DYNAMIC METEORLOGY II (ATSC 4302) – Lecture Session  
Department of Physical and Environmental Sciences  
Spring 2020

A. COURSE INFORMATION
Course number/section: ATSC 4302.001
Class meeting time: TR 3:30-4:45PM
Class location: RFEB 400
Course Website: http://bb9.tamu.edu

B. INSTRUCTOR INFORMATION
Instructor: Pat Fitzpatrick
Office location: CS243
Office hours: Mon,Wed 4-6PM, Thur 1:15-3:15PM
Telephone: 361-825-4061
e-mail: patrick.fitzpatrick@tamucc.edu
Appointments: Available by email, phone request, or videoconference. Videoconferences are especially productive and convenient for students. I’m often accessible by videoconference in the evenings and Sunday night. Email me a for a videoconference, and I’ll setup a session with Zoom software.

C. COURSE DESCRIPTION
Catalog Course Description
This course is a continuation of ATSC 4301 (Dynamic Meteorology I), which covers the introductory-level atmospheric dynamics. The course introduces more advanced materials including equatorial waves, baroclinic and barotropic instability, two-dimensional turbulence, atmospheric teleconnection, El Nino/Southern Oscillation, Madden-Julian Oscillation, global warming, and numerical modeling of atmospheric circulations.

Extended Course Description
This class will cover Chapters 5-7, Chapter 12, and Chapter 13 in Holton and Hakim (HH). Topics include: atmospheric waves and normal mode analysis; quasi-geostrophic theory; the omega equation and its applications; baroclinic instability; sudden stratospheric warmings, the Quasi-Biennial Oscillation; numerical methods; and atmospheric modeling. Computer applications with spreadsheets, Matlab, R, python, and FORTRAN will be applied to lecture material. Applications to the atmosphere, weather analysis, and weather prediction will be clarified throughout the class. Time will be set aside for in-class exercises, and attendance is extremely important for learning. Study sessions will also be performed before exams. A study guide is provided.

D. PREREQUISITES AND COREQUISITES
Prerequisites
E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbooks


Practical numerical analysis using Microsoft Excel, by A. Nandy. Alpha Science International Ltd. (may be out of print, only available as used book), 2005 ISBN: 1-84265-167-6


Optional Textbook(s) or Other References

Supplies
Students should buy a binder (to keep notes and assignments) and a set of colored pencils and/or pens (helpful during math derivations).

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.

The goal of this course is to provide the students with an opportunity to learn about atmospheric waves, synoptic forcing, and numerical modeling. Students will be expected to

- Apply normal mode analysis to derive and understand atmospheric wave properties
- Understand the impact of atmospheric wave propagation
- Assess synoptic forcing of vertical motion
- Explain baroclinic instability
- Apply numerical methods to solving dynamics equations
- Elucidate atmospheric modeling and data assimilation
G. INSTRUCTIONAL METHODS AND ACTIVITIES

My teaching philosophy combines theory with practical, up-to-date applications. Students will not just learn math derivations, but acquire the physical understanding of dynamical processes. Students will be able to expound on the mathematical processes, verbally explaining the theories, and perform real-world meteorology and oceanography examples. Learning material is a blend of notes, supplemental documents, pertinent websites, videos, and COMET modules. Every third-class period will be devoted to on-hands training of the mathematical concepts to reinforce retention of this difficult material.

H. MAJOR COURSE REQUIREMENTS AND GRADING

The final letter grade will be based on the percentage you earn out of a possible 100 points, which are distributed as follows:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams</td>
<td>45</td>
</tr>
<tr>
<td>Homework</td>
<td>30</td>
</tr>
<tr>
<td>Final exam</td>
<td>25</td>
</tr>
</tbody>
</table>

You are expected to independently to solve the problems though discussions among classmates are allowed. Some questions will be unique to each student to encourage solo activity. Please hand in your assignments at beginning of the class on the due day. Late homework will include a cumulative 10% penalty for every 2 days late unless a valid excuse is provided to the instructor. Valid excuses include severe illness, conference participation, and field project participation.

I. COURSE CONTENT/SCHEDULE

Tentative Lecture Schedule:

<table>
<thead>
<tr>
<th>Week(s)</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>Chapters 5-6, HH</td>
</tr>
<tr>
<td>4</td>
<td>Exam 1</td>
</tr>
<tr>
<td>5-8</td>
<td>Chapters 7 and 12, HH</td>
</tr>
<tr>
<td>8</td>
<td>Exam 2</td>
</tr>
<tr>
<td>9-12</td>
<td>Chapter 13, HH, and numerical methods in Esfandiari</td>
</tr>
<tr>
<td>12</td>
<td>Exam 3</td>
</tr>
</tbody>
</table>
Numerical methods and modeling continued, semester review

The final exam schedule is at:
https://registrar.tamucc.edu/Register%20for%20Classes/Final_Exams.html. The exam is scheduled on Thursday, May 14, 1:45PM.

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
It is the best of student’s interest to attend each class, because of the weight placed on the lectures in the homework and exams. Participation is essential to do well in the class, which includes in-class discussion and direct communication with the instructor and peers.

Late Work and Make-up Exams
Assignments are expected on time unless prior arrangements are made. Such prior arrangements will be granted only in exceptional circumstances as well. Without prior arrangement, the late homework has a 10% cumulative deduction for every 2 days late.

Class exams cannot be retaken other than for an excused absence. Excused absences are limited to medical emergencies that can be certified in writing by a physician, participation in a TAMUCC sanctioned event or other similar circumstances justified in writing and specified in the TAMUCC graduate catalog for the ongoing academic year.

Extra Credit
None

Cell Phone Use
Prohibited during the class

Laptop Use
A personal laptop will be essential for the homework in this class.

Food in Class
Not allowed in the lab
Missed Exam
Unless with a doctor’s note, no make-up exam.

Participation
Exceptionally important during hands-on exercises!

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/) 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.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**
  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.