Texas A&M University-Corpus Christi
Department of Mathematics and Statistics

MATH 3310.001/MEEN 3310.001
MATH Analysis for MECH Engineering/Engineering Analysis for Mechanical Engineers
Spring Semester 2013

I. Course Information
Meeting Time & Place: TR 11:00-12:15PM CI 122
Professor: Dr. D. Palaniappan (Dr. Pal)
Office Phone: (361) 825-2221
Office: ST 211
Office Hours: MW 3:00-4:30PM, TR 12:30-1:30PM
and by appointment
E-mail Address: devanayagam.palaniappan@tamucc.edu
Class Hours: Three-hour course

II. Course Description

III. Prerequisites for the Course
MATH 3315 (Differential Equations) or Instructor’s Consent. A strong background in MATLAB and its applications is essential.

IV. Text and Other Supplies Required
Linear Algebra with Applications by Steven J. Leon 8th edition (required). In addition, Introduction to Linear Algebra (3rd edition) by Gilbert Strang and Vector Calculus (3rd edition) by Susan J. Cooley are recommended. Additional text material will be provided (if necessary).

V. Students Learning Outcomes
At the end of the course the student should be able to:

1. Calculate sums and products of matrices.
2. Compute the inverse of a square matrix.
3. Find left and right inverses of a matrix.
5. Solve system of algebraic equations using matrix methods.
6. Obtain solutions of problems in engineering applications.
7. Give examples of vector spaces and subspaces.
8. Use the ideas of linear dependence and linear independence, inner products and projections in practical situations.
9. Define a basis and properties of bases and find a rank of a matrix.
10. Apply Gram-Schmidt process and least squares method for systems
11. Utilize the concepts of linear transformations.
12. Find eigenvalues and eigenvectors of a matrix and understand their applications.
13. Evaluate double integrals using Green’s theorem
14. Compute surface and triple integrals using Stokes and Divergence theorems.
15. Apply integral calculus to problems in mechanical engineering.
16. Use numerical techniques and computer technology to solve linear systems.
17. Apply numerical methods to obtain solutions of ordinary differential equations arising in the field of engineering.
18. Find a Fourier series of a given function.
19. Construct series solutions of differential equations in terms of special functions including Bessel functions.

VI. Method of Instruction
A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, cooperative/collaborative learning, projects and presentations, computer demonstrations, learning experiences outside the classroom. Methodology will be selected to best meet student needs.

VII. Evaluation and Grade Assignment
The assessment methods may include but are not limited to, the following:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework, and Class Participation</td>
<td>15%</td>
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<tr>
<td>Quizzes</td>
<td>10%</td>
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<tr>
<td>Project(s)</td>
<td>10%</td>
</tr>
<tr>
<td>Class Tests</td>
<td>40%</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
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</tbody>
</table>

GRADES: A = 90.00 - 100%, B = 80.00 - 89.99%, C = 70.00 - 79.99%, D = 60.00 - 69.99%, F = below 60%

Homework will be assigned in class along with the due date. No credit for late homework. Quizzes will be given in class. At the end of the semester the lowest homework/quiz grade gets dropped.

Project(s): Each student will select a topic to describe a physical problem from mechanical engineering. The problem should be such that its mathematical model use the concepts of this course. Project paper (report) should include the following:

a. Statement of the problem
b. Its Mathematical Model
c. Analytical/numerical results of the model
d. Interpretation of the results in mechanical engineering
VIII. Course Outline

<table>
<thead>
<tr>
<th>Week of</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Jan 21</td>
<td>Introduction to the Course</td>
</tr>
<tr>
<td>28</td>
<td>Linear Algebra: Matrices and operations, determinants and properties</td>
</tr>
<tr>
<td>Feb 4</td>
<td>Gauss-Jordan method, inverse of matrices, systems of equations</td>
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<tr>
<td>11</td>
<td>Solutions of linear systems, applications, vector spaces</td>
</tr>
<tr>
<td>18</td>
<td>Subspaces, examples, linear independence and linear dependence</td>
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<tr>
<td>25</td>
<td>Basis and dimension, inner products, Gram-Schmidt process, least squares</td>
</tr>
<tr>
<td>Mar 4</td>
<td>Gauss-Jordan method, inverse of matrices, systems of equations</td>
</tr>
<tr>
<td>18</td>
<td>Solutions of linear systems, applications, vector spaces</td>
</tr>
<tr>
<td>25</td>
<td>Basis and dimension, inner products, Gram-Schmidt process, least squares</td>
</tr>
<tr>
<td>April 1</td>
<td>Test # 1 Diagonalization of matrices and applications</td>
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<tr>
<td>8</td>
<td>Diagonalization of matrices and applications</td>
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<tr>
<td>15</td>
<td>Test # 2</td>
</tr>
<tr>
<td>22</td>
<td>Linear transformations, eigenvalues and eigenvectors,</td>
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<tr>
<td>25</td>
<td>Diagonalization of matrices and applications</td>
</tr>
<tr>
<td>29</td>
<td>Test # 2</td>
</tr>
<tr>
<td>May 6</td>
<td>Series solutions, Bessel functions</td>
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<td></td>
<td>FINAL EXAM: Tuesday, May 14, 11:00-1:30PM</td>
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IX. Class Policies and Remarks

- This syllabus is subject to change at the discretion of the instructor. Material included is meant to provide an outline of the course and rules that the instructor will adhere to in evaluating the student’s progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.
- Attendance is required except in sickness and emergency situations.
- I do expect that you come to each class ready to learn and to participate. You are expected to devote for each hour of class 2-3 hours outside the class.
- Homework will be assigned every meeting to promote adequate student learning.
- The programming part of this class will take the form of computer projects that contain additional and extended problem material designed to engage students in the exploration and application of subject matter using computational technology.
- Make up work is not possible except in sickness and emergency situations.
- If at any point in the semester 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 succeed in your college career.
- Please Turn Your Cellular Phones, Pagers, and other Electronic Devices off before you enter class. THANKS!
- Reviews sessions will be used to master material covered in class, catch up on lab activities, and planned topics for class.
- **Academic Integrity:** You are assumed to be familiar with, and to abide by, all TAMUCC policies and procedures, particularly the *Code of Academic Integrity* and the *Student Code of Conduct*. Students found to be in violation of any of these policies will be appropriately sanctioned.
X GRADE APPEALS PROCESS

As stated in University Rule 13.02.99.C2, Student Grade Appeals, 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 Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules Web site at http://www.tamucc.edu/provost/university_rules/index.html. For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.

XI DISABILITY STATEMENT

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 contact the Disabilities Service Office at (361) 825-5816 or visit the office in Driftwood 101. The Disabilities Service Office will determine appropriate accommodations and outline them in a notification letter. You will then be asked to give this letter to your instructors. Without an accommodation plan, no student can be treated differently from the others.