

MATH 715: Applied Math I

Table of Contents

- [Class Meetings](#)
- [The Instructor](#)
 - [Contacting Me](#)
 - [Office Hours](#)
- [The Course](#)
 - [Course Goals and Learning Outcomes](#)
 - [Course Prerequisites](#)
 - [Programming](#)
 - [Textbook](#)
 - [Recommended Reading](#)
- [Assignments and Grading](#)
 - [Assignment Types](#)
 - [Written Homework](#)
 - [Journal Entries](#)
 - [Programming assignments](#)
 - [Exams](#)
 - [Rubrics](#)
 - [Assignment Policies](#)
 - [Late or Missing Assignment Policy](#)
 - [Make-up Work](#)
 - [Extra Credit Options](#)
- [Other Topics](#)
 - [Technology Requirements](#)
 - [Technical Difficulties](#)
 - [University Expectations of "Classroom" Conduct](#)
 - [Student Access Center and Classroom Accommodations](#)
 - [Academic Honesty](#)
 - [Copyright](#)
 - [Academic Freedom](#)

Class Meetings

MWF 11:30am - 12:20pm in Durland/Rathbone 1063

The Instructor

- **Name:** Pietro Poggi-Corradini
- **Department:** Mathematics
- **Phone:** 785-532-0569
- **Email:** pietro@math.ksu.edu

Contacting Me

- For urgent, sensitive or personal communications, please use email or phone. Note that, if you email with a question more suitable for the Common Room (see below), I will ask you to post your question there before responding to it. Keep in mind that conversations through email and discussion boards are much slower than in-person conversations and will frequently require a few back-and-forth interactions to answer your question. So don't wait until the last minute to ask your questions. Begin each assignment as soon as it is posted and **ask questions early and often**.
- For other communications, please post to the Canvas discussion titled "Common Room". Whether your question is about mathematics (What's the difference between definitions X and Y?), programming (Why did my code do X when I wanted it to do Y?), or procedural (How am I supposed to complete task X for the course?), there is a good chance that another participant will have a similar question or will know the answer.

Office Hours

By appointment.

The Course

Course Goals and Learning Outcomes

The goals of this class are:

- review and practice linear algebra;
- learn the standard techniques for the numerical treatment of common linear algebra problems;
- understand how these problems are solved;
- build some experience in solving them;
- acquire the necessary knowledge to use the methods correctly and effectively in your own research work.

Course Prerequisites

Either MATH 515 (Linear Algebra) or MATH 551 (Applied Matrix Theory) and some programming experience (preferably Matlab).

Programming

A large portion of the course is theoretical, but there will also be some required Matlab programming. That said, this course is not intended to be a course on programming. If you experience difficulties with programming, I strongly encourage you to speak with fellow students and/or to look for relevant tutorials online. I will be happy to offer programming advice during office hours, but I will not be able to devote large amounts of time to debugging incorrect programs.

Textbook

Applied Numerical Linear Algebra, by James W. Demmel

Recommended Reading

- General numerical analysis
 - Analysis of Numerical Methods by Isaacson and Keller
 - Elementary Numerical Analysis by Atkinson and Han (Math 655 text)
 - Numerical Methods by Faires and Burden
- Numerical analysis of linear algebra problems
 - Matrix Computations by Golub and Van Loan

Assignments and Grading

Assignment Types

Final grades will be based on weekly homework assignments and journal entries, programming assignments, a midterm exam and a final exam. Final grades will be weighted (approximately) as follows:

- Homework: 50%
- Journal entries: 10%
- Programming: 10%
- Midterm: 10%
- Final: 20%

Written Homework

Homework will be assigned each week and will be due the following week. All homework will be due on the date announced in class and listed on the course calendar.

Collaboration on homework is acceptable and encouraged. However, copying is not permissible. It is your responsibility to submit your own work and to understand the answers you submit.

The written homework assignments will have to be uploaded in Canvas. You may choose to typeset your homework in LaTeX, so as to upload a PDF file, or you can simply scan your written manuscript. Homework assignments and due dates will be announced well in advance in order to allow you to seek help if necessary. Be sure to start working on these assignments as soon as they are assigned.

