Time: MWF 1:00-1:50pm  
Location: Education, Rm 240  
Instructor: Jingchen Niu  
Office: Math Building Rm 314  
Office Hours: Monday 12-1pm & Tuesday 1-2pm  
Email: jniu@math.arizona.edu  
Course Website: Our D2L site. Grades/announcements/solutions/etc. will be posted on D2L; please check D2L for announcements regularly.  
(HW/Exam info can also be found at https://www.math.arizona.edu/~jniu/413S20.html)

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change, as deemed appropriate by the instructor. Any such changes will be announced in class and/or posted on the class website on D2L.

Course materials:
Please read the textbook ahead of and after class discussions/new material.
- **Linear Algebra Done Right** (LADR), by Sheldon Axler, the 3rd edition, published by Springer. This is the main textbook that we use in this semester.
- **Linear Algebra Done Wrong** (LADW), by Sergei Treil, September 2017 version, available on Dr. Treil's website: https://www.math.brown.edu/~treil/papers/LADW/LADW.html

Please read the "Term of use" section on Dr. Treil's website. You are allowed to download the text of the book and/or print a paper copy for studying. You are certainly NOT allowed to use it for any commercial purposes.

We will cover some sections of LADW, mostly from Chapter 3 as determinants are "abandoned" in LADR. You are encouraged to read other sections of LADW and compare them with LADR.

Course Objectives:
We will cover most of Chapters 1 – 8 & 10 of LADR and some sections (mostly from Chapter 3) of LADW, with some subsections skipped. We will discuss
- vector spaces, subspaces, and dimension;
- linear maps, kernel and range, and isomorphism;
- matrices, matrix operations, trace, and determinant;
- eigenvalues, eigenvectors, and invariant subspaces;
- inner product spaces and operators on them;
- Jordan canonical form.

A tentative calendar can be found on D2L.

Expected learning outcomes:
Upon successful completion of this course,
- students should be able to handle definitions and use definitions to solve problems;
- students are expected to be able to construct rigorous and well-written proofs; they should understand when a proof is required and when a counter-example is needed;
• the key notion of this course is the study of linear maps/operators; students should be able to understand that they are defined independent of the choice of a basis, and at the same time they should also understand that defining the action of an operator on a basis is sufficient to define the operator on the whole space;
• building on the preceding point, students should also understand that the quantities defined for linear maps/operators such as the characteristic polynomials, traces, determinants, etc. are all intrinsic to the maps/operators and do not rely on their matrix characterizations; in other words, students should think in terms of linear maps while compute with the matrices;
• students should be able to understand what additional structure are imposed by adding an inner product to a space; and
• students should be able to have a grasp of the notion of the Jordan canonical form and preferably understand why we study it.

Drop-in Tutoring:
The mathematics department provides drop-in tutoring in Math Bldg Rm 220, where instructors are available to answer questions about upper division math courses including ours. It is staffed M-F 10am-3pm.

Communication with Students:
Announcements and important course information may be sent out via official University email and/or through D2L. It is the student’s responsibility to check for messages and D2L announcements regularly.

Attendance:
Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings. Absences may affect a student's final course grade. If you anticipate being absent, are unexpectedly absent, or are unable to participate in class online activities, please contact me as soon as possible. To request a disability-related accommodation to this attendance policy, please contact the Disability Resource Center at (520) 621-3268 or drc-info@email.arizona.edu. If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is located in the Robert L. Nugent Building, room 100, or call 520-621-7057.
• The UA’s policy concerning Class Attendance, Participation, and Administrative Drops is available at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop
• The UA’s policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable. See: http://policy.arizona.edu/human-resources/religious-accommodation-policy.
• Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: https://deanofstudents.arizona.edu/absences.

Classroom Behavior:
To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with
each other and where we can challenge ourselves to succeed. To that end, our focus is on the
tasks at hand and not on extraneous activities, including texting, chatting, reading a newspaper,
making phone calls, web surfing, etc.

Before class, please turn off or silence your cell phone and put it out of sight. If you have a truly
essential emergency, please step outside of the classroom so as not to disturb your classmates.
Repeat offenders to this policy will be asked to leave class or referred to the Dean of Students'
office.

Homework Assignments & Quizzes: (160 points)
Homework is an essential component of the course, whether it is assigned for grading or not.
In general, no late homework will be accepted. Technical difficulties (e.g. power/internet
outage) are not an excuse for missing a deadline. Please start early! Similarly, there will not be
any make-up quizzes. However, in complex and unusual circumstances which are beyond your
control, an extension of the homework assignment or a make-up quiz may be given, or the grade
of the missed assignment or quiz may be dropped, on a case-by-case basis. This will require
providing a detailed account of the situation and sufficient supporting documents. Approval in
these cases is at the sole discretion of the instructor.

- **Quizzes** (90 pts). Six in-class quizzes, with dates listed in the Tentative Calendar, each
  worth 15 points. All are closed-book and closed-notes. All electronic devices, particularly
cell phones, must be turned off during all quizzes.

- **Written Assignments** (70 pts). A set of written problems is typically assigned every one
  or two weeks, and is typically due, in class, one week after it is assigned. These problems
  may come from the text and/or be created by the instructor. They will be posted on D2L.
  (Written assignments and their solutions will also be posted on
  [https://www.math.arizona.edu/~jniu/413S20.html](https://www.math.arizona.edu/~jniu/413S20.html),
  but may not be up-to-date; please check D2L for the accurate assignments and due dates).

You are encouraged to seek help from me, your classmates, your friends, and/or tutors on any
homework problems, especially the challenging ones, even before their due dates. Nonetheless,
make sure you actually understand the problems afterwards, and complete the problems by
yourself. Do NOT simply copy other people’s solutions. It is a violation of the Academic
Integrity Code, and usually it does not have positive effects on your exam performance.

