



Course Syllabus

BA 523 – LINEAR PROGRAMMING FOR DATA SCIENCE

Spring 2020

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Office/Phone: A211
Office Hours: Monday, 12:00-14:00

Course days and hours: Tuesday, 17:10-20:00

Location: LB212-R103

Course Aim:

The main purpose of this course is to introduce the theory, algorithm and calculation methods of linear programming. It covers the topics such as modeling linear programming problems, mathematical analysis of linear programming (polyhedral theory, duality, optimality conditions, level of complexity), network flow models, simplex algorithm and its variations, decomposition techniques, interior point methods.

Learning Objectives and Outcomes:

By the end of this course, students will be able:

1. Develop a fundamental understanding of linear programming models,
2. Able to develop a linear programming model from problem description,
3. Apply the simplex method for solving linear programming problems,
4. Apply the revised simplex method to solve linear programming problems,
5. Express the dual of a linear programming problem and solve the resulting dual problem using the dual simplex method, interpret the results and obtain solution to the primal problem from the solution of the dual problem,
6. Conduct sensitivity analysis for linear programming problems and interpret the results,
7. Apply the transportation simplex method to solve transportation problems,
8. Demonstrate hands-on problem solving skills for linear programming problems using Lingo, GAMS Modeling Environment and a variety of solvers.

Resource/s:

Paul R. Thie and Gerard E. Keough	An Introduction to Linear Programming and Game Theory
Taha	Operations Research: An Introduction
Bertsimas and Tsitsiklis	Introduction to Linear Optimization.
Winston	Introduction to Mathematical Programming
Bazaraa, M.S., J.J. Jarvis and H.D. Sherali	Linear Programming and Network Flows
Robert J. Vanderbei	Linear Programming: Foundations and Extensions

Accommodations:

Any student requiring special accommodations for any reason should contact the instructor as soon as possible.

Homework:

There will be total at least 2 homework assignment during the semester. Late assignments will not be accepted. Hard copy of assignments are due in class before the lecture starts. Acknowledge all resources used. Plagiarism is not acceptable. Identical homework submission receive zero. You should protect your own work including individual assignments, term paper and exams all the time.

Teaching Methodology:

Learners will be provided with as much opportunities of hands-on practice as possible with the aim of striking a balance between learner-centeredness and sufficient guidance. Various forms of interaction (i.e. pair work and group work) will also be encouraged to cater for learners with different learning styles. Additionally, individuals will be expected to produce both in-class writings and homework assignments in addition to the reading tasks, which will encourage them to reflect and think critically. Technology will also be incorporated into the classroom procedures in order to create a better learning environment.

Grade Distribution:**Evaluation Criteria****Percentage**

Weekly assignments
Final Project

50%
50%

Total: 100%

Grading Scale:

A	4,00	90-100
A-	3,67	87-89
B+	3,33	83-86
B	3,00	80-82
B-	2,67	77-79
C+	2,33	73-76
C	2,00	70-72
C-	1,67	64-69
D+	1,33	56-63
D	1,00	50-55
F	0,00	0-49

For a detailed description of grading policy and scale, please refer to the website <https://goo.gl/HbPM2y> section 28.

Course Web Site:

canvas.agu.edu.tr will be used to post important announcements, documents, and homework assignments.

Attendance Policy:

The course consists of 3 lecture hours per week. All students attend a minimum of 70% of classes during their course. If you come after the instructor (when the door is closed) or leave any class for more than 5 minutes you will be marked absent for that class. All absences from class, including absences due to illness, are counted as official absences.

Class Policy :

You must be in class before the lecture starts. You are expected to do your best to be in class on time. You are not allowed to enter the classroom after the lecture starts. You must turn off all your electronic equipment before the lecture starts, in particular mobile phones, laptops and tablets. During the lecture, you must avoid all activities that are better performed elsewhere.

Cheating & Plagiarism:

You are responsible for knowing the University policies on cheating and plagiarism. Not giving credit to a person for their intellectual work and passing it off as your own is stealing.

Specifically:

- 1) Copying or allowing someone to copy your work on an exam, homework, or in class assignment is cheating.
- 2) Cutting and pasting material from the web or any other electronic source is plagiarism.

- 3) Copying and turning in the same assignment as someone else, from this class or from another class, is cheating. Unless explicitly told otherwise, you can discuss and problem- solve on homework together but the final product has to be your own – not just your own handwriting but your own way of explaining and organizing your ideas.
- 4) Making superficial changes (minor additions, deletions, word changes, tense changes, etc) to material obtained from another person, the web, a book, magazine, song, etc. and not citing the work, is plagiarism. The idea is the intellectual property, not the specific format in which it appears (e.g., you wouldn't reword Einstein's theory of relativity and imply that relativity was your own idea, would you?)
- 5) If you find material and it is exactly what you are trying to say, or you want to discuss someone's idea, give the person credit and cite it appropriately. Don't overuse citations and quotes: instructors want to know how you think and reason, not how some one else does.

If you have any questions or concerns about whether your behavior could be interpreted as plagiarism, please ask the assistants or me before you submit the work.

- If the pace of the lectures is too fast or slow, let me know. I am not always aware of it, no matter how obvious it may be to you.

Email Policy:

When contacting the instructor or the course assistant, please use the Canvas email feature. Only use my `firstname.lastname@agu.edu.tr` if Canvas is not accessible (server down, etc). Include in the subject line the class and section number (CISXXX, Section XXXX). If this information is not included, your email may not be answered. Any announcements or warnings will be send to your AGU e-mail. Therefore it is the responsibility of every student to read his/her AGU e-mails and CANVAS emails regularly. AGU webmail can be accessed through <https://mail.agu.edu.tr>

Course Outline:

Week	Date	Topic
1st	Feb 04	Review of Linear Algebra
2nd	Feb 11	Modeling Linear Programming Problems, Nature of Linear Programs Formulation of LP Model Types
3rd	Feb 18	Formulation of LP Model Types , Convex Analysis and Polyhedral Sets,
4th	Feb 25	Linear Programming (LP): Graphical Solution Methods
5th	March 03	Linear Programming (LP): Computer Solution and Sensitivity Analysis
6th	March 10	The Simplex Method
7th	March 17	Starting Solution and Convergence
8th	March 24	LFW
9th	March 31	Midterm
10th	April 14	The Revised Simplex Method
11th	April 21	Duality and Sensitivity Analysis
12th	April 28	The Wolf-Dantzig and Benders decompositions
13th	May 05	Polynomial Algorithms, Special Cases of Optimization Problems
14th	May 12	Interior point methods, Introduction and Straightforward Optimization Methods
15th	May 19	Final exam week
