Information.
Instructor: Dr. S. Muir  
Office: Loyola Science Center (LSC) 271  
Office Hours: MW: 2:00 – 3:30 p.m.; T: 2:00 – 3:00 p.m.  
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Web Address: www.scranton.edu/faculty/muir2/  
Class Meetings: MWF 1:00 – 1:50 p.m., LSC 329  

Important Dates.  
January 30: First day of class  
February 3: Last day to add a class  
March 1: Last day to drop a class with no grade  
March 13 – 17: Spring break  
March 20: Midsemester grades submitted  
April 12: Last day to withdraw with a “W” grade  
May 12: Last day of class  
May 17: Final Exam (tentative), 12:45 – 2:45 p.m.  

Course Description: In this course, we will see geometric, algebraic, and some graph theoretic ways of looking at optimization problems. Additionally, we will motivate this work by formulating and analyzing some real-world applications. Further, we will address questions of whether there even exists an optimal solution and if so, what algorithms are applicable for finding it. 

Students are expected to have a solid background in matrix algebra for this course. This material is covered in Math 351, Linear Algebra. However, it is possible students have seen enough matrix algebra through other avenues as Linear Algebra covers more topics than we will use. If you have not had Linear Algebra, you should come by during the first week of classes to discuss the needed background.  

Textbook: The required textbook is A Gentle Introduction to Optimization by Guenin, Könenman, and Tunçel.  

Student Learning Outcomes: By the end of this course, students should, among other things, be able to 

• Formulate linear optimization problems in standard equality and inequality form, as well as primal and dual form.  
• Solve linear optimization problems using the simplex algorithm.  
• Model practical applications as linear optimization problems.  

Selected questions on exam(s), which will consist of previously unseen problems, will be used to assess some of these outcomes. Because of this, I will retain all exams; however, you may view
your exam(s) at later times by appointment or in office hours. You may find it necessary to seek additional help to meet these expectations and objectives.

**A few (or more!) words:** In this course, most of our time will be spent on understanding the mathematical structure of the topics given in the learning outcomes. You may see more theorems and proofs than you’ve probably encountered in your previous math classes, but keep in mind a proof is just a written explanation of why something is true supported by definitions, theorems, and calculations. So one can still expect to see math symbols and calculations, but they will be accompanied by reasons/explanations! Even when performing direct calculations, it is important to understand the process and to present your work in a clear manner. Therefore, you should expect to spend a reasonable amount of time outside of the scheduled class time reading the text, mastering terminology and notation, solving problems, and constructing logical arguments. The key is to be patient and diligent as you engage in the material/exercises/problems in advanced courses. There are many resources to help you along the way!

**Stuff You Definitely Should Read:** Your grade in this course is to be a reflection of what you have mastered in Linear Optimization. It is **not** to be a measure of how efficient you are at finding solutions on the interwebs and whatnot. Even so, math is a social endeavor. That is, it is natural that we discuss ideas and do not work in isolation. We learn more and develop a deeper understanding when we have to explain ourselves and when we question each other than when we just look up an answer. Therefore, acceptable resources and collaborators are:

- your or a current classmate’s personal course notes,
- documents distributed by me _during this semester_,
- the required textbook,
- other members of _this_ class and
- me!

You are not to use other sources of potential solutions. This includes, but is not limited to, other texts, the internet, software/programs with “checking” and computational capabilities (e.g. Maple, Wolfram Alpha, Lurch, etc.) unless specified for use in instructions, other notes or documents _not_ given out by me this semester, other faculty, students, tutors, etc. If you are ever in doubt about what you can and cannot use, ask and ask _before_ you use it!

Violating any policy of the course or the University’s Academic Code of Honesty is considered cheating. Specifically, any use of materials outside of those discussed here and _not cleared with me before use_, either directly or transitively through another classmate, will be considered a violation of the course grading policy and hence the Academic Code of Honesty. Moreover, each person is expected to take reasonable precautions to prevent his/her work from being copied or used to violate a course policy. Cheating may result in a _failing grade_ in the course and the student being reported to appropriate administrators. _Whenever you turn in any work to be graded, you are implicitly stating that you abided by the conditions stated in this syllabus, in class, on the assignment, and in the Academic Code of Honesty._ For more information, see the Academic Code of Honesty at [www.scranton.edu/academicintegrity](http://www.scranton.edu/academicintegrity).
Remember the grade you earn should be your grade! Equally important, remember that we’re in this together! I have more than the required three office hours a week that you can drop in without notice to talk about any aspect of the course. If you are unavailable during my scheduled office hours, do not hesitate to contact me as I am available more often than just the times listed. In fact, you should feel quite welcome just to stop by the office and if my door is open, I can almost always make some time to chat!

**Grading:** There will be three exams each worth 18% and a comprehensive final worth 25%. Graded homework will account for 21% of the course grade. Exam dates will be announced in class, and calculators may not be allowed for exams.

What percentage is necessary for a particular letter grade will be determined as the course progresses, and after each exam, I will give grade ranges. I assure you assigning fair and accurate grades is of utmost importance to me, and the grade you earn should reflect your level of knowledge and grasp of the material. It is not determined by how well or how poor you perceive your fellow classmates are performing. Please do not hesitate to see me if you have questions about your grade at any time throughout the semester.

**Homework:** The homework problems will be broken into two types: suggested and graded. The suggested problems typically come from the text, are more computational in nature, and often have the answer in the back of the book. The graded homework will tend to be more conceptual in nature. It is important and assumed that you work both sets of problems as both types may appear on exams and each type can inform the other. The graded homework will be collected regularly and is worth 21% of the course grade. It is due at the start of class on the assigned due date or at a time specified in class. Late homework may not be accepted but early always is!

