

<p style="text-align: center;"><b>MATH 318 <i>Operations Research</i></b> <b>Course Description</b> <b><i>Spring Term 2023</i></b></p>
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*Catalog Description:* Operations research is the utilization of quantitative methods as an aid to managerial decisions. In the course, several of these methods will be introduced and studied in both a mathematical context and a physical context. Topics included will be selected from the following: classification of problems and the formulation of models, linear programming, network optimization, transportation problems, assignment problems, integer programming, nonlinear programming, inventory theory, and game theory. (MATH 0200 or waiver))

Successful completion of this course satisfies the "Deductive Reasoning and Analytical Processes" distribution requirement.

*A More Informal Description From The Department's Website:* Operations Research (OR) is a young branch of mathematics, which combines tools from Mathematics, Computer Science and Economics to provide a quantitative basis for making decisions. That's quite a mouthful, but OR techniques have found such wide-ranging applications that it becomes hard to give a precise definition of the field. Still, one recurring theme in OR is the optimal allocation of scarce resources, and the decision criteria in OR problems often have an economics spirit. In the business world, you'll find OR professionals working on problems ranging from manufacturing planning to financial management, and many large companies have their own in-house OR consulting groups. Mathematics majors with an interest in real-world applications, and Economics majors with good analytical skills, should certainly consider taking MATH 318 as an elective.

Most OR applications require the ability to formulate a mathematical model for a decision problem. These models can be large and complex, and the computer becomes an essential tool for solving them. In fact, many OR algorithms are interesting objects of study in their own right. Prime example: the simplex algorithm invented in 1947 for solving optimization models known as "Linear Programs" – has direct connections to convexity problems in computational geometry.

*Instructor:* Michael Olinick ([molinick@middlebury.edu](mailto:molinick@middlebury.edu)), 202 Warner, 443-5559. Home: 388-4290. Office Hours: Monday, Wednesday, Thursday and Friday from 9:30 AM to 11 AM, Monday and Wednesday from 12:10 to 1:10 PM. **I am happy to make an appointment to see you at other mutually convenient times.**

*Meeting Times:* Monday, Wednesday and Friday: 11:15 AM – 12:05 PM in Warner 101.

*Prerequisites:* A good background is a year's study of calculus and term of linear algebra.

*Textbooks:* (1) Frederick S. Hillier and Gerald J. Lieberman, *Introduction to Operations Research*, 10th Edition, (New York: McGraw-Hill, 2015). This book is the most widely used text in Operations Research. Copies may be purchased through the College Store or online. A copy is also on reserve at Davis Family Library. You will also be able to access a digital version through our course website.

(2) Michael Olinick, *Linear Programming*. These notes will be distributed in

class.

Your assignments will include reading in the texts. Be certain to read the books carefully (with pencil and paper close by!) and to complete the relevant reading before coming to class and before embarking on the homework problems.

*Additional Course Materials:* See the course webpage at <http://s23.middlebury.edu/MATH0318A>

*Software:* We will make extensive use of some of the powerful software packages which accompany the Hillier-Lieberman text.

*Requirements:* There will be two midterm examinations and a final examination in addition to required homework assignments and team projects. The midterm examinations will be given in the evening to eliminate time pressure. Tentative dates for these tests are:

Wednesday, March 15  
Monday, April 24

The College's Scheduling Officer has set Thursday, May 18 from 9 AM to 12 Noon as the date and time of the final exam.

*Advice:* At this point in your scholarly careers, you probably don't need the following words of wisdom but a reminder may be helpful:

One of the essential characteristics of college life that distinguishes it from secondary school is the increased responsibility placed on *you* for your own education. **Most of what you will learn will not be told to you by a teacher inside a classroom.** Even if our model of you were an empty vessel waiting passively to be filled with information and wisdom, there wouldn't be time enough in our daily meetings to present and explain it all. We see you, more appropriately, as an *active* learner ready to confront aggressively the often times subtle and difficult ideas our courses contain. You will need to listen and to read carefully, to master concepts by wrestling with numerous examples and problems, and to ask thoughtful questions.

*Grades:* Grades in the course will be determined first by weighing the course components in the following manner:

Homework/Projects	35%
Exam 1	20%
Exam 2	20%
Final Exam	25%

and then adjusting to take account such factors as class participation and improvement (or deterioration) in performance.

*Help:* Please see me immediately if you have any difficulties with this course. Do not hesitate to utilize office hours. I welcome questions of any sort, including questions on assignments not yet handed in. In addition, I always appreciate your opinions, comments and suggestions concerning the course.

Students may also obtain many different forms of assistance from the Center for Teaching, Learning and Research (<http://www.middlebury.edu/academics/resources/ctlr>) and the Disability Resources Center (<https://www.middlebury.edu/office/disability-resource-center>). I encourage you to investigate the services they offer.

*Accommodations:* Students who have Letters of Accommodation in this class are encouraged to contact me as early in the semester as possible to ensure that such accommodations are implemented in a timely fashion. For those without Letters of Accommodation, assistance is available to eligible students through the Disability Resource Center. Please contact Jodi Litchfield or Peter Ploegman, the ADA Coordinators, for more information: Peter Ploegman can be reached at [ccioffredi@middlebury.edu](mailto:ccioffredi@middlebury.edu) or 802-443-2382 and Jodi Litchfield can be reached at [litchfie@middlebury.edu](mailto:litchfie@middlebury.edu) or 802-443-5936. All discussions will remain confidential.

### *Expectations*

- ***Be There:*** Attend all lectures, arriving on time, and staying for the duration of the class period.
- ***Be Prepared:*** We expect students to complete assigned readings prior to the class. Reading a mathematics text requires a pencil and paper. Do not stress about understanding every detail you read, but focus on getting a general picture of the topics discussed, and understanding most of the examples. Completing these readings will enhance the lecture experience for all of us.
- ***Be Present:*** Plan to participate in lectures by both asking and answering questions, as well as by taking part in discussions and group activities.
- ***Be Proactive*** in your understanding. Complete assignments regularly. Ask questions as they come to you. Attend office hours for clarification the moment you run into trouble.
- ***Be Respectful*** of yourself, your classmates, your instructor, and our classroom. This is our shared experience, and we are all partially responsible for ensuring a successful semester as a productive, welcoming, and stimulating class environment.
- ***Be Honorable:*** Students are expected to follow the Honor Code for all activities in this course. Expectations for feedback assignments, exams, and projects will be discussed explicitly in advance during class and students will be required to write/sign the honor pledge on larger assignments.

*A Final Word:* **There is a lot of exciting mathematical material in this course. Have fun with it!**