

**IE3800 Deterministic Operations Research Tuesdays/Thursdays 11:00am - 12:15pm,
Kinard 001**

Instructor: Dr. Yongjia Song, Office: Freeman Hall 264, Email: yongjis@clermson.edu

- Office Hours: Tuesdays 1:00pm - 2:00pm, Fridays 11:00am - 12:00pm, and by appointment.

Teaching assistant: Mr. Murwan Siddig, Office: Freeman Hall 278, Email: msiddig@g.clemson.edu

- Office Hours: Mondays 11:00am - 12:00pm and by appointment.

Reference books (no textbook required):

- You can mostly rely on the class notes for this course.
- Introduction to Mathematical Programming: Applications and Algorithms, by Winston/Venkataramanan
- Operations Research – Applications and Algorithms, by Wayne L. Winston, 4th edition, Brooks/Cole, 2004.
- John Lee’s “dynamic book”: A First Course on Linear Optimization, https://github.com/jon77lee/JLee_LinearOptimizationBook/blob/master/JLee.3.0.pdf

Main software: Julia and its JuMP package (Julia for Mathematical Programming)

- Download Julia from www.juliaopt.org and install it on your own computer. You can also write and run Julia locally on your computer. More information can be found at the course website on Canvas.
- More information about JuMP:
 - (a) There are many online tutorial videos and courses on the programming language, Julia, and the optimization package, JuliaOpt and JuMP.
 - (b) Pros: Simple interface with state-of-the-art FREE optimization software and solvers; maintained by a group of excellent researchers from MIT.
 - (c) Cons: Julia is a new language, JuMP is very dynamic and needs updates frequently.

References for Other Optimization Software:

- (a) AIMMS Optimization Guide. https://download.aimms.com/aimms/download/manuals/AIMMS3_0M.pdf
- (b) Applications of Optimization using Xpress: http://www3.ntu.edu.sg/home/bernhard/lp/lp_book.pdf

These references are extended user-guides for state-of-art optimization software. They describe some general optimization modeling techniques that are independent of the software language.

Prerequisite: MATH 3110 with a C or better.

Catalog description: Introduction to operations research models, including linear programming, integer linear programming, transportation and assignment problems, and network flows.

Course objectives: After taking this course, my objective is that you will be able to do the following:

- Take an abstract decision problem, model it as an appropriate optimization problem, solve the model using computer-based software (e.g., JuMP), and interpret the solution;
- How to write a project report and interpret your solution to practitioners;
- Understand the simplex method for linear programming;
- Understand the relationship between a linear program and its dual, and understand their meaning in practice;
- Perform sensitivity analysis to understand how changes in the data input impact the optimal solution;
- Understand how to model simple logical constraints using integer decision variables;
- Understand the branch-and-bound algorithm used in discrete optimization.

Grading policy: The grade is distributed into the following sections:

- Homework: 25%
- 1st mid-term exam: 25% (Oct. 3rd, in class)
- 2nd mid-term exam: 25% (Nov. 12th, in class)
- Final exam: 25% (scheduled at 7pm on Dec. 13th)

No makeup exams will be given unless a university-approved excuse is provided. When possible, excuses should be provided at least ten days prior to the exam.

Homework assignments:

- All assignments are due when class begins on the assigned due date.
- You have FIVE FREE days for delayed assignment submission for the entire semester (allocate them in an optimal way!) After that, 20% of the grade will be taken off for each day delayed.
- No assignments will be accepted if more than FIVE days overdue, regardless if you apply free days or not.
- All coding assignments will be submitted through Canvas.

Grading scale:

- A: ≥ 90
- B: 80-89.9
- C: 70-79.9
- D: 60-69.9
- F: < 60

Other policies:

1. Waiting: Students must wait 10 minutes before leaving the classroom if I am late.
2. Attendance: I will not take attendance. However, if you miss a class you are responsible to make sure that you are aware of what was discussed in class.
3. Disability: Students with disabilities needing accommodations should contact the Office of Student Disability Services in Suite 239, Academic Success Center building 864-656-6848, to discuss specific needs within the first month of classes.
4. Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. The policy is located at <http://www.clemson.edu/campus-life/campus-services/access/non-discrimination-policy.html>. Alesia Smith serves as Clemson's Title IX Coordinator and may be reached at alesias@clemson.edu or (864) 656-3181.
5. Integrity: "As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately to charges of violations of academic integrity." (<http://gradspace.editme.com/AcademicGrievancePolicyandProcedures#integritypolicy>)

This syllabus is subject to change at any time at the discretion of the instructor.