

VIRGINIA COMMONWEALTH UNIVERSITY
Department of Statistical Sciences and Operations Research
OPER 731 (Section 001) – Discrete Optimization (3 credit hrs)
Spring 2024

Instructor: Dr Larson
Office: 4106 Harris Hall
Email Address: clarson@vcu.edu
Web page: mathlum.github.io, and Canvas for grades.
Classroom and Meeting: 4155 Harris, 9:30-10:45 MW
Office Hours: 11:00-12:00 MWF

Prerequisite(s): OPER 527.

Text and Other Materials: *A Gentle Introduction to Optimization*, by B. Guenin, J. Könemann, L. Tunçel, ISBN: 9781107053441.

VCU Bulletin Description: Provides the theoretical background necessary to design and evaluate advanced solution techniques for discrete optimization problems. Topics include theory of polyhedra and valid inequalities for integer programming models, matchings, computational complexity, and sufficient conditions for integer programs to be polynomially solvable. Scheduling, packing, covering and routing models will also be examined.

Learning Goals: Our principle aim is to model a variety of practical and combinatorial questions with linear optimization models, learn how to solve them, to prove conditions for when there is a unique solution or no solution, to investigate the geometry of the feasible solution space of their component inequalities, and use this geometry to help us understand the solution space.

Topics and Goal: Provides the theoretical background necessary to design and evaluate advanced solution techniques for discrete optimization problems. Topics include theory of polyhedra and valid inequalities for integer programming models, matchings, computational complexity, and sufficient conditions for integer programs to be polynomially solvable.

Attendance: There is no attendance policy per se, but there will be homework and in-class assignments that are due.

Course Schedule: This course is based on a set of daily instructor-produced worksheets. We will do one of these in class every class day. It is generally impossible to finish these completely without in-class help and discussion. Tests are based on the text as well as these daily classroom worksheets. We will do Chapters 1 through 7. The pace will not be predetermined (but will depend on how things go in class from day to day).

Expectations:

- You are expected to attend class, complete homework, and ask questions during class or office hours.
- When presenting your work, I expect you to show all significant steps that are used to complete each problem. In cases where work is missing, you will not be given full credit.

- I encourage you to work with others on homework problems, however, any assignments to be turned in must be written up on your own. If you work with others, you must write who you worked with on your assignment.
- Please write neatly on all assignments to be graded; exceptionally messy work may not be graded.
- Only selected homework problems will be graded; other problems will be graded for completion.
- **There are no make-ups on in-class assignments.** I will drop your three lowest in-class assignments, assuming that you couldn't come to class for excusable reasons.
- Make up tests will be considered under exceptional circumstances: if you miss a test and want to be considered for a make-up, you *must* contact me immediately.

Tests and Determination of Grades:

There will be two equally weighted tests. Here is the *tentative* schedule:

Test #1, Wed., Mar. 1

Test #2, Mon., May 6, 8:00-10:50.

- The tests are closed-book and closed-notes.
- The tests will be *closely based on* the in-class assignments and assigned homework.
- Use of calculators or other computing technology is not allowed on the tests.
- Tests are written under the assumption that you are studying the material at least 6 hours per week outside of class.

Your final average will be computed as follows:

Tests:	40% (20% each)
Homework:	30%
In-class assignments:	30%

Grade Scale: The 10-point scale: 90-100 A, 80-89 B, etc.

Important Dates to Know:

- Last day to withdraw is Fri., Mar. 29
- Spring Break (no classes), Mar. 3-10.
- Classes end on Tues., April 30
- Reading Day, Wed., May 1

VCU Syllabus Information:

Students should visit go.vcu.edu/syllabus and review all syllabus statement information. The full university syllabus statement includes information on safety, registration, the VCU Honor Code, student conduct, withdrawal and more.

VCU Libraries:

Use [VCU Libraries](#) to find and access library resources, spaces, technology and services that support and enhance all learning opportunities at the university.