A. COURSE INFORMATION

Course number/section: MATH-3311.001
Class meeting time: MW 5:30-6:45pm
Class location: OCNR 133
Course Website: bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

Instructor: Staff
Office location: TBA
Office hours: TBA
Telephone: TBA
e-mail: TBA
Appointments: email me to make an appointment to meet outside office hours

C. COURSE DESCRIPTION

Catalog Course Description
Fundamentals of linear algebra and matrix theory. Topics include vectors, matrix operations, linear transformations, fundamental properties of vector spaces, systems of linear equations, eigenvalues and eigenvectors. Applications.

D. PREREQUISITES FOR THE COURSE

Prerequisites
Math 2413 (Calculus I)

Corequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)
Introduction to Linear Algebra, 5th Ed. By Gilbert Strang (older edition is fine)

Optional Textbook(s) or Other References
none

Supplies
Paper and pen or pencil
**F. STUDENT LEARNING OUTCOMES AND ASSESSMENT**

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the courses student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. Make calculations as needed with vectors and matrices using addition, scalar multiplication, matrix multiplication and inner (dot) products.

2. Solve general linear systems of equations using inverses, the Gauss-Jordan method (from row operations to LDU factorization) and other methods.

3. Understand and apply concepts of vector spaces including defining properties, linear independence, spanning, basis, dimension and subspaces (especially null- and column-).

4. Understand and apply orthogonality to find projections, least square solutions and orthogonal bases.

5. Find eigenvalues and eigenvectors using determinants or other means as needed. If time permits, understand and apply the Spectral Theorem.

6. If time permits, understand and apply linear transformations.

**G. INSTRUCTIONAL METHODS AND ACTIVITIES**

Most class meetings will begin with the proposal of a significant problem in mathematics. Students will work individually and through group discussion to solve the problem. If the class is able to solve the problem, we will discuss the possible ways in which we can communicate our solution. We will not dedicate much time to working through specific examples, as the student will be asked to work out specific examples for homework.

If you must miss a class, you should watch the MIT OpenCourseWare preparation videos listed on the course schedule. The titles listed on our schedule each represent a cluster of short videos. A link will be provided on Blackboard, but students can use any search engine to find the cluster of videos online.
H. MAJOR COURSE REQUIREMENTS AND GRADING

Student learning outcomes will be measured in the following 3 ways:

1. Students will turn in one exploration assignment. For the assignment, choose a topic related to linear algebra and explore it. You can either search for an application of linear algebra that sounds interesting to you or explore a topic from our textbook. Your grade on the assignment will be based on
   (a) how well you articulate your own questions and thought process,
   (b) how well your exploration addresses your questions,
   (c) how much intuition you develop through example calculations, and
   (d) whether or not you convince me you spent 6-12 hours on the assignment.

   Please write legibly or type. I don’t care whether or not you answer your questions completely. I just want to see you genuinely explore some math.

2. Three in-class written exams will be given during the semester (with a fourth, comprehensive final exam at the end of the semester). Students will not be allowed to use calculators, phones, notes, or any other type of help during the exams.

3. A comprehensive final exam will be given at the end of the semester and will be similar in style to the three semester exams. Studying for the final exam helps solidify students’ understanding of key concepts developed in the class.

