Linear Algebra – Math3311.002  
Department of Mathematics and Statistics  
Spring 2015

A. COURSE INFORMATION

Course number/section: Math3311.002  
Class meeting time: MWF 11:00 to 11:50  
Class location: CS 112  
Course Website: None

B. INSTRUCTOR INFORMATION

Instructor: Dr. Pablo Tarazaga  
Office location: CI 316  
Office hours: TR 10:00 to 12:00 and M 10:00 to 11:00  
Telephone: (361) 825-3187  
e-mail: pablo.tarazaga@tamucc.edu  
Appointments: By e-mail.

C. 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 AND COREQUISITES

Prerequisites  
Math 2413 (Calculus I)

Corequisites  
N/A

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Textbook  

Supplies  
None

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 course’s 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.

At the end of the course, a student will 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 the Gauss elimination process, compute inverses using the Gauss-Jordan method. Compute and apply factorizations for solving systems of equations.

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

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. Understand and apply the Spectral Theorem.

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

G. INSTRUCTIONAL METHODS AND ACTIVITIES

The class uses lecture format encouraging student participation and discussion.

H. MAJOR COURSE REQUIREMENTS AND GRADING

- All the work done in the class will be part of your final grade (tests and final). I will evaluate very carefully the learning objectives.
- The table below shows the weight of each of the items considered to determine your grade.
- Assignments will be given with each section of the book that we cover during the course, but they will not be collected.
• All tests and the final will contain a part on techniques, a part on understanding and basic proofs and a part on writing main definitions, properties and theorems.
• Final exam will be comprehensive.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>2 Exams</td>
<td>30% and 35%</td>
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<tr>
<td>Final Exam</td>
<td>35%</td>
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I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
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<tbody>
<tr>
<td>1/19</td>
<td>Introduction to vectors, length and dot product</td>
</tr>
<tr>
<td>1/26</td>
<td>System of linear equations.</td>
</tr>
<tr>
<td>2/2</td>
<td>The idea of Gauss elimination: elementary operations.</td>
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<tr>
<td>2/9</td>
<td>Gauss elimination using elementary matrices.</td>
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<tr>
<td>2/16</td>
<td>Operations with matrices. Inverse of a matrix.</td>
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<tr>
<td>2/23</td>
<td>LU factorization. Transposition, symmetric matrices.</td>
</tr>
<tr>
<td>3/2</td>
<td>Space of vectors. Solving the systems Ax=0</td>
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<tr>
<td></td>
<td>Test #1</td>
</tr>
<tr>
<td>3/16</td>
<td>Spring brake</td>
</tr>
<tr>
<td>3/23</td>
<td>Solving the general system Ax=b.</td>
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<tr>
<td>3/30</td>
<td>Generators, independence and basis.</td>
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<tr>
<td>4/6</td>
<td>The four fundamental subspaces.</td>
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<tr>
<td>4/13</td>
<td>Orthogonality of the four subspaces. Projections</td>
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<tr>
<td></td>
<td>Test #2</td>
</tr>
<tr>
<td>4/20</td>
<td>Least Squares and the Gram-Schmidt process.</td>
</tr>
<tr>
<td>4/27</td>
<td>Eigenvaleus and eigenvectors, diagonalization, symmetric matrices</td>
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<tr>
<td>5/4</td>
<td>Positive Definite Matrices and Similar matrices.</td>
</tr>
<tr>
<td>May 8</td>
<td>Final Exam (11:00 – 1:30)</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
  It will not be part of your grade, but it is required. Exceptions are sickness and emergencies.

- Preparation for class
  I do expect that you come to each class ready to learn and to participate. Also you have to be prepared to do any required work. You are expected to devote for each hour of class a minimum of two or three hours outside the class working in the subject (some people need more time than others).

- Missed Exam
  If you are missing a test, you have to tell me beforehand by any mean, examples: e-mail or phone. There is not date change for any exam including the Final Exam.

- Grades
  After you receive your grades you have up to a week to dispute it. I am the person you can dispute your grade with.

- Class withdraw
  If at any point during the course you are considering to drop the class, talk to me before you do it. I am here to help you in your learning experience and to help you to succeed in your college career.

- Food in Class
  No food is not allowed in the classroom.

- Cell Phone Use
  PLEASE TURN YOUR CELLULAR PHONES OFF. PLACE THEM IN YOUR BAG OR POCKET DURING THE CLASS. DO NOT DISTURB THE CLASS WITH THEM.

K. COLLEGE AND UNIVERSITY POLICIES

- Academic Integrity (University)
  It is expected that university students will demonstrate a high level of maturity, self-direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior.
  See Full University Policy at
http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity

- **Classroom/Professional Behavior**

- **Deadline for Dropping a Course with a Grade of W (University)**
The grade of W will be assigned to any student officially dropping a course by Friday, April 10, 2015. No student is eligible to receive a W without completing the official drop process by this deadline. Visit the Office of the University Registrar for the Course Drop Form that must be submitted. After April 10, 2015 a student will not be allowed 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](http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage at [http://sci.tamucc.edu/students/GradeAppeal.html](http://sci.tamucc.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**
Disability Services (DS) is the hub for coordinating services and accommodations to ensure accessibility and utilization of all programs for all Texas A&M University-Corpus Christi students with disabilities. Our services are designed to meet the unique educational needs of enrolled students with documented permanent or temporary disabilities. DS provides intake and consultation services to students seeking to register with our office. DS reviews an individual’s documentation of disability and assesses eligibility for services and the determination of reasonable accommodations. For more information visit the Disability Services Office at 116 Corpus Christi Hall or go to [http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

- **Academic Honesty**
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, forgery, or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) For the complete statement, see [http://catalog.tamucc.edu/content.php?catoid=10&navoid=313%23Academic_Integrity#Academic_Honesty](http://catalog.tamucc.edu/content.php?catoid=10&navoid=313%23Academic_Integrity#Academic_Honesty)

I. OTHER INFORMATION

N/A

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.