AMS 341 Operations Research I: Deterministic Models, Fall 2020

Distance Learning

Instructor: Estie Arkin, Math Tower P134B, 632-8363, esther.arkin@stonybrook.edu;

Office hours:

Teaching Assistants: Caleb Kofahl caleb.kofahl@stonybrook.edu office hours Thursday 9-11am, Natalie Cotroneo Natalie.Cotroneo@stonybrook.edu office hours Monday 5-7pm in person, Harriman 132. Xinyi (Amber) Lin xinyi.lin.1@stonybrook.edu office hours Wednesday 9-11am, Alan Huang alan.huang.1@stonybrook.edu office hours Tuesday 3-5pm. Caleb, Amber and Alan’s office hours will be online; look for instructions on Blackboard.

Lectures: Tuesday, Thursday 11:30-12:50, Pre-recorded modules will be available before class, please watch. The designated class time alternate between going over more examples, homework solutions and answer students questions, (so please try to “attend” live, if possible) and office hours to answer individual students questions or concerns.


Optional texts: There are many books on the subject, here is a very partial list: Applied Mathematical Programming, by Bradley, Hax, and Magnanti, Introduction to Operations Research, by Hillier and Lieberman, Linear Programming, by Chvátal, and Linear Programming and Related Problems, by Nering and Tucker.

Computing: LP’s can be solved by a many programs, you can choose to use whichever you’d like. The two options discussed in the textbook are Excel and Lindo.

Homeworks: Homework will be assigned weekly (approximately), posted on blackboard, to be turned in via blackboard, as a single PDF file, before the due date and time. Homework that does not meet these expectations will not be graded and will not receive credit. If you want to correct your submission (before the deadline) you may upload a revision. Only your last submission will be graded. There will be approximately 10 homework sets, equally weighted, and I will drop the lowest two scores before computing your average. Homework cover sheet: Each homework must have a cover sheet (available on blackboard) which should be filled out and included with the homework. Homeworks turned in without a cover sheet will not be graded. No late homework will be accepted. (Reminder - the 2 lowest scores will be dropped.) Homeworks will be posted on blackboard. You may discuss homework problems with other students taking the course, with the TA, and with the instructor. But the work that you turn in should always be your own write-up, and you should show that you personally understand everything that you write. Please make certain that your writing is neat and clear, and that you have expressed your reasoning, not just the final answer.

Exams: There will be two exams. Exam 1 will be during class, tentatively scheduled for Thursday October 15. The second exam (final) is Wednesday December 16, 11:15-12:45, and is non cumulative. All exams are closed notes and book. Exam times are by NY (Stony Brook) time, and will be online, details will be posted on blackboard.

Grades: Your total average score will be computed based on 20% homework, 40% for each of the two exams. Please note that there will be no extra credit option. I will use your total average score to assign a letter grade; about 30% A’s, 35% B’s, 25% C’s, and 10% D’s and F’s.

Course Outline: The following chapters will be covered: 1-2, 3, 4 Sections 1-9, 11-13, 5 Sections 1-3, 6 Sections 4-8, Transportation and Assignment problems (Chapter 7 Sections 1-3, 5), CPM (Section 8-4), Integer programming (Chapter 9 Sections 1-4, 8) and Dynamic Programming (Chapter 13[WV] 18[W], Sections 1-2, 4-5).

Learning Outcomes
1.) Become familiar with the many optimization problems arising in diverse settings that can modeled as linear programs, and construct mathematical models for an array of such optimization problems.

• Maximizing income subject to supply constraints;
Minimizing costs subject to minimum requirements;
Scheduling problems;
short-term and long-term financial planning problems;
blending problems;
multi-period planning problems.

2.) Learn the simplex algorithm and use it to solve linear programs
putting linear programs in standard form with slack and excess variables;
finding an initial basic feasible solution (using big M or two-phase simplex for min problems);
choosing which variable enters and which variable leaves the basis;
handling unbounded and infeasible problems.

3.) Apply sensitivity analysis to optimal solutions
shadow prices and reduced costs;
range for objective function coefficients and right-hand sides;
connections to the dual linear programs and complementary slackness.

4.) Learn and use specialized algorithms for solving network problems:
transportation problems;
assignment problems;
critical path problems.

5.) Demonstrate an understanding of integer programs and how to solve them.
model various discrete optimization problems as integer programs;
solve integer programs using a branch-and-bound strategy.

6.) Demonstrate an understanding of dynamic programming and solution techniques.
model a class of discrete optimization problems as dynamic programs;
solve simple dynamic programs using a sequential solution technique.

Academic Integrity: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

Disability Policy: If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information, go to the following web site. http://www.ehs.sunysb.edu/fire/disabilities.asp

The University at Stony Brook expects students to maintain standards of personal integrity that are in harmony with the educational goals of the institution; to observe national, state, and local laws and University regulations; and to respect the rights, privileges, and property of other people. Faculty is required to report disruptive behavior that interrupts faculty’s ability to teach, the safety of the learning environment, and/or students’ ability to learn to Judicial Affairs.

Technical Needs (Hardware and Software): The following list details a minimum recommended computer set-up and the software packages you will need to access and use:
- **Hardware:**
  - PC (Windows 7, 8, or 10) or Macintosh (OS X/macOS 10.10 or higher).
  - 4 GB RAM.
  - A high-speed internet connection. Note that public WiFi (e.g., Starbucks) and internet service provider hotspots (e.g., optimumwifi or xfinitywifi) are not recommended.
  - Printer and scanner. A cell phone or tablet camera can do the scanning, with apps such as Office Lens or CamScanner (there are many others).
  - Speakers (either internal or external) or headphones. **Headphones are strongly recommended** to reduce the risk of feedback during communications.
  - Microphone (either internal or external).
  - WebCam or other camera (interfacing with your computer) for producing video.

- **Software** (additional tools may be needed). **Remember to use your Stony Brook email or NetID** when configuring specialized software:
  - An up-to-date Internet browser, such as Chrome, Firefox, Explorer/Edge (Windows), or Safari (macOS). A complete list of supported browsers and operating systems can be found on the My Institution page when you log in to Blackboard.
  - PDF viewer, such as Adobe Reader.
  - Zoom. Stony Brook has a site license for Zoom; you can find information on downloading, installing, and using Zoom at [https://it.stonybrook.edu/services/zoom/students](https://it.stonybrook.edu/services/zoom/students).
  - Respondus LockDown browser and Monitor, for taking quizzes and exams. Stony Brook has a site license for these packages; see [https://download.respondus.com/lockdown/download.php?id=772113517](https://download.respondus.com/lockdown/download.php?id=772113517).

**Technical Assistance:** If you need technical assistance at any time during the course or to report a problem with Blackboard you can:

- Visit the Stony Brook University Student Help Desk Page, [http://www.stonybrook.edu/helpme](http://www.stonybrook.edu/helpme)
- **Phone:**
  - (631) 632-2358 (technical support and Blackboard issues)
  - (631) 632-9800 (client support, wifi, software and hardware)
- Create a ticket at [http://service.stonybrook.edu](http://service.stonybrook.edu).

Students who need assistance with their personal devices can contact DoIT’s service desk at (631) 632-9800 or submit an online request. For more information, visit: [https://it.stonybrook.edu/students](https://it.stonybrook.edu/students)