Graded homework and quizzes will be handed out in class (usually within a week after the due
date). Unclaimed HW/quiz will be discarded.

Solutions of the quizzes and the written assignments, as well as that of the midterm, will be
posted on D2L (after the due date). I recommend you to read the solution files and understand all
of the quiz/HW problems. If there is a mistake in any solution and you are the first one to report
it to me, I will add 1 point to your overall grade. If it is a major mistake, you will get 2 points.

Midterm: (60 points)
The Midterm Exam is 50 minutes long and worth 60 points. It is scheduled for:
Friday, March 6, in class.
The midterm is closed-book and closed-notes. All electronic devices, particularly cell phones,
must be turned off during the midterm. Silence and vibration modes are not allowed.
Final: (100 points)
The final exam is worth 100 points. It is scheduled for **Monday, May 11** from 1-3pm. The room for the final exam is our regular classroom. The final is closed-book and closed-notes. All electronic devices, particularly cell phones, must be **turned off** during the final. Silence and vibration modes are not allowed.

The University’s Exam regulations for final exam week will be strictly followed. They can be found at [http://www.registrar.arizona.edu/courses/final-examination-regulations-and-information](http://www.registrar.arizona.edu/courses/final-examination-regulations-and-information)
The University final exam schedule may be found at: [http://www.registrar.arizona.edu/schedules/finals.htm](http://www.registrar.arizona.edu/schedules/finals.htm)

**Missed Exam Policy (for Midterm & Final):**
In general, there will be **no make-up exams**. However, in complex and unusual circumstances which are beyond control, either a make-up exam may be given or the grade of the missed exam may be dropped or substituted on a case-by-case basis. This will require providing a detailed account of the situation and sufficient supporting documents. Approval in these cases is at the sole discretion of the instructor and/or the Dean of students.

Legitimate reasons include an excuse letter from a Dean, religious holidays recognized by the University, and verifiable emergencies. Prior personal commitments such as pre-arranged travel plans or meetings of an activity group are generally not considered as legitimate reasons. Students who are unable to attend a test for a legitimate reason must notify me at least **two weeks** prior to the test date, unless it is a verifiable emergency. If a verifiable emergency arises that prevents you from taking a test at the regularly scheduled time, you must notify me within **24 hours** after the test had been administered. Otherwise a score of 0 will be recorded.

**Grades:**
Your overall letter grade will depend on your overall percentage:

\[
\frac{\text{Homework + Quizzes + Midterm + Final}}{320}.
\]

Letter grades will be **no lower** than those set forth in the following table:

<table>
<thead>
<tr>
<th>Points Range</th>
<th>Percentage Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>288 ≤ points ≤ 320</td>
<td>90% to 100%</td>
<td>A</td>
</tr>
<tr>
<td>256 ≤ points &lt; 288</td>
<td>80% to 90%</td>
<td>B</td>
</tr>
<tr>
<td>224 ≤ points &lt; 256</td>
<td>70% to 80%</td>
<td>C</td>
</tr>
<tr>
<td>192 ≤ points &lt; 224</td>
<td>60% to 70%</td>
<td>D</td>
</tr>
<tr>
<td>0 ≤ points &lt; 192</td>
<td>0% to 60%</td>
<td>E</td>
</tr>
</tbody>
</table>

You might get a **higher** letter grade than that set forth in the above table. This is at the sole discretion of the instructor.

In addition, if your grade of the Final Exam is at least 90 points, you will be guaranteed an A in this course; if your grade of the Final Exam is at least 70 points, your overall letter grade will be **no lower** than C. (This additional policy does not apply to the letters B, D, E.)

**Students withdrawing from the course:**
Must be made in accordance with University policy [http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal](http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal) and [https://registrar.arizona.edu/dates-and-deadlines/view-dates?field_display_term_value=201](https://registrar.arizona.edu/dates-and-deadlines/view-dates?field_display_term_value=201)

If you withdraw from the course by January 28 (February 11 if you are in Math 513), the course will remain on your UAccess academic record with a status of dropped but will not appear on your transcript. If you withdraw from the course between January 28 (February 11 if you are in Math 513) and March 31, you will receive a grade of W. After March 31, course withdrawals (with a grade of W) may be processed only with the approval of the student’s instructor and college Dean on a Late Change Petition (Instructor's and Grad College Dean's approval required on a Change of Schedule form if you are a graduate student). Students must have an extraordinary reason for approval. Student's last day to submit Late Change Petitions to their college is April 14.

**Incompletes:**
Must be made in accordance with University policies, which are available at [http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete](http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete)

**Accessibility and Accommodations:**
At the University of Arizona we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations. If you need DRC test accommodation, please contact them as early as possible. It usually takes at least three business days (much longer for the Final Exam) for DRC to arrange for test accommodations.

**Code of Academic Integrity:**
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. University policies can be found at [http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity](http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity).

**Other Relevant University Policies Relating to Conduct:**
Please take note of the following University policies:
- Policy on Threatening Behavior by Students: The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See [http://policy.web.arizona.edu/education-and-student-affairs/threatening-behavior-students](http://policy.web.arizona.edu/education-and-student-affairs/threatening-behavior-students)
- Nondiscrimination and Anti-Harassment Policy: The University is committed and maintaining an environment free of discrimination: see [http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy](http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy)

**Computing Resources:**
Information about using computers on campus, setting up a UA email account, and computer support can be found at [http://www.oscr.arizona.edu](http://www.oscr.arizona.edu). A list and map of open access computing facilities on campus can be found at [http://www.oscr.arizona.edu/maps](http://www.oscr.arizona.edu/maps).