Texas A&M University–Corpus Christi
Calculus 3 MATH 3470
Department of Mathematics and Statistics
Spring 2016

A. COURSE INFORMATION

Course number/section: MATH-3470.003
Class meeting time: MWF 11:00-11:50am
Class location: BH-126
Course Website: bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

Instructor: Jordan Alexander
Office location: CI 213a
Office hours: MTWR 2:00-4:00pm
Telephone: (361) 825-3613
e-mail: jordan.alexander@tamucc.edu
Appointments: email me to make an appointment to meet outside office hours

C. COURSE DESCRIPTION

Catalog Course Description
4 sem. hrs. (3:2)
Parametric equations, vectors, functions of two and three variables. Contains a laboratory component.

Extended Course Description
Dot products, cross products, surfaces, tangent planes, partial derivatives, double and triple integration, change of variables, center of mass and first and second moments of 3D objects with variable density, vector fields, line integrals, Green’s Theorem, surface integrals, Stokes’ Theorem, Divergence Theorem

Serves as a prerequisite for Fluid Mechanics, Electromagnetism, Thermodynamics, Quantum Physics, Nuclear Physics, Introduction to Analysis, Partial Differential Equations, and Introduction to Mathematical Statistics. Also aids the study of Physical Chemistry.

D. PREREQUISITES FOR THE COURSE

Prerequisites
MATH 2414

Corequisites
None
E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)
James Stewart’s *Calculus: Early Transcendentals*, 7th Edition together with WebAssign.

Optional Textbook(s) or Other References
MIT OpenCourseWare @ http://ocw.mit.edu/courses/mathematics/18-02sc-multivariable-calculus-fall-2010/index.htm

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.

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

1. Use and convert among Cartesian, parametric, polar, and cylindrical coordinate systems.
   (a) graph a parametric curve
   (b) convert between rectangular and polar coordinates

2. Calculate dot and cross products as needed for vectors and vector valued functions and gradients.
   (a) calculate and use dot products and cross products of vectors
   (b) give the equation of a plane in 3 dimensional space

3. Calculate and apply derivatives and integrals for vector-valued functions.
   (a) calculate derivatives and integrals of vector-valued functions
   (b) calculate arc length for vector-valued functions

4. Calculate and apply derivatives and integrals for functions of several variables.
   (a) match 3d plots and contour plots of functions in 2 variables
   (b) calculate and use partial derivatives
   (c) calculate tangent planes to the graph of a function in two variables
   (d) use the chain rule for functions in several variables
   (e) take directional derivatives and determine gradient vectors
(f) determine minimum and maximum values of functions in several variables with or without constraints
(g) change the order of integration in multiple integrals

5. Represent integrals in various forms using transformations (substitutions) and Green’s, Stokes’ and the Divergence Theorems.
   (a) use the change of variable formula for multiple integrals
   (b) evaluate line integrals
   (c) state and use Green’s theorem

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Class time will mostly consist of group discussion and lecture. Students will also give short, informal presentations on the blackboard.

H. MAJOR COURSE REQUIREMENTS AND GRADING

Student learning outcomes will be measured in the 5 following progressive stages:

1. Before a lesson is discussed in class, students will read about that lesson in the text or will watch a corresponding lecture from MIT OpenCourseWare (a link will be provided on Blackboard). **Students will take a reading quiz over that lesson on Blackboard before coming to class. This is a very important part of students’ learning and will greatly enhance student learning during class time.**

2. After a lesson is discussed in class, students will work through a corresponding homework assignment online via WebAssign (which will be accessed through Blackboard). Clicking the WebAssign button on the top left of our Blackboard page should take you directly into WebAssign. You will either need the access code that comes with the book or will need to buy an access code online. There is an initial grace period where you can use the system without an access code. Online homework provides students with immediate feedback, but it is not personalized. Students have the responsibility to seek out personalized help from the instructor when their understanding of a particular homework solution or mathematical concept is not satisfactory. Help is also available from CASA on campus, but obtaining help from the instructor is more highly recommended.