Show your work! The homework is intended to help you practice and perfect your problem-solving techniques as applied to this course, not to simply see if you can write down the correct answer. Therefore, you must clearly and carefully explain the steps you took in arriving at your answer. If at some point you use a calculator or computer to perform some computation, this is fine; but be sure to explain your work.

Journal Entries

The journal is where you will track your progress in the course. Here, you will record your weekly activities, thoughts and ideas. I will provide you with a LaTeX template for your journal. You may choose to upload it to CoCalc and edit it there, or install a LaTeX distribution on your own computer for editing.

Each week, you will add an entry to your journal, reflecting on your progress from the week. Your journal will be cumulative, with new entries added to the end of the document as you go. Periodically, you will be asked to upload a PDF version of your journal, updated for the past week, to Canvas.

The best entries I have seen, try to summarize the mathematical concept that were learned on a given week. This document then can serve as a study guide beofre the exams.

Each weekly journal entry will be graded out of 5 points according the the journal rubric. For journal entries, you are not being graded on correctness but on process. So don't be afraid to jot down whatever comes to your mind throughout the week; we're not going to judge your thoughts. Our goal is to help you learn to track your ideas and activities as you work. One of the trickiest parts of research is remembering what you've done and why. A good research journal will help with that. Our advice is to quickly jot down your ideas throughout the week, then spend a little time at the end of the week cleaning up and clarifying your thoughts.

Programming assignments

One of the course objectives is to teach the students to use programming to solve numerical linear algebra problems.

Each assignment will be graded out of 10 points. Here is a list of some general characteristics of a good programming assignment.

- If you were asked to write code...
 - The code is clean and easy to read.
 - Variables and functions are given helpful names.
 - Comments are provided to aid in understanding.
 - There is *not* a lot of commented-out code cluttering the notebook.
 - Good use is made of existing functions and data structures. (You are not reinventing the wheel.)
 - When possible, simple algorithms and data structures are used. (You are not over-complicating the problem.)
- If you were asked to write text...
 - The text is written in complete sentences, with correct spelling and grammar.
 - The text aids in understanding the rest of the code.
 - The text is well-organized and well-formatted.
 - Mathematical formulas are correctly typeset and fit well in the text.

Exams

The Midterm will be in late October and the Final exam is scheduled for Thursday December 13, 11:50am - 1:40pm in the usual classroom.

Rubrics

- Written homework assignments will be graded out of 20 points according to the following rubric.

Criteria	Unacceptable (0 pts)	Acceptable (3 pts)	Good (4 pts)	Excellent (5 pts)
Correctness	Few or no correct answers.	Some of the answers are correct.	Most of the answers are correct.	All answers are correct.
Logic	Logical argument is missing or seriously flawed.	Solution strategy was poorly chosen or poorly executed.	A reasonable strategy was selected, but there	A good strategy was selected and

			are still some logical errors. May be missing key steps or unnecessarily complicating the problem.	carried out with correct logic.
Neatness & Clarity	Work is difficult to read or understand.	Work is partly understandable.	Work is mostly understandable but could still use improvement.	Work is clear and easy to understand.
Organization & Exposition	No overall organizational structure is apparent or no explanation of the work is offered.	Some attempt at organization was made, but the structure is difficult to follow due to poor or missing explanations.	The work is organized reasonably well, but still could be significantly improved. At least some explanation is provided, but spelling or grammatical errors may be present.	The work is well-organized and well-explained. The explanation provides a concise, step-by-step English explanation of the result presented.

- Each weekly journal entry will be graded out of 5 points according the the following rubric.

	Unacceptable (0 pts)	Acceptable (3 pts)	Good (4 pts)	Excellent (5 pts)
Journal Entry	No entry was provided.	The basic structure of the journal entry is filled in, but it is not apparent that the student is thinking deeply about the course content.	More than just a minimal entry is provided, but the ideas are not clearly expressed. It will probably be difficult for the student to make sense of the entry a few months down the road.	The journal entry is well-organized and well-written. The student's progress through the week is clearly demonstrated, and the entry is sufficiently well-written to make sense in the future.

- The programming assignments will be graded out of 10 points. Since these assignments may differ

significantly from one to the next, writing down a simple, comprehensive rubric isn't possible.

Assignment Policies

Late or Missing Assignment Policy

If for any reason you are unable to complete the assignment on time, please contact me by email as soon as possible so that we can make arrangements for the completion of the work.

