Math 309: Matrix Algebra

Instructor: Christopher Felder
Summer (4), 2019

E-mail: cfelder@wustl.edu
Office Hour: Tuesday, 1:00-2:00 PM
Office: Cupples I, Room 8
Start Date: 7/15/2019

Course Description

In this course we will explore the theory of matrices and vector spaces from a concrete, computational point of view. Broadly, the topics to be covered will be

- Linear equations
- Matrix algebra
- Determinants
- Vector spaces
- Eigenvalues and eigenvectors
- Orthogonality and inner products
- Symmetric matrices and quadratic forms (time permitting)

These topics correspond to the first seven chapters of the course text (see below).

Prerequisites/Corequisites

Prerequisites: Math 132 (Calc II)

Required Materials

- A healthy dose of Cartesian doubt.
Course Objectives

Students who complete this course successfully will be able to:

1. Have a basic theoretical understanding of the topics listed in the course description
2. Have a firm handle on computational methods and be able to solve problems related to the mentioned topics
3. Understand and appreciate the power of linear algebra

Daily Work/Homework

Each day before class, I suggest you look over the notes from the previous class. It is also important that you work problems every day– even if just one.

There will be two components to homework:

1. Written homework problems from the text, to be handed in during class
2. Webwork problems to be completed via the Canvas portal

Each of these will be assigned and due weekly. I will give assignment announcements both in class and on Canvas. The policy for grading and late work is explained in detail below.

Major Assignments: Descriptions

Written Homework

The written homework problems will be graded for correctness. Please provide sufficient detail in your solutions. The general grading criteria for a given written homework problem is as follows:

- Correct theoretical approach: 50%
- Correct computation: 50%

Partial credit will be given at the discretion of the instructor. Written assignments are to be handed in at the beginning of class on the due date. These assignments will not be accepted via email without prior approval.

Webwork

WeBWorK is a system used to create weekly problem sets. You submit your answers online. After you submit an answer, WeWork tells you immediately whether your answer is correct or not. You can resubmit answers to questions as often as you like, without penalty, up until the closing time for the problem set. This allows you to go return to your work, figure out what you did wrong, and, we hope, understand the question better. Please see the following great resources, created by Dr. Blake Thornton, on using WeWork:

- Introduction to WeBWorK for students
Class Participation

Class participation is expected but will not be assessed. Questions asked in class by the instructor will not, in general, be rhetorical. All interactions in class are expected to be civil, respectful, and supportive of an inclusive learning environment for all students. Please speak to me, the department chair, or an advisor, about any concerns you may have about classroom participation and classroom dynamics.

Course Grading

Grading Approach and Philosophy

Assignments, in general, will not be curved when graded. Please see the Major Assignments: Descriptions section for assignment grading criteria. Exams will be graded as follows:

- Correct theoretical approach: 50%
- Correct computation: 50%

Again, partial credit will be given at the discretion of the instructor. Exam grades and final course grades will be curved at the discretion of the instructor.

Explanation of Grading System

- Final Exam: 35%
- Midterm Exam: 25%
- Written homework assignments: 25%
- Webwork assignments: 15%

A final course grade of $x$ will be reported in the following way:

<table>
<thead>
<tr>
<th>A+</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x \geq 97$</td>
<td>$93 &lt; x \leq 97$</td>
<td>$90 &lt; x &lt; 93$</td>
<td>$87 \leq x &lt; 90$</td>
<td>$83 \leq x &lt; 87$</td>
<td>$80 \leq x &lt; 83$</td>
<td>$77 \leq x &lt; 80$</td>
</tr>
<tr>
<td>C</td>
<td>C-</td>
<td>D+</td>
<td>D</td>
<td>D-</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>$73 \leq x &lt; 77$</td>
<td>$70 \leq x &lt; 73$</td>
<td>$67 \leq x &lt; 70$</td>
<td>$63 \leq x &lt; 67$</td>
<td>$60 \leq x &lt; 63$</td>
<td>$x &lt; 60$</td>
<td></td>
</tr>
</tbody>
</table>

Course-Specific Support and Supplementary Instruction

Please find office hours at the header of this document. The publisher of the text maintains an online student resource page which includes review sheets and practice exam (click “Student Resources” and then “Review Sheets and Practice Exams” in the left margin). This is an excellent resource.
Course Policies and Information for Students

INCLUSIVE LEARNING ENVIRONMENT STATEMENT

Developed by WUSTL Standing Committee on Facilitating Inclusive Classrooms, 2016

The best learning environment—whether in the classroom, studio, laboratory, or fieldwork site—is one in which all members feel respected while being productively challenged. At Washington University in St. Louis, we are dedicated to fostering an inclusive atmosphere, in which all participants can contribute, explore, and challenge their own ideas as well as those of others. Every participant has an active responsibility to foster a climate of intellectual stimulation, openness, and respect for diverse perspectives, questions, personal backgrounds, abilities, and experiences, although instructors bear primary responsibility for its maintenance. A range of resources is available to those who perceive a learning environment as lacking inclusivity, as defined in the preceding paragraph. If possible, we encourage students to speak directly with their instructor about any suggestions or concerns they have regarding a particular instructional space or situation. Alternatively, students may bring concerns to another trusted advisor or administrator (such as an academic advisor, mentor, department chair, or dean). All classroom participants—including faculty, staff, and students—who observe a bias incident affecting a student may also file a report (whether personally or anonymously) utilizing the online Bias Report and Support System.