I reserve the right to change the homework policy and structure as needed, including, but not limited to, adjusting the frequency of assignments and instituting homework quizzes and/or individual homework discussions/assessments.

Keep in mind that you may not immediately know the “answer” to or how to prove every assigned problem. To let you in a not so little secret about math, we often don’t discover the path through a solution or a proof linearly even though we write it up as if we did! It is important to start the homework early to give yourself time to ask questions as you are moving through this learning process. Also, it is a good idea to spend time alone on each problem before you consult with any permissible collaborators named above (you know – in the “Stuff you should definitely read” section!) and of course, before the day it’s due! Note plagiarism is more than simply copying. It is passing off the work of others as if it is your own. Therefore, you should not turn in work that you did not contribute to substantially. A good measure for this is whether you could explain the solution in your own words or explain if called on in class, and so I strongly recommend writing your solutions independently to assure you are the one grasping the material. You must always indicate with whom you worked on each homework problem.

Working diligently and frequently is a key to success in this course. Because the process of applying reasoning to solve problems and communicating arguments is fundamental to this course, unsupported answers and arguments may receive no credit. To facilitate this process, the following requirements are made of the written homework. (An example of the format is at the end of the syllabus.) Failure to follow these may result in point deductions.

- Problems should be clearly labeled and numbered on the left side of the page and written in
the order they are assigned. There should also be a visible separation between problems, and you should leave the left margin and the back of every page blank so that the space may be used for scoring and comments.

- Because there is a difference between “scratch work” and your final solution/argument, cross outs and excessive eraser marks should not be found throughout your work.

- Use complete sentences when communicating an argument/proof, and of course, proofs should be written in paragraphs with calculations/equations and diagrams centered as needed. Look to your text and our work in class for examples of appropriate mathematical writing. The proofs there are not strewn with symbols nor are they in a two-column format!

- You must always indicate with whom you worked on each problem. Simply write the name of your collaborators to the left of the problem number in the margin. This is the exception to leaving the left margin blank!

- Staple all pages together before class and remove “rough” edges.

One last tip that isn’t required: Beginning each solution/proof with the original problem statement makes it easier to study from your work later and allows me to address different aspects of the problems in my comments to you when needed.

You may use lined or unlined paper. You most definitely do not need to type up your homework, but if you so wish, I can provide you with a \LaTeX template.

**Electronic Devices:** No calculators, electronic devices, or computational software of any kind may be used on any graded assignment unless stated otherwise in class. Students should not come to rely on calculators too heavily outside of class as all work on graded material must be supported.

While you may consider yourself an expert multi-tasker and while you may not intend it to be, texting and other cell phone usage is disruptive and disrespectful to your fellow classmates (and to me!). Thus, cell phones must be put away during class and should be silenced, set to vibrate, or turned off. If there is a real need to have access to your phone (e.g. family illness/emergency), please inform me before class.

**Attendance/Missed Assignments:** I expect you to be in every class from start to finish. If you miss for any reason, you are still responsible for all announcements made and all material presented. You can find a class schedule on the web page given above, and you can always turn in homework early! Make-up privileges for absences may be extended at the discretion of the professor. It is your responsibility to contact me to request alternative arrangements. If at all possible, contact should be made prior to the absence, and contact is expected to be made within one class period of an absence except under unusual circumstances. Keep in mind things such as sniffles, oversleeping, and leaving early or returning late from breaks do not justify make-up opportunities.

You are free to choose not to attend class, but if you attend class, you are expected to maintain a certain level of decorum that includes, but is not limited to, the cell phone usage expectation above. If need be, additional cell phone and other policies will be implemented throughout the semester.
**Other stuff:** When writing email, please use capitalization, punctuation, and complete sentences, and I assume you regularly check your University email account. All notes and materials that I provide for you throughout the semester may not be distributed or posted anywhere without my permission first. Nor may lectures be recorded without my permission.

In order to receive appropriate accommodations, students with disabilities must register with the Center for Teaching and Learning Excellence (CTLE) and provide relevant and current documentation. Students should contact Mary Ellen Pichiarello (570-941-4039, LSC 580) or Dr. Andrée Catalfamo (570-941-4218, LSC 582E) for an appointment. For more information, please visit [www.scranton.edu/disabilities](http://www.scranton.edu/disabilities)

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**Sample for Homework Format Requirements**

Name (on first page at least)

Homework Assignment (on first page at least)

Due Date (on first page at least)

1. [Write out problem statement including labeled diagrams if you want. If the problem is from the book vs. one I write for you, you may find it worthwhile to write which problem it is, e.g. Section 2.1, #5]

   [Neatly written solution]

   [A clear gap (e.g., multiple blank lines if using lined paper) to indicate the end of one problem and the start of another]

2. [Write out problem statement including labeled diagrams if you want. If the problem is from the book vs. one I write for you, you may find it worthwhile to write which problem it is, e.g. Section 2.1, #5]

   [Neatly written solution]

   [A clear gap (e.g., multiple blank lines if using lined paper) to indicate the end of one problem and the start of another]

3. [Write out problem statement including labeled diagrams if you want. If the problem is from the book vs. one I write for you, you may find it worthwhile to write which problem it is, e.g. Section 2.1, #5]

   [Neatly written solution]

   [A clear gap (e.g., multiple blank lines if using lined paper) to indicate the end of one problem and the start of another]