BOB JONES UNIVERSITY
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College of Arts and Science
Division of Mathematical Sciences

Ma 391 ~ Topics in Optimization

Spring Semester 2022 – 2023

Instructor:	Dr. Melissa Gardenghi
Office:	Alumni 38
Office Hours:	Daily by appointment, see https://calendly.com/mgardeng/20min
Preferred Method of Communication:	MS Teams; personal correspondence by personal chat and general course/content related questions in the course general channel
Email:	mgardeng@bju.edu
Textbooks:	Introduction to Operations Research , 10th Edition, by Frederick Hillier and Gerald Lieberman
Course Website:	http://math.bju.edu/ma391/

Catalog Description:

A study of deterministic methods employed in operations research. Topics include specific cases of linear programming problems, as well as integer and nonlinear programming.

Context: This course supports the following goals of the mathematics program:

- MM1: The student will be able to progress logically from premises to valid conclusions in a variety of mathematical contexts.
- MM2: The student will be able to apply mathematics to model real-life situations.
- MM3: The student will be able to select and use technology for understanding, as well as a labor-saving or problem-solving tool.
- MM4: The students will construct a biblically consistent philosophy of mathematics.

Course Goal (CG):

- CG1: Introduce the student to a breadth of topics in optimization and develop the student's ability to know when to use the tools of optimization. MM2, MM4
- CG2: Develop the student's ability to exploit the characteristics of the given problem to formulate an appropriate mathematical programming problem that can be efficiently solved. MM1, MM2, MM3
- CG3: Encourage the appropriate use of technological and algorithmic tools to efficiently solve optimization problems. MM2, MM3
- CG4: Develop the student's ability to understand and communicate technical information related to operations research. MM2, MM3

Course Objectives: The student will be able to

1. Reconstruct various theoretical results pertaining to network and integer programming. CG1, CG2, CG3 (Assessed on Ch 8, 9, 11 tests)
2. Formulate and solve specific and general network problems, problems with integer constraints, and simple nonlinear problems. CG1, CG2, CG3 (Assessed on Ch 8, 9, 11, 12 tests)
3. Select appropriate methods for approximating and solving various types of problems. CG1, CG2, CG3 (Assessed on Ch 8, 9, 11, 12 tests, Case Studies, and summary paper)
4. Employ computer software to solve and present solutions to various mathematical programs. CG3 (Assessed on Case Studies and homework)
5. Summarize technical work in a manner understandable and compelling to both technical and non-technical audiences. CG1, CG4 (Assessed on Case Studies)

Course Requirements and Evaluation: The course grade will consist of

1. Three unit tests – tentative schedule: Chs 9-10 (150 pts) 2/6, Ch 12 (100 pts) 2/27, Ch 13 (100 pts) 3/17
2. Weekly homework rubrics – 7 points each, for 15 weeks. Recommended problems are posted on the course webpage. There will be a weekly progress/homework report submitted (in Canvas – due by end of day on Saturday of each week). Homework problems themselves will NOT be collected.
3. Three case studies (see the course webpage for further details) worth 100 points each.
4. Written assignments (see the course webpage for further details) worth 140 points.
5. A cumulative final exam worth 200 points.

* Point assignments are subject to change.

Grading Scale: Standard 10 point scale

Course Reading and Online Supplements:
Textbook should be read strategically. Students are responsible for all the information in the assigned sections of the textbook even if not discussed in class. Students are also responsible to make appropriate use of the course website supplements available on www.mhhe.com/hillier. This website includes: Worked examples for all examples found in the chapters, OR tutorial that contains demonstration examples that supplement the examples in the book, IOR tutorial which is an interactive tutorial to help the student to execute the algorithms discussed in the book, downloadable versions of the software solution packages (EXCEL Solver, CPLEX, and LINGO).

