

Department of Mathematics
SA 405 - Advanced Mathematical Programming
Policy Document - Fall 2021

Class time & location

MWF Period 4 (Sections 4001) 5 (Sections 5001), Period 6 (Sections 6001)

Location: CH 104

Instructor - Dr. Chris Lourenco

email: lourenco@usna.edu

Office phone: 410-293-6720

Office: CH 354

EI: Feel free to drop by if I am in my office. It's helpful to send an email to let me know you are coming so I will make sure to be available. Generally, I will be in my office in these times:

- Mondays: 1000-1040, 1530-1700
- Tuesdays: 1300-1700
- Wednesdays: 1000-1040, 1530-1700
- Thursdays: 1300-1700
- Fridays: 1530-1700

If you can't make it during the day, we can also do an evening EI session if needed. Please email or ask after class for an appointment. Evening EI will almost always be done via GoogleMeets.

Course Description

This course covers a range of advanced topics in mathematical programming. Topics include integer programming modeling, network problems, branch-and-bound methods, integer programming theory and several algorithms.

Prerequisites

SA 305

Textbook

Deterministic Operations Research by David Rader (ISBN 978-0470484517)

Recommended references

- Pyomo - Optimization Modeling in Python (2nd ed.), by Hart, et al.

Course website

The course website will be provided through blackboard. This site will contain announcements and important information regarding the course. In addition, the course website will be used to distribute class materials such as homework assignments, posted course notes, and grades. Finally, this website will be used by students to post quizzes, exams, python assignments and other graded assignments.

Topics to be covered

The major topics of this course include linear programming modeling, graphical solution techniques, convexity, the simplex method, duality, sensitivity analysis, and solving large LPs using Python Pyomo.

1. Network flows: formulations and applications
2. Integer programming: formulations and applications
3. Integer programming theory
4. Integer programming solution techniques
5. Linear & Integer programming software: Python Pyomo

Tentative course schedule

There are about 45 total class sessions this semester. Please refer to the syllabus for a tentative schedule of the course broken down weekly.

Important Dates

- Exam 1: Either Wednesday Sept 29 or Friday October 1
- Exam 2: Either Wednesday Nov 3 or Friday Nov 5
- Common Final Exam: TBA

Quizzes

Throughout the course, there will be 8-10 quizzes assigned. These quizzes are designed to reinforce topics from the previous week. Altogether, quizzes are worth 15% of your final grade.

Homework/Labs

Throughout the course, several homeworks and Python labs will be assigned to provide extra practice. I will periodically collect homework and grade it.

Everyone in the class begins with a 100 as their homework grade. If you do not turn in a homework assignment, then that grade will be deducted 10 points (so if you fail to turn in 2 assignments, your homework grade will be reduced by 20 points).

Altogether, homework and labs will be worth 5% of your final grade.

Projects

Throughout the course, there will be three python miniprojects. These projects will be focused on modeling real world problems using integer programming and implementing these models in Python Pyomo. Each project will be worth 5% of your final grade. Thus, altogether, Python Pyomo miniprojects are worth 15% of your grade.

Grading Policy

Grades this semester will be posted at the 6 week mark (October 5), 12 week mark (November 9) and at the final. Please refer to the table below for information on how your grade at each point in the semester will be computed.

	HW/Labs	Quizzes	Projects	Exam 1	Exam 2	Final Exam
6 Week Grade	5 %	20%	15%	60%	0%	0%
12 Week Grade	5 %	20%	15%	30%	30%	0%
Grade before Final	5 %	20%	15%	30%	30%	0%
Final Grade	5 %	15%	15%	20%	20%	25%

To summarize, your final course grade is computed as follows:

1. Projects (15%)
2. Quizzes (15%)
3. Homework/Labs (5%)
4. Exam 1 & 2 (20% each)
5. Final Exam (25%)

Grades at each milestone will be based on the following scale: **A**: [93.5-100], **A-**: [90-93.5), **B+**: [86.5-90), **B**: [83.5-86.5), **B-**: [80-83.5), **C+**: [76.5-80), **C**: [73.5-76.5), **C-**: [70-73.5), **D+**: [66.5-70), **D**: [60-66.5), **F**: [0-60)

Make-up Policy

Any assignment that is missed by a legitimate reason must be made up within 1 week.

Late Work

Any assignment that is turned in late will have a penalty of 10% per day late applied.

Re-grading policy

Students have **one week** after grades are posted to submit a **written regrade request**. This regrade request should be 1 page or less and must clearly indicate the reason(s) why the student wants the work to be regraded. Note that if you request a regrade, the **entire assignment** will be regraded; thus it may result in further deductions if new errors are discovered.

Statement of Diversity

The United States Naval Academy 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 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. If you experience any such discrimination, please feel free to reach out to me, your advisor, or the midshipmen resource center. I seek to take such discrimination as serious as possible.

MGSP

The USNA MGSP program gives you extra help in the class via a weekly peer study/help session with a Midshipmen who has taken the class before. This semester, the MGSP leader for SA405 is MIDN Andi Alonso-Cintron. More information about her sessions will be posted/emailed weekly.

Academic Integrity

According to the Honor Concept, Midshipmen do not lie, cheat, or steal. Further guidance regarding academic honesty is available in Policies Concerning Graded Academic Work (USNAINST 1531.53B) and Brigade Honor Program (USNAINST 1610.3J). Violation of the Honor Concept will lead to a zero on the assignment and reporting to the appropriate authorities.

- Collaboration of any kind is not allowed on quizzes or exams. A grade of 0 will be assigned on any quiz or exam for which there is evidence of cheating.
- Collaboration in projects/homeworks:
 - You may discuss the project with classmates, figuring things out together and helping each other to debug code.
 - You may look up Pyomo and Python syntax online.
 - You must write all of your own code. You may not cut-and-paste code from any resource, either online or from a classmate. The only exception to this rule is if I give you a “starter” file.
 - You must cite all resources. For example, it is sufficient to write: Joe from class suggested these variables or my roommate helped me understand this constraint or Dr. Lourenco helped me with the syntax or I Googled this and found another way to .
 - I will assign a grade of zero on any project for which there is evidence that it has been copied in part or entirely from another classmate or any other source.

Professionalism

I expect a high level of professionalism in class. Sleeping, arriving late, using inappropriate technology or engaging in other disruptive activities are unacceptable classroom behavior. Do not use profane or suggestive language in the classroom. Do not belittle “dumb” questions.

I am a civilian professor. It is appropriate to refer to me as Dr. Lourenco or Professor Lourenco. It is not appropriate to refer to me by my first name. I will usually refer to you by your first name. If you prefer to be addressed in a different manner please let me know.

Strategies for Success

It would be very helpful if you prepare for each class by reviewing ahead of time the material to be covered during the lecture. Furthermore, it is important to complete all homework assignments and projects with focused intent to learn. Active engagement in classwork and projects will contribute greatly to your understanding and retention of the material.

Seek assistance promptly when needed, either from me or with other Midshipmen who are in (or have taken) the course. Please contact me if you are experiencing difficulties that may affect your academic performance.