In general, late work will not be accepted. Five reading quiz grades and five homework grades will be dropped. These drops are meant to cover all possible good excuses for late work, such as illness, technical problems, and family emergencies. Long term illness and official university business are probably the only exceptions to this rule.

3. Lab assignments will further develop students’ understanding of various topics discussed in class and will develop students’ ability to solve mathematical problems with the extra calculation power of a computer. All grading questions regarding labs should first be directed toward the lab instructor. One lab grade will be dropped.
4. 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. This means students are expected to have an understanding of where various formulas come from and are expected to be able to produce and use those formulas without outside help. **By the end of the semester, students should be ready to apply what they have learned to more exciting problems encountered in the students’ chosen field of work.**

5. 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. Studying for the exam serves as the finishing step in preparing the student for future work with the powerful mathematical tools developed throughout the semester. **Students who consistently study well throughout the semester should find studying for the final to be a pleasant experience.**

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Reading Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>WebAssign Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Lab Reports</td>
<td>20%</td>
</tr>
<tr>
<td>Exam 1</td>
<td>10%</td>
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<tr>
<td>Exam 2</td>
<td>10%</td>
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<tr>
<td>Exam 3</td>
<td>10%</td>
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<tr>
<td>Final Exam</td>
<td>30%</td>
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</tbody>
</table>

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 1/20</td>
<td>Coordinates in 3D</td>
<td>12.1</td>
<td>Session 1</td>
</tr>
<tr>
<td></td>
<td>Vectors</td>
<td>12.2</td>
<td>Session 1</td>
</tr>
<tr>
<td>F 1/22</td>
<td></td>
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<tr>
<td>M 1/25</td>
<td>Dot Product</td>
<td>12.3</td>
<td>Sessions 2 – 4</td>
</tr>
<tr>
<td>W 1/27</td>
<td>Determinant, Cross Product</td>
<td>12.4</td>
<td>Sessions 5 – 7</td>
</tr>
<tr>
<td>F 1/29</td>
<td>Equations of Planes</td>
<td>12.5</td>
<td>Sessions 8, 15, 16</td>
</tr>
<tr>
<td>M 2/1</td>
<td>Cylinders and Quadric Surfaces</td>
<td>12.6</td>
<td>None</td>
</tr>
<tr>
<td>W 2/3</td>
<td>Parametric Equations</td>
<td>13.1</td>
<td>Sessions 15 – 18</td>
</tr>
<tr>
<td>F 2/5</td>
<td>Velocity, Arc Length</td>
<td>13.2, 13.3</td>
<td>Sessions 19, 20</td>
</tr>
<tr>
<td>M 2/8</td>
<td>Kepler’s Second Law</td>
<td>13.4</td>
<td>Session 21</td>
</tr>
<tr>
<td>W 2/10</td>
<td>Review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F 2/12</td>
<td>Exam 1</td>
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</table>
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.

