Math 1101 – 1030 (20092) - An Introduction to Optimization
The University of Pittsburgh - Fall 2025

MWF 9:00-9:50 Room 704 - Thackeray Hall

Instructor Information

Instructor:	Jeffrey Paul Wheeler, Ph.D.
Office:	Room 610 Thackeray Hall.
Office Hours:	MWF 1:00-1:45 or by appointment.
Email:	`jwheeler@pitt.edu`
Website:	We will heavily use Canvas. Please regularly check Canvas for important announcements.
Departmental Phone:	412-624-8375

Textbook

The textbook for this class is available through CRC Press, but I will share pdfs of what we will cover for no charge. Please note that this is a work in progress and any feedback you can provide will be greatly appreciated. Also note that I worked hard to write this book and ask that you not post the pdfs I have kindly shared at no cost.

Suggested Textbooks

- *Mathematical Programming - an Introduction to Optimization* by Melvyn W. Jeter, Marcel/Dekker Publishing (CRC Press), ISBN: 978-0-82-477478-3
- *Spreadsheet Modeling and Decision Analysis*, 6th edition, by Cliff T. Ragsdale, Cenage, ISBN: 978-0-538-74631-1. We will borrow much from this book and it is a standard text in MBA programs.
- *Quantitative Methods for Business*, 13^{th} edition, by Anderson, et.al., Cenage Learning, ISBN: 978-1-305-50460-8. Another good business school text.
- *A First Course in Optimization* by Charles L. Byrne, CRC Press, ISBN: 978-1-482-22656-0. Has a lot in it, but not a lot of explanation.
- *Combinatorial Optimization for Undergraduates*, by L.R. Foulds, Springer, ISBN: 0-387-90977-X. This is an excellent text.
- *The Mathematics of Nonlinear Programming*, by A.L. Peressini, F.E. Sullivan, and J.J. Uhl, Jr., Springer, ISBN: 0-387-96614-5.
- *Graphs, Algorithms, and Optimization*, 2^{nd} edition, Willam L. Kocay and Donald L. Kreher, CRC Press 2017, 978-1-4822-5116-6.
- *Graphs & Digraphs*, 6^{th} edition, Chartrand and others, CRC Press (it is my opinion that this is the best Graph Theory text on the market).
- *An Introduction to Optimization*, 3rd Edition, Edwin Kah Pin Chong and Stanislaw H. Zak. Excellent text, but no Combinatorial Optimization.

Course Content

Course topics will include Linear Programming - in which we will explore the Simplex Method, the notion of Dual Linear Programming (and Duality in general) as well as the Big M Method; Integer Programming via branch and bound and cut planes; Nonlinear Programming via Gradient Descent, Evolutionary Programming, Newton's Method, and the Arithmetic-Geometric Mean; Convex Functions and Convex Optimization; affine and convext sets and the Fundamental Theorem of Linear Programming; and Commbinatorial Optimization including Network Programming and transshipment problems; the Traveling Salesperson Problem, Minimal Spanning Trees, and Shortest Path. Discrete Optimization topics like Assignment Problems, Vehicle Scheduling, etc. will be explored, time permitting. Excel's Solver and other programming will be presented. The semester will end with student teams presenting a case.

We will primarily focus on applications, but this is a mathematics course and some proofs will be done. As well, your writing, especially your presentation, will weigh into your grade (as much as 10% of your homework). There will be at least one case that you will have to present to the class as part of a team. In past courses, I have had industry professionals come and speak. If we decide this is something we wish to do this term, I will expect students to be present and be professional.

Calendar

First Day of Class	Monday 25 August
Labor Day (University CLOSED)	Monday 1 September
Last Day to Drop/Add	Friday 5 September
Student Fall Break (University OPEN)	Friday 10 October
Final Exam Conflict Form Submission Deadline	Friday 24 October
Student Thanksgiving Recess	Sunday-Sunday 23 - 30 November
Faculty and Staff Thanksgiving Recess	Thursday-Friday 27-28 November
Last Day of Class	Friday 5 December
Cumulative Final Exam	Thursday 11 December, 12-1:50pm

Upper-level Math Class Rules

As an upper-level mathematics course, these are the rules:

- Always defend an answer.
- Please realize my standards may be more demanding than the TA's standards.
- You may use any result proven in class or what has been proven in the covered text. An exception, of course, would be if you were asked to prove a known result (e.g. you cannot cite Lagrange's Theorem to prove Lagrange's Theorem).
- If you use a named theorem in your work, you are to state the named theorem (e.g. "By the Cauchy-Schwarz Inequality...").
- Unless approved by me, electronic devices including cell phones, laptops, and tablets will not be permitted in the classroom.

- Attendance and participation are expected. Random attendance will be randomly taken. After two unexcused absences, each additional unexcused absence will lead to a 1 letter deduction from a student's semester grade.

