Courses: M 362 Sec. 01 (CRN 74668) 3 cr. & M 363 Sec. B01 (CRN 74993) 1 cr., Autumn 2020

Linear Optimization

TΘ 11:00am–12:20pm in MATH103 & T 1:00–1:50pm in MATH103 & by arrangement & on Zoom (meeting ID: 943 2431 6583 passcode: 598116 for both courses)

Instructor: Mark Kayll
Econtact: mark.kayll@umontana.edu
umontana.zoom.us/j/6948539958 (for Office Hours)
hs.umt.edu/math/people/default.php?s=Kayll
Office: MATH 209
406.243.2403 (tentative) (open for all course matters, including DSS accomm.)

Hours: T 3:00–3:50pm, Θ 2:00–2:50pm & by appointment

Prerequisites: one of M 162 (Applied Calculus), M 172 (Calculus II) or M 182 (Honors Calculus II);
M 221 (Intro Linear Algebra) is also recommended; or consent of instructor.
Students should have background appropriate for junior-level mathematical studies. Though we shall begin from first principles, it is extremely helpful if students have, or can learn quickly, basic knowledge of elementary linear algebra.


Important Dates: last day to add w/o instructor consent Thursday, 27 August (5pm);
Labor Day Holiday Monday, 7 September;
last day to drop or select Audit grade option Wednesday, 9 September (5pm);
last day to drop via Add/Δ/Drop link and avoid ‘WP’ or ‘WF’ Wednesday, 21 October (5pm);
Election Day Holiday Tuesday, 3 November;
Veterans’ Day Holiday Wednesday, 11 November;
last day to add/drop by petition Wednesday, 18 November (5pm);
last class meeting (during finals) Friday, 20 November 10:10am–12:10pm.

Description: Linear optimization is concerned with optimizing a linear function subject to linear inequality constraints. This pair of courses will focus on modeling real-world problems as linear programs (LPs) and solving the resulting LPs using various techniques, including via computer. Strayer’s text will be our guide; the plan is to cover much (most?) of this book. The simplex algorithm and duality are of principal importance. In addition, topics from the following list will be considered as time permits: matrix games, transportation and assignment problems, network-flow problems.

Learning outcomes: The ‘official’ outcomes below are reflected in the description above.
- Demonstrate the techniques of linear optimization and their applications;
- Formulate a linear program for an appropriate ‘real-world’ problem;
- Solve linear programs using appropriate software packages;
- Explain the beautiful theoretical underpinnings of linear programming.

Accommodation: The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you have a disability that adversely affects your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or 406.243.2243. The instructor will work with you and Disability Services to provide an appropriate modification.

Assessment: M 362 course grades are based on homework assignments, two term tests, and a final exam. M 363 grades are based exclusively on weekly computer projects and associated writing assignments. In both courses, traditional letter grades will be assigned using the +/− system (see UM catalog at catalog.umt.edu/academics/policies-procedures). UM’s policy on Incomplete grades will be followed (see UM catalog).

(over)
Homework Assignments are set regularly, roughly every two weeks. A (possibly improper) subset of the assigned problems will be graded. Homework is submitted electronically on gradescope.com, either in PDF or JPG format from your device. The course number is 156755, with Entry Code MKV2RG. You’ll receive an email invite at your official UM email address; follow the instructions to link to Gradescope and get started. Students are responsible for compiling their own ‘solution sets’, comprised of their own submissions, augmented by notes from meetings with other students and with the instructor.

I urge students from the outset to get into the habit of staying on schedule with reading and homework. This helps to maximize the material absorbed in class, meaning less effort in preparing for tests.

<table>
<thead>
<tr>
<th>Tentative grading schedule</th>
<th>Item</th>
<th>Date(s)</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>362</td>
<td>Homework</td>
<td>19 August — 17 November</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Test # 1</td>
<td>Thursday, 17 September</td>
<td>20%</td>
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<tr>
<td></td>
<td>Test # 2</td>
<td>Thursday, 22 October</td>
<td>20%</td>
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<tr>
<td></td>
<td>Final exam</td>
<td>Friday, 20 November 10:10am–12:10pm</td>
<td>40%</td>
</tr>
<tr>
<td>363</td>
<td>Weekly Computer Projects &amp; Writing Assignments</td>
<td>100%</td>
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Teaching modality: This is a hyflex course; i.e., some students attend face-to-face while others join synchronously via Zoom. Class meetings will be recorded on Zoom so that all students can revisit desired segments.

Moodle pages: These are located at moodle.umt.edu/course/view.php?id=33442. Students should check the Moodle site regularly to stay in tune with the course flow (announcements, homework, grade book, etc.).

General Remarks

On homework: Please use complete sentences, proofread, and polish your work prior to submission. You’re encouraged to type homework solutions unless your handwriting is clear. You may work with others on homework problems, and you’re encouraged to do so.

Solutions should be written down privately in your own words.

If you use an important idea of someone else, then please acknowledge that person by giving an appropriate citation in your write-up. This professional courtesy will not affect your grade.

On exams: As noted above, there are two in-class tests and a final exam. The latter will be cumulative with a slight emphasis on the material not covered by the in-class tests.

On make-ups: Make-ups for tests will not be given unless there is a valid excuse cleared with the instructor prior to the test. At least your most detrimental assignment will be dropped; thus, there are no homework make-ups.

On deadlines: Any stated deadlines are firm; please don’t ask for extensions.

On electronic devices: Cell phones must be silenced during class meetings and office hours. Use of a cell phone during a test for any purpose other than as a calculator is grounds for earning a zero score on that test.

On coronavirus: Attendance will be recorded to support contact tracing. All students must follow UM’s face covering policy; see www.umt.edu/policies/browse/facilities-security/covid-19-face-covering-policy. With mask use required in the classroom, consuming food or beverages is not allowed because these require mask removal.

On conduct: All students need to be familiar with the Student Conduct Code; it can be found in the ‘A to Z Index’ on the UM home page. All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the university.

Additional References


Combinatorics is the most fundamental, and hence the most important, branch of mathematics, since it deals with FINITE structures, and the world is finite.

Doron Zeilberger, Board of Governors Professor of Mathematics
Rutgers University