APPLIED ANALYSIS  MATH 5375.001
Department of Mathematics & Statistics
Spring 2019

A. COURSE INFORMATION

Course number/section:  MATH 5375.001
Class meeting time:  MWF 8:00-8:50 AM
Class location:  IH-158
Course Website:  https://bb9.tamucc.edu/

B. INSTRUCTOR INFORMATION

Instructor:  Dr. Beate Zimmer
Office location:  CI 310
Office hours:  MWF 11:00 – 12:00 noon and MW 1:00 - 2:00 PM
Telephone:  (361) 825-2682
e-mail:  beate.zimmer@tamucc.edu
Appointments:  e-mail to make appointments outside the announced office hours

C. COURSE DESCRIPTION

Catalog Course Description
Topics to include basic theory of Euclidean, Banach and Hilbert spaces, calculus of variations and optimal control, elements of system analysis, and elements of complex analysis. All theoretical topics will be illustrated by real application.

Extended Course Description
This course provides some of the background in Functional Analysis, Calculus of Variations and Complex Analysis that is used all over Applied Mathematics

D. PREREQUISITES FOR THE COURSE

Prerequisites
MATH 4301 or MATH 5351.

Corequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)
The textbook for the course is Gilbert Strang, Introduction to Applied Mathematics. While this book does not cover all of the material for the course and will be supplemented with handouts, it is a very nice introduction to Applied Mathematics that is good to have on hand for reference.
Optional Textbook(s) or Other References
Additional reading materials will be available on BlackBoard.

Supplies
None. Homework is paper and pencil and due once a week. No calculator is needed or permitted on the exams.

Class notes will be available on BlackBoard. You may print them, but don’t have to print them.

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.

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

1. correctly state and use the main theorems and definitions from class
2. analyze proofs of the theorems from class
3. apply the theorems to real life problems
4. analyze different kinds of spaces
5. solve some theoretical problems from applied analysis
6. discuss and present theories from this course to class.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Methods and activities for instruction include: Lectures and discussions.

H. MAJOR COURSE REQUIREMENTS AND GRADING

The methods of evaluation and the criteria for grade assignments are:
Homework is assigned weekly. The lowest homework grade gets dropped.

Each student will give a presentation on an application of a topic from class to a real life problem and write up typed notes for the presentation that will be shared with the class. The presentation is graded on mathematical correctness, depth and clarity of the exposition, relevance of the application and quality of the provided notes.
The exams ask for statements of theorems or definitions of class and basic applications of them.

The final exam is cumulative.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Two exams</td>
<td>40%</td>
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<tr>
<td>Homework</td>
<td>20%</td>
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<tr>
<td>Presentation</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td>20%</td>
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</tbody>
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Grading Scale: Grades will be no stricter than
A = 90.00 – 100%
B = 80.00 – 89.99%
C = 70.00 – 79.99%
D = 60.00 – 69.99%
F = below 60%

I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>CHAPTER</th>
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<tbody>
<tr>
<td>1 M 1/14</td>
<td>Some Problems in Applied Mathematics</td>
<td>2.1</td>
</tr>
<tr>
<td>2 W 1/16</td>
<td>Equilibrium in discrete Dynamical Systems</td>
<td></td>
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<tr>
<td>3 F 1/18</td>
<td>Stability in Dynamical Systems</td>
<td></td>
</tr>
<tr>
<td>4 W 1/23</td>
<td>Optimization</td>
<td>2.2</td>
</tr>
<tr>
<td>5 F 1/25</td>
<td>Duality</td>
<td>2.2</td>
</tr>
<tr>
<td>6 M 1/28</td>
<td>Lagrange Multipliers 2.2</td>
<td></td>
</tr>
<tr>
<td>7 W 1/30</td>
<td>Applications</td>
<td>2.2</td>
</tr>
<tr>
<td>8 F 2/1</td>
<td>Electrical Networks</td>
<td>2.3</td>
</tr>
<tr>
<td>9 M 2/4</td>
<td>Structures in Equilibrium</td>
<td>2.4</td>
</tr>
<tr>
<td>10 W 2/6</td>
<td>Least Squares and the Kalman Filter</td>
<td>2.5</td>
</tr>
<tr>
<td>11 F 2/8</td>
<td>Recursive Least Squares</td>
<td>2.5</td>
</tr>
<tr>
<td>12 M 2/11</td>
<td>Equilibrium in the continuous case</td>
<td>3.1</td>
</tr>
<tr>
<td>13 W 2/13</td>
<td>Differential Equations of Equilibrium</td>
<td>3.2</td>
</tr>
<tr>
<td>14 F 2/15</td>
<td>Maximum and Minimum Principles</td>
<td>3.2</td>
</tr>
<tr>
<td>15 M 2/18</td>
<td>Laplace’s Equation and Potential Flow</td>
<td>3.3</td>
</tr>
<tr>
<td>16 W 2/20</td>
<td>Boundary Conditions and Green’s Formula</td>
<td>3.3</td>
</tr>
<tr>
<td>17 F 2/22</td>
<td>Minimum Principles for Laplace’s Equation</td>
<td>3.3</td>
</tr>
<tr>
<td>18 M 2/25</td>
<td>Exam 1</td>
<td></td>
</tr>
<tr>
<td>19 W 2/27</td>
<td>Equilibrium of Fluids and Solids</td>
<td>3.5</td>
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<tr>
<td>20 F 3/1</td>
<td>Calculus of Variations</td>
<td>3.6</td>
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The comprehensive Final Exam is on Monday, May 6, 8:00 AM – 10:30 AM.

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

Attendance/Tardiness
Attendance will be taken each class. For most students attending class is a faster way of learning the material than trying to catch up on missed material solely from the book. Tardiness is often disruptive to the whole class and is not appreciated. If you are delayed and arrive late for class please do so quietly. Usually the topic/technique of the day is introduced in the first few minutes of class; missing that part usually means that you will be lost all class.

Late Work and Make-up Exams
Missed homework assignments can not be made up; the drop grade accommodates those. Make-up exams will not be given. If a student misses an exam and has a valid excuse,
the final exam score will serve as the score for that exam.

**Extra Credit**
There is no extra credit in this class.

**Cell Phone Use**
Cell phones and such must be turned off before class. Each time your phone rings during class, your course grade goes down by 1%.

**Laptop Use**
You may use a laptop to take notes during lecture. Distracting other students by surfing the web is not acceptable behaviour.

**Food in Class**
No food in class (except during the final, where non-noisy foods are OK).

**Missed Exam**
If you have to miss an exam, it is your responsibility to contact me **no later than the day of the exam**. Failure to contact me on or before the exam day results in a grade of zero points for the exam. This also applies to the final exam. For missed final exams due to an acceptable excuse the university rules about I (Incomplete) grades apply and the make-up is at the instructor’s convenience early in the next long semester. Only extreme emergencies or official university business are acceptable reasons to miss exams and documentation will be required. Car trouble, routine doctor’s appointments, family reunions or graduations of siblings etc. are not valid reasons to miss exams. If your reason to miss the exam is not a valid one, your exam score is 0 points. Be sure to check before missing an exam whether your reason is acceptable.

**Participation**
Participation is not part of the grade, but you learn more by interacting, than by watching passively.

**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 instructor’s 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 ([http://www.tamucc.edu/academics/calendar/](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


  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 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 Blackboard and/or e-mail. In addition the syllabus and class activities may be modified to allow continuation of the course. University Facilities (i.e. e-mail, web sites, and Blackboard) will be operational within two days of closing the physical campus. However, students need to make certain that the course instructor has a primary and secondary way of contacting each student.

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.