Evaluation

We will have one midterm covering Chapters 6, 8, 9, and 10 - date is TBA (25%), a comprehensive final exam (35%), numerous homeworks (35%), attendance, and a team case presentation (5%).
As well, I follow the standard scale:

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
Percent	$93-100$	$90-92$	$87-89$	$83-86$	$80-82$	$77-79$	$73-76$	$70-72$	$67-69$	$63-66$	$60-62$	<60

Note: I will not assign a grade I cannot justify.

Laptops or Tablets

You may write notes on a tablet, but other use of electronics during class is prohibited; that is, **you may not use a laptop or your phone during class**.

The exception will be on days where we explore Excel together and these days will be announced in advance. Though we will use will use Microsoft Excel's built-in solver on numerous occasions in class, you are welcome to use Mathematica, Maple, Matlab, etc. for your own work.

Homework

Hard copies of homework will be submitted each time we are done with a chapter. The homework is, in many ways, the most important part of this class. Many Math 1101 students are STEM majors, which is wonderful, but one thing most STEM majors can greatly improve is their skill in giving presentations; both written and oral. More importantly, **if want a job and you want to do well in your job, you will need to present well. As such, at least 10% of every homework assignment will include an evaluation of your presentation**; namely

Evaluation	Presentation Score
Does not meet expectations	Less than 9.3% of the possible 10%.
Meets expectation	$\lceil 9.3\% \rceil$
Exceeds expectations	full credit (10%) with possible extra credit

For example, if the HW totals 230 and your writing meets expectations, you will receive a 22/23 for the writing part of your work. This will be added to your score and the HW point value.

Unless a coversheet is provided, on the upper right corner of your homework please write:

$\cdot **$ *Your name* $**$ *Homework* $N -$ "*Topic*" (*e.g. HW* $3 -$ *IntegerLinearProgramming*)
$\cdot$ *Math* $1101 -$ *Wheeler* *Grader* : *Anastasiia Rudenko*

Not following this instruction will result in a deduction of points.

Note that late homework will not be accepted and do not expect me to be sympathetic if your homework grade is low.

Email 101

Please be aware that you are writing me, the instructor of your mathematics course at a major university, and not text-messaging a friend. There should be something in the Subject box (e.g."Homework Question"). The opening of the email should be something of the order of *"Dear* (or *Hello) Dr. Wheeler,"*. As well, please note that *you* is spelled "y-o-u", not "u", and *are* is spelled "a-r-e", not "r". Proper grammar and punctuation are expected. Lastly, please be sure to close your correspondence by stating your name.

Grades 101

Your grade in this class is determined by your performance on the exams and homework. It is not my assessment of your worth as a human being nor does your grade depend upon my opinion of you. Also note that:

- There will be no Extra credit assignments, but there will be chances for extra credit presentations. The presentations must be related to content discussed in the class.
- Also, the time to improve your grade is now. You have 15+ weeks to earn your grade. DO NOT CONTACT ME when the semester is over and ask me if you can do extra work to improve your grade.

Writing:

You are a student at a major university. I expect you to write your work on tests, quizzes, and homework well. Do note that as much as 10% of your score on the homework assignment will be assessing your presentation of your solution.

Academic Misconduct:

No form of this will be tolerated, including submitting AI-authored homework solutions. Please do not put me in a situation where I have to deal with this.

Be smart - do not even give the appearance of cheating.

Student Evaluations

You are encouraged to read former students evaluations at

`http://www.ratemyprofessors.com`

Please be aware that I have evaluations at the University of Pittsburgh, the University of Memphis, and Rhodes College (in Memphis). There is a link to this site on my webpage.

Disability Resources and Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 140 William Pitt Union, 412-648-7890 or 412-383-7355 (TTY) as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Advice for Success in the Class

I will close with the following advice. If you wish to do well in my class, then you will

- Come to class;
- Read the notes;
- Ask questions when you have them;
- There is a good chance I will grade more severely on exams than the grader does on the homeworks;
- Notes on Courseweb are not a substitute for class (neither are office hours);
- An open-book exam does not mean that you do not have to study;
- Realize mathematics is difficult. No matter how smart you are or what success you have had in the past, there will come a mathematics class that you will find to be very difficult. Math 1101 may be that class.

Advice for Future Consultants

Josh Figaretti, a long-time consultant for Ernst & Young and now an executive at Chick-fil-A, offers the following advice about consulting:

A good consultant will:

1. have the ability to quantify abstract terms and articulate return on investment (ROI);
2. know about boundary and exception conditions (consultants cannot live in a happy place - where do things break?);
3. know how to validate solutions;
4. be a creative problem solver (an important part of consulting is to get people to think differently - i.e. consultants give fresh views); and
5. know basic finance.