
Math 313: Linear Programming and Optimization

Fall 2023

Department of Mathematical Sciences, UWM

Lecture Time

10:00 AM - 11:15 AM, Monday and Wednesday, EMS, Room E423

Instructor:

Dr. Dexuan Xie

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Office Hours: 2:30 PM - 3:30 PM, Monday and Wednesday

Textbook

Linear Programming, R.J. Vanderbei, Fifth Edition, Springer, 2020.

- The author's teach slides can be viewed on a webpage at <https://vanderbei.princeton.edu/307/lectures.html>
- The author also provides online tools that illustrate various pivot rules and variants of the simplex method in the link <https://vanderbei.princeton.edu/JAVA/pivot/simple.html>
- You can download the Python programs of the linear programming algorithms described in the book as the Zip file in the link <https://vanderbei.princeton.edu/LPbook/src/python.zip>

Prerequisite

Math 240 (P), Math 234 (P), or graduate students.

Course Overview

- Basic Linear Algebra (a short review)
- The Simplex Method
- Sensitivity Analysis and Duality
- Primal and dual Simplex methods
- Game Theory
- Data science applications
- Financial applications

Required Software

All computer work can be done either in MATLAB or Python. MATLAB is freely available on UWM computer labs; Jupyter Notebook can be downloaded for free at <https://jupyter.org/>.

Grading

- Four Homework Evaluations: 400 points
- Final Exam: 200 points
- The final grade score is the average of your total scores from the homework and the final exam.
- Grading scales: A (90-100), A- (85-89), B (76-84), C (65-75), D (60-64), F (below 59)

Important Dates:

- Homework due dates: Announced in the class.
- September 6: First class.
- October 2: Last day to drop without "W".
- November 12: Last day to drop.
- November 22 - 26: Thanksgiving Break.
- December 13: Last Class.
- Final Exam: 11:00 AM -1:00 PM, Monday, Dec. 18, 2023.

Credit hour policy and time allocation

The expected workload for this 3-credit course is 148 hours: 35 hours in the classroom (including lecture attendance and in-class midterm), 2 hours for the final exam, and 111 hours of homework and exam preparation (at 3 hours per class hour).

Class attendance

Attendance is required. Attendance will be taken after the first week. Extra credit (5 points) will be added to your final grade score if you miss three classes at most). There is no provision for absences, missing examinations, and missing homework due to vacations, family outings, social activities, other special plans and appointments, etc. Absences due to illness require a medical excuse on Physician's letterhead, signed by a physician.

Homework policies

Late homework will not be accepted. Collaboration among students is allowed but each student must submit his/her own work.

Make-up policies

No make-up is given for the final exam, but an incomplete grade can be given to eligible students (see link below).

Rules

- Books and notes are NOT allowed to be used for the Exam.
- Hand in homework at the beginning of class on the due date. No homework will be accepted at any other time.
- Texting and photo-taking are not permitted during class time. Cell phones and smart watches should be turned off.

University Policies

- Students with disabilities: <http://uwm.edu/arc>
- A notation of "incomplete" may be given in lieu of a final grade to a student who has carried a subject successfully until the end of a semester but who, because of illness or other unusual and substantiated cause beyond the student's control, has been unable to take or complete the final examination or to complete some limited amount of term work.
- Consultation, Complaints, and Appeals: <https://uwm.edu/deanofstudents/assistance/complaints/>
- Discrimination conduct and consensual relationships policy: <https://apps.uwm.edu/secu-policies/storage/other/SAAP%205-1.%20Discriminatory%20Conduct%20Policy.pdf>
- Academic misconduct. <https://uwm.edu/deanofstudents/academic-misconduct-2/>

Note

The instructor reserves the right to make changes to the syllabus as needed as the course progresses.