Make-up Work

Make-up work will be granted only if the issue is communicated to the instructor in a timely manner.

Extra Credit Options

Extra credit options will not be available in this course.

Other Topics

Technology Requirements

Students are encouraged to familiarize themselves with the following tools:

- **Matlab:** The programming assignments in this course must be completed using Matlab. Anyone with a valid KState eID will have access to our Matlab licence via this web-site (<https://www.math.ksu.edu/help/>), by clicking on the light blue rectangle "Matlab Windows Access".
- **CoCalc:** Students can create a free online account on CoCalc (<https://cocalc.com>). CoCalc is a web-based platform that supports Python, Octave (the free version of Matlab), and many other languages, for computing using Jupyter notebooks.
- **LaTeX:** This is not strictly necessary for this course, but is useful for communicating mathematically via email with peers and with the instructors. LaTeX is a document preparation system used to typeset mathematical and scientific documents. CoCalc supports LaTeX file processing, probably the simplest option for students with little or no LaTeX experience. Similar options include ShareLaTeX (<https://www.sharelatex.com/>) and Overleaf (<https://www.overleaf.com/>). Students desiring a local LaTeX installation on their own computers can find installation files and instructions at <https://www.latex-project.org/get/>.

Technical Difficulties

The K-State IT Help Desk is there to assist you with questions regarding the technology used for your course.

- **Phone:** 785-532-7722 or toll free 1-800-865-6143
- **Email:** helpdesk@k-state.edu

If you have issues with your technology, please contact them first, they are the technology experts. If you continue to have problems, please post in the "Common Room" discussion thread so that other students can indicate if they are also having problems. If you miss a deadline due to technological difficulties, make sure it is documented through communication with the IT Help Desk, then exceptions may be made on a case-by-case basis.

University Expectations of "Classroom" Conduct

All student activities in the University, including this course, are governed by the [Student Judicial Conduct Code](#) as outlined in the Student Governing Association [By Laws](#), Article V, Section 3, number 2. Students who engage in behavior that disrupts the learning environment may be asked to leave the class (in an online environment, you may be restricted from accessing the course).

Student Access Center and Classroom Accommodations

Students with disabilities who need classroom accommodations, access to technology, or information about emergency building/campus evacuation processes should contact the Student Access Center and/or their instructor. Services are available to students with a wide range of disabilities including, but not limited to, physical disabilities, medical conditions, learning disabilities, attention deficit disorder, depression, and anxiety. If you are a student enrolled in campus/online courses through the Manhattan or Olathe campuses, contact the [Student Access Center](mailto:accesscenter@k-state.edu) at accesscenter@k-state.edu, 785-532-6441; for Salina campus, contact [Disability Support Services](#) at 785-826-2984.

Academic Honesty

Kansas State University has an Honor and Integrity System based on personal integrity, which is presumed to be sufficient assurance that, in academic matters, one's work is performed honestly and without unauthorized assistance. Undergraduate and graduate students, by registration, acknowledge the jurisdiction of the Honor and Integrity System. The policies and procedures of the Honor and Integrity System apply to all full and part-time students enrolled in undergraduate and graduate courses on-campus, off-campus, and via distance learning. The Honor and Integrity System website can be reached via the following URL: <http://www.k-state.edu/honor>. A component vital to the Honor and Integrity System is the inclusion of the Honor Pledge which applies to all assignments, examinations, or other course work undertaken by students. The Honor Pledge is implied, whether or not it is stated: "On my honor, as a student, I have neither given nor received unauthorized aid on this academic work." A grade of XF can result from a breach of academic honesty. The F indicates failure in the course; the X indicates the reason is an Honor Pledge violation.

Copyright

Copyright is a form of legal protection that allows authors, photographers, composers, and other creators to control some reproduction and distribution of their work. Both student and professors are protected by copyright. Please visit <http://www.k-state.edu/copyright/basics/> for more information.

Academic Freedom

Kansas State University is a community of students, faculty, and staff who work together to discover new knowledge, create new ideas, and share the results of their scholarly inquiry with the wider public. Although new ideas or research results may be controversial or challenge established views, the health and growth of any society requires frank intellectual exchange. Academic freedom protects this type of free exchange and is thus essential to any university's mission.