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>SECTIONS</th>
<th>VIDEO LECTURES</th>
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</thead>
<tbody>
<tr>
<td>M 2/15</td>
<td>Partial Derivatives</td>
<td>14.1, 14.3</td>
<td>Sessions 24 – 26</td>
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<tr>
<td>W 2/17</td>
<td>Tangent Planes</td>
<td>14.4</td>
<td>Session 27</td>
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<tr>
<td>F 2/19</td>
<td>Extreme Values</td>
<td>14.7</td>
<td>Sessions 28, 30, 31</td>
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<tr>
<td>M 2/22</td>
<td>Chain Rule</td>
<td>14.5</td>
<td>Sessions 32 – 34</td>
</tr>
<tr>
<td>W 2/24</td>
<td>Gradient Vectors</td>
<td>14.6</td>
<td>Sessions 35 – 38</td>
</tr>
<tr>
<td>F 2/26</td>
<td>Lagrange Multipliers</td>
<td>14.8</td>
<td>Sessions 39 – 41</td>
</tr>
<tr>
<td>M 2/29</td>
<td>Double Integrals</td>
<td>15.1 – 15.3</td>
<td>Sessions 47 – 49</td>
</tr>
<tr>
<td>W 3/2</td>
<td>Polar Coordinates</td>
<td>10.3, 15.4</td>
<td>Session 50</td>
</tr>
<tr>
<td>F 3/4</td>
<td>Applications</td>
<td>15.5</td>
<td>Sessions 51, 52</td>
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<tr>
<td>M 3/7</td>
<td>Change of Variables</td>
<td>15.10</td>
<td>Sessions 53 – 55</td>
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<tr>
<td>W 3/9</td>
<td>Review</td>
<td></td>
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<tr>
<td>F 3/11</td>
<td>Exam 2</td>
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<tr>
<td>M 3/21</td>
<td>2D Vector Fields</td>
<td>16.1</td>
<td>Session 56</td>
</tr>
<tr>
<td>W 3/23</td>
<td>2D Line Integrals</td>
<td>16.2</td>
<td>Sessions 58 – 60</td>
</tr>
<tr>
<td>F 3/25</td>
<td>Fundamental Theorem</td>
<td>16.3</td>
<td>Sessions 60 – 63</td>
</tr>
<tr>
<td>M 3/28</td>
<td>Green’s Theorem</td>
<td>16.4</td>
<td>Sessions 65 – 72</td>
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<tr>
<td>W 3/30</td>
<td>Triple Integrals</td>
<td>15.7</td>
<td>Sessions 74, 75</td>
</tr>
<tr>
<td>F 4/1</td>
<td>Cylindrical Coordinates</td>
<td>15.8</td>
<td>Session 75</td>
</tr>
<tr>
<td>M 4/4</td>
<td>Spherical Coordinates</td>
<td>15.9</td>
<td>Sessions 76 – 78</td>
</tr>
<tr>
<td>W 4/6</td>
<td>3D Line Integrals</td>
<td>16.1 – 16.3</td>
<td>Sessions 79, 88, 89</td>
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<tr>
<td>F 4/8</td>
<td>Parametric Surfaces</td>
<td>16.6</td>
<td>Session 83</td>
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<tr>
<td>M 4/11</td>
<td>Surface Integrals, Flux</td>
<td>16.7</td>
<td>Sessions 80 – 83</td>
</tr>
<tr>
<td>W 4/13</td>
<td>Review</td>
<td></td>
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<tr>
<td>F 4/15</td>
<td>Exam 3</td>
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<tr>
<td>M 4/18</td>
<td>Curl and Divergence</td>
<td>16.5</td>
<td>Sessions 84, 90</td>
</tr>
<tr>
<td>W 4/20</td>
<td>Stokes’ Theorem</td>
<td>16.8</td>
<td>Sessions 91 – 95</td>
</tr>
<tr>
<td>F 4/22</td>
<td>Divergence Theorem</td>
<td>16.9</td>
<td>Sessions 84 – 87</td>
</tr>
<tr>
<td>M 4/25</td>
<td>Applications</td>
<td></td>
<td>Sessions 97, 98</td>
</tr>
<tr>
<td>W 4/27</td>
<td>Review</td>
<td></td>
<td></td>
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<tr>
<td>F 4/29</td>
<td>Review</td>
<td></td>
<td></td>
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<tr>
<td>M 5/2</td>
<td>Review</td>
<td></td>
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<tr>
<td>F 5/6</td>
<td>Final Exam (11am – 1:30pm)</td>
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J. COURSE POLICIES

Attendance/Tardiness
Punctual class attendance is highly recommended.

Late Work and Make-up Exams
In general, late work will not be accepted. Five reading quiz grades and five homework grades will be dropped. These drops are meant to cover all possible good excuses for late work, such as illness, technical problems, and family emergencies. Long term illness and official university business are probably the only exceptions to this rule.

Make-up exams will not be given. If a student misses one exam, the student’s score on the final exam will serve as the score for the missed exam. If a student misses a second exam, they will receive a zero on that exam. For students who take every exam, the final exam score will replace the student’s lowest semester exam score (unless the final score is lower than all three semester exam scores).

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

Cell Phone Use
Please turn off cell phones before class starts. I will ask any student with their phone out to turn it off and put it up. If this happens multiple times with the same student, I will ask the student to leave class.

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)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. 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.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 oper-
ational 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.