials	<ul style="list-style-type: none"> • Winston W.L. (2004) <i>Operations Research: Applications and Algorithms</i>, Brooks/Cole – Thomson Learning • Taha H.A. (2003) <i>Operations Research: An Introduction</i>, Pearson Education Inc. • Taha H.A. (2000) <i>Yöneylem Arastirması, Literatur Yayıncılık (cev. Alp Baray ve Sakir Esnaf)</i> • Winston W.L., Albright S.C. (2001) <i>Practical Management Science</i>, Duxbury Press, Wadsworth Inc. • Render B., Stair R.M. Jr., Hanna M.E. (2003) <i>Quantitative Analysis for Management</i>, Pearson Education Inc. • Taylor B.W. III (2002) <i>Introduction to Management Science</i>, Pearson Education Inc • Rardin R.L. (1998), <i>Optimization in Operations Research</i>, Prentice Hall Inc.

Course information	
Content	This course aims to guide students in formulating integer problems and finding appropriate solutions, algorithms or heuristics to solve them, teach students how to tackle goal programming, non-linear programming and dynamic programming problems.
Prerequisites	END 331 Operation Research I
Type	Required

Course learning outcomes
<p>Students who pass the course will:</p> <ol style="list-style-type: none"> I. Formulate Integer Programming Problems II. Solve Integer Programming Problems III. Formulate and Solve Goal Programming problems IV. Formulate and Solve Non-Linear Programming Problems V. Formulate and Solve Dynamic Programming Problems VI. Formulate complex real-life problems VII. Develop solution strategies to complex problems

Student outcomes	Level of contribution
SO1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	High
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.	Not applicable
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.	Little
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.	Partial
SO6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	High
SO7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	Partial

Week	Topics	Learning outcome(s)
1	Integer Programming Problems (Budgeting and Knapsack Problems)	I, VI
2	Integer Programming Problems (Fixed Charge Problems, Either-Or and If- Then constraints, Travelling Salesman Problems)	I, VI
3	Solution methods for Integer Programming Problems (Categorization, LP relaxation, Enumeration)	II, VII
4	Solution methods for Integer Programming Problems (Branch-and-bound method)	II, VII
5	Solution methods for Integer Programming Problems (Combinatorial optimization methods)	II, VII
6	Formulating Goal Programming models	III, VI
7	Solving Goal programming models	III, VII
8	Non-Linear Programming Problems (Modelling and Solving Unconstrained NLPs)	IV, VI
9	Non-Linear Programming Problems (Solving Constrained NLPs)	IV, VII
10	Interior Point Algorithm	IV, VII
11	Deterministic Dynamic Programming Problems (Solving problems)	V, VII
12	Deterministic Dynamic Programming Problems (Formulating DP recursions)	V, VI
13	Probabilistic Dynamic Programming Problems (Solving problems)	V, VII
14	Probabilistic Dynamic Programming Problems (Formulating DP recursions)	V, VI