ATTENDANCE POLICY

Attendance is required but will not be documented or assessed. However, missing class is highly discouraged. If you are going to be absent from class, it is your responsibility to encounter the missed lecture material. Sharing notes is permitted (and encouraged). Please feel free to make me aware of prolonged illness or family/personal emergency as a cause for excessive absence.

PENALTIES FOR LATE WORK and REQUESTS FOR EXTENSIONS, POLICIES ON MISSED EXAMS, MAKE-UP EXAMS OR QUizzes

In general, late homework (written and Webwork) will not be accepted. Although this policy may be considered strict, this course will have a unique late-work subsidy:

Late Work Passes

You will be given ten (10) late day passes to use as pardon for handing in late homework assignments. These passes are to be used at your discretion throughout the duration of the course (up until the start of the final exam). For example, if an assignment is due on day $n$, and you turn it in on day $n + 1$, you may surrender one late day pass in exchange for the ability to turn in the assignment past the due date. Weekend days (Saturdays and Sundays) do not count as late days (i.e. if an assignment is due on Friday and is turned in on Monday, you need only surrender one pass).

AN IMPORTANT NOTE FOR WEBWORK

Once the due date on a Webwork assignment has passed, you will not be able to enter answers. Therefore, if you would like to use a late pass for Webwork, you need to send me an email no later than six hours before the due date, indicating the length of extension you would like. This
will ensure that I have time to make the appropriate changes in the Webwork system. You will then need to give me the corresponding number of passes in person.

Disclaimer: Late day passes may not be traded, sold, or purchased, and have no cash value. Passes are subject to expiration: you may use any number of late passes until the start of the final exam (11:00 AM on 8/15/2019).

REGRADING POLICY

Please review feedback/grades promptly and address any concerns about grading criteria or possible mistakes as soon as you can. A provisional timeline of one week is encouraged for regrade requests.

TECHNOLOGY POLICIES

The use of mobile devices is strongly discouraged in the classroom. Tablets and laptops, for the use of taking notes, are allowed. Recording devices, for audio purposes, are allowed. Please refrain from videotaping or taking pictures during lecture.

ETHICS/VIOLATIONS OF ACADEMIC INTEGRITY

Ethical behavior is an essential component of learning and scholarship. Students are expected to understand, and adhere to, the University’s academic integrity policy, which can be found here. Students who violate this policy will be referred to the Academic Integrity Policy Committee. Penalties for violating the policy will be determined by the Academic Integrity Policy committee, and can include failure of the assignment, failure of the course, suspension or expulsion from the University. If you have any doubts about what constitutes a violation of the Academic Integrity policy, or any other issue related to academic integrity, please ask your instructor.

Collaboration on homework is permitted but only after each collaborating party has completed the assignment or made a sincere attempt to complete the assignment. If you have collaborated with other students, please list the names of those students (“Collaborators: Jane Doe, John Doe, . . .”) on your assignment.

No notes, phones, calculators, or other aids are permitted during exams. Computations will be designed to be easy.

Resources for Students

DISABILITY RESOURCES

If you have a disability that requires an accommodation, please speak with instructor and consult the Disability Resource Center at Cornerstone (cornerstone.wustl.edu). Cornerstone staff will determine appropriate accommodations and will work with your instructor to make sure these are available to you.

THE UNIVERSITY’S PREFERRED NAME POLICY FOR STUDENTS

The university’s preferred name policy, with additional resources and information, may be found here.
ACCOMMODATIONS BASED UPON SEXUAL ASSAULT

The University is committed to offering reasonable academic accommodations to students who are victims of sexual assault. Students are eligible for accommodation regardless of whether they seek criminal or disciplinary action. Depending on the specific nature of the allegation, such measures may include but are not limited to: implementation of a no-contact order, course/classroom assignment changes, and other academic support services and accommodations.

If you need to request such accommodations, please direct your request to Kim Webb, Director of the Relationship and Sexual Violence Prevention Center. Ms. Webb is a confidential resource; however, requests for accommodations will be shared with the appropriate University administration and faculty. The University will maintain as confidential any accommodations or protective measures provided to an individual student so long as it does not impair the ability to provide such measures.

If a student comes to me to discuss or disclose an instance of sexual assault, sex discrimination, sexual harassment, dating violence, domestic violence or stalking, or if I otherwise observe or become aware of such an allegation, I will keep the information as private as I can, but as a faculty member of Washington University, I am required to immediately report it to my Department Chair or Dean or directly to Ms. Jessica Kennedy, the University’s Title IX Coordinator. If you would like to speak with the Title IX Coordinator directly, Ms. Kennedy can be reached at (314) 935-3118, jwkennedy@wustl.edu, or by visiting her office in the Women’s Building. Additionally, you can report incidents or complaints to Tamara King, Associate Dean for Students and Director of Student Conduct, or by contacting WUPD at (314) 935-5555 or your local law enforcement agency. You can also speak confidentially and learn more about available resources at the Relationship and Sexual Violence Prevention Center by calling (314) 935-8761 or visiting the 4th floor of Seigle Hall.

BIAS REPORTING

The University has a process through which students, faculty, staff and community members who have experienced or witnessed incidents of bias, prejudice or discrimination against a student can report their experiences to the University’s Bias Report and Support System team. See brss.wustl.edu.

MENTAL HEALTH

Mental Health Services’ professional staff members work with students to resolve personal and interpersonal difficulties, many of which can affect the academic experience. These include conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety and depression. See shs.wustl.edu/MentalHealth.

YOUTH PROTECTION POLICY

For the policies regarding minors of Washington University in St Louis, see this page.

DISCLAIMER

The instructor reserves the right to make modifications to this information throughout the semester.