IE3800 Deterministic Operations Research Tuesdays/Thursdays 11:00am - 12:15pm, Fully Online

---

Instructor: Dr. Yongjia Song, **Email: yongjis@clemson.edu**

- Office Hours: Mondays and Wednesdays 11:00am - 11:59am, and by appointment (all on Zoom, links will also be provided on Canvas from tab "Zoom").

Teaching assistant: Mr. Morteza Soltani, Email: mortezs@g.clemson.edu

- Office Hours: Mondays and Wednesdays 10:00am - 10:59am, and by appointment (all on Zoom, links will also be provided on Canvas from tab "Zoom").

Course Modality: Fully online: synchronous Zoom conferences

- Lecture slides will be provided before each session, lecture recordings will be provided after each session.

- Links to Zoom lectures and office hours will be provided on Canvas from tab "Zoom". Login information will be provided via course announcements.

Online learning resources:

1. For general guideline, refer to: `https://ccit.clemson.edu/working-remotely`

2. Zoom virtual lecture instructions:

   - To ensure the smoothness of the Zoom conference, **please make sure that your video is turned off and you are muted.**
   - Please use the **chat window for questions** at any time.
   - If you have a question that you would like to ask in words rather than putting into the chat window, do not interrupt the lecture by speaking directly. **Use the "raise hand"** option on Zoom before asking a question. I will unmute you and then you may ask the question in words.
   - I will stay on Zoom for 15 mins after each lecture (and will stop recording), in case you have any immediate questions.
   - The online lecture recordings and the chat history will be shared with everyone on Canvas after each online lecture.
   - In case of any technical difficulty that would prevent the Zoom lecture to continue smoothly, I will cancel the online Zoom lecture immediately and provide pre-recorded lecture materials on Canvas instead.

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

- Model Building in Mathematical Programming 5th edition, by Paul Williams (available online from Clemson library).

- AIMMS Optimization Guide.
  `download.aimms.com/aimms/download/manuals/AIMMS3_OM.pdf`

- Applications of Optimization using Xpress:
  `www3.ntu.edu.sg/home/bernhard/lp/lp_book.pdf`

- 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: Excel and/or Python

- Excel has a default "solver" with limited functionality. We will use an add-on package called "Open Solver", which can be downloaded from `https://opensolver.org/`. Instructions on how to download and install it on your computer are provided on Canvas.

- Python (highly recommended with extra credits): a modern, versatile, and powerful programming language. We will use an interactive coding environment made possible by **Anaconda**, and a powerful optimization solver called **Gurobi**. Instructions on how to install Anaconda and Gurobi are provided on Canvas. We will be using Python version 3.7 and Gurobi version 9.0.

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 (Excel, or Python+Gurobi), 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. 1st, online)

- 2nd mid-term exam: 25% (Nov. 12th, online)

- Final exam: 25% (scheduled at 3pm on Dec. 9th, online)

No makeup exams will be given unless a university-approved excuse is provided. **When possible, excuses should be provided at least 10 days prior to the exam.**

Homework assignments:

- All assignments are due when class begins on the assigned due date.

- You have **FIVE FREE late 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 Zoom room 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, veterans 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 Clemsons 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.