The following letter grades will be assigned to the associated range of final grades: 90.0 – 100 A; 80.0 – 89.99 B; 70.0 – 79.99 C; 60.0 – 69.99 D; below 60 F.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Homework</td>
<td>0%</td>
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<tr>
<td>Exploration</td>
<td>20%</td>
</tr>
<tr>
<td>Exams</td>
<td>45%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>35%</td>
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I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>SECTIONS</th>
<th>VIDEO LECTURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>W 1/17</td>
<td>Introduction</td>
<td>1.1</td>
<td>Lecture 1</td>
</tr>
<tr>
<td></td>
<td>Vectors and Linear Combinations</td>
<td></td>
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<tr>
<td>M 1/22</td>
<td>Lengths and Dot Products</td>
<td>1.2</td>
<td>Lecture 1</td>
</tr>
<tr>
<td>W 1/24</td>
<td>Matrices</td>
<td>1.3</td>
<td>Lecture 2</td>
</tr>
<tr>
<td>M 1/29</td>
<td>Exam 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 1/31</td>
<td>Vectors and Linear Equations</td>
<td>2.1</td>
<td>Lecture 2</td>
</tr>
<tr>
<td>DATE</td>
<td>TOPIC</td>
<td>SECTIONS</td>
<td>VIDEO LECTURES</td>
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<tr>
<td>M 2/5</td>
<td>Elimination</td>
<td>2.2</td>
<td>Lecture 2</td>
</tr>
<tr>
<td>W 2/7</td>
<td>Elimination w/ Matrices</td>
<td>2.3</td>
<td>Lecture 2</td>
</tr>
<tr>
<td>M 2/12</td>
<td>Matrix Operations</td>
<td>2.4</td>
<td>Lecture 3</td>
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<tr>
<td>W 2/14</td>
<td>Inverse Matrices</td>
<td>2.5</td>
<td>Lecture 3</td>
</tr>
<tr>
<td>M 2/19</td>
<td>$LU$ Factorization</td>
<td>2.6</td>
<td>Lecture 4</td>
</tr>
<tr>
<td>W 2/21</td>
<td>Transposes and Permutations</td>
<td>2.7</td>
<td>Lecture 5</td>
</tr>
<tr>
<td>M 2/26</td>
<td>Review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 2/28</td>
<td><strong>Exam 2</strong></td>
<td></td>
<td></td>
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<tr>
<td>M 3/5</td>
<td>Spaces of Vectors</td>
<td>3.1</td>
<td>Lecture 5</td>
</tr>
<tr>
<td>W 3/7</td>
<td>Nullspace of $A$</td>
<td>3.2</td>
<td>Lectures 6, 7</td>
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<tr>
<td>M 3/19</td>
<td>Complete Solution to $Ax = b$</td>
<td>3.3</td>
<td>Lectures 7, 8</td>
</tr>
<tr>
<td>W 3/21</td>
<td>Independence, Basis and Dimension</td>
<td>3.4</td>
<td>Lecture 9</td>
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<tr>
<td>M 3/26</td>
<td>Dimensions of the Four Subspaces</td>
<td>3.5</td>
<td>Lecture 10</td>
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<tr>
<td>W 3/28</td>
<td>Orthogonality of the Four Subspaces</td>
<td>4.1</td>
<td>Lecture 14</td>
</tr>
<tr>
<td>M 4/2</td>
<td>Projections</td>
<td>4.2</td>
<td>Lecture 15</td>
</tr>
<tr>
<td>W 4/4</td>
<td>Least Squares Approximations</td>
<td>4.3</td>
<td>Lecture 16</td>
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<tr>
<td>M 4/9</td>
<td>Orthonormal Bases, Gram-Schmidt</td>
<td>4.4</td>
<td>Lecture 17</td>
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<tr>
<td>W 4/11</td>
<td>Review</td>
<td></td>
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<tr>
<td>W 4/16</td>
<td><strong>Exam 3</strong></td>
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<tr>
<td>M 4/23</td>
<td>Diagonalizing a Matrix</td>
<td>6.2</td>
<td>Lecture 22</td>
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<tr>
<td>W 4/25</td>
<td>Systems of Differential Equations</td>
<td>6.3</td>
<td>Lecture 23</td>
</tr>
<tr>
<td>M 4/30</td>
<td>Review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 5/9</td>
<td><strong>Final Exam 1:45-4:15pm</strong></td>
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Note: Changes in this course schedule may be necessary and will be announced to the class by the instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

### J. COURSE POLICIES

**Attendance/Tardiness**

Punctual class attendance is highly recommended.

**Late Work and Make-up Exams**

If a student misses an exam, the student’s grade on the final exam will serve as a replacement for the missed exam. Exceptions can be made to this rule if the student notifies me far in advance.
Late exploration assignments will receive a 5% penalty for each regular weekday that they are late (up to the last day of class).

Long term illness and official university business are the only exceptions to these rules.

Extra Credit
There is no extra credit given in this course. Just study diligently throughout the semester.

Cell Phone Use
Please leave the room to use your phone.

Laptop Use
Please do not open laptops during class. This can distract others from learning, and part of my job is to provide a class atmosphere that aids student learning.

Food in Class
Please do not eat during class. This can distract others from learning, and part of my job is to provide a class atmosphere that aids student learning.

Missed Exam
See “Late Work and Make-up Exams” above.

Participation
Strong, consistent class participation is expected from all students.

K. COLLEGE AND UNIVERSITY POLICIES

- Academic Integrity (University)
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- Classroom/Professional Behavior
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructors ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.
• **Statement of Civility** Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

• **Deadline for Dropping a Course with a Grade of W (University)** I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar at

http://www.tamucc.edu/academics/calendar/

for the last day to drop a course.

• **Grade Appeals (College of Science and Engineering)** As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at

http://www.tamucc.edu/provost/university_rules/index.html

and the College of Science and Engineering Grade Appeals webpage at

http://sci.tamu.edu/students/GradeAppeal.html

For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

• **Disability Services**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be
guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

http://disabilityservices.tamucc.edu/

• Statement of Academic Continuity
In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

L. OTHER INFORMATION

• Academic Advising
The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

GENERAL DISCLAIMER

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.