Office Hour Appointments:

Office hour appointments can be made using the Calendly site, https://calendly.com/mgardeng/20min (appointments may be made up to two weeks in advance). If there are no available times at which you able to meet, send Dr. Gardenghi a message including some days/times between 7:30am and 3pm when you are available.

General Policies:

1. Compliance with student handbook policies is expected during class. The classroom is to be a professional environment. That means you are to come to class prepared for the day's discussion, your attention is expected to be on course related material, and you are expected to positively contribute to the class.
2. Failure to complete an algorithms assignment will constitute a failure to be prepared for class, and you will be asked to leave (this will count as a personal absence). Productive professional meetings require that participants prepare as necessary prior to the start of the meeting. This requirement will help you build important professional skills.
3. Late Policy:
    - Weekly HW/progress reports are penalized at 25% per calendar day late (automatically in Canvas).
    - Written assignments/problems/case studies are penalized at 25% off if turned in with 3 calendar days of the due date and are a 0 after that for the first late. Additional late papers may incur a larger penalty.
    - In-class tests must be taken by the date given in class unless there is incapacitating illness (see attendance policy below).
    - Work may always be completed early (contact your professor if you wish to take a test early).

Exceptions may be granted by your professor in emergencies. Contact your professor asap by Teams to notify them of the emergency.

4. University attendance policy is in effect (see https://home.bju.edu/bju-policies/ for details).

   Scheduled tests/quizzes should be taken before your *planned absence*; please contact your professor to make arrangements for doing so. You are personally responsible to get notes from your classmates and discuss the missed material with them. You should not expect your professor to privately re-teach you the material you missed. Your professor is always available to help you with specific questions. If an unannounced quiz/assessment is taken during the class that you miss, you will NOT be allowed to make it up, and you WILL receive a zero on the assignment. Work may always be completed early (see your professor if you wish to take a test early).

   Missing a test because you feel you are not prepared to take it is **not** acceptable. Work missed for this reason will not made up and you will receive a zero on the assignment.

   For *absences due to incapacitating illness or emergency*, you should contact the instructor as soon as you realize you will not be in class to make arrangements for making up any missed work. Tests will be made up without penalty for the first occurrence. Each subsequent time a test is missed because of incapacitating illness or emergency, an additional 10 percent grade penalty for that test will be incurred. A 10% penalty will be assessed for a late submission of take-home tests.

5. University academic integrity policy is in effect (see https://home.bju.edu/bju-policies/ for details).

   Cheating is defined as any use of unauthorized helps, and plagiarism is defined as taking someone else's words and/or ideas and claiming them as your own.

   Doing your own work brings glory to God. The claiming of someone else's work as your own is cheating and is a sin. All work done for this class needs to be your own. If information is taken from other sources (which is at times appropriate), it always needs to be referenced and credit given where it is due. Use standard referencing techniques as taught in En 102. Solutions found on the internet are not to be copied.

   At no time may you copy solutions from the internet or a solutions manual. The work you present should represent your own effort and your own understanding of the work.

   Projects: You are encouraged to discuss the general ideas of optimization as discussed in this course with your classmates but are **not** permitted to "work together" on your project. Your projects must represent your own ideas and your own work.

   In-Class Tests: In today's age of technology, cheating includes getting unapproved help from a source on the internet and/or using your calculator to provide you with additional information during a test. The presence of any unauthorized material on your desk while taking a test, will be construed as cheating and will be dealt with as such. Cheating on a test will likely result in a zero on the test and will be submitted to the Academic Integrity Committee.

   Take-Home Tests: Take-home tests are also expected to represent your own work. All guidelines for in-class tests also apply to take-home tests unless explicitly stated otherwise in the directions. No collaboration, discussion, consultation, etc. with any person is permitted. Cheating on a test will likely result in a zero on the test and will be submitted to the Academic Integrity Committee.

   If you have a question about any source you are considering using, please gain your professor's approval before using it. You are always permitted to ask your professor for help. Any help they choose to provide is acceptable.