TEXAS A&M UNIVERSITY COMMERCE
COLLEGE OF SCIENCE, AGRICULTURE AND ENGINEERING
DEPARTMENT OF MATHEMATICS

CALSS SYLLABUS

Instructor: Tingxiu Wang, Ph.D.   Semester: Spring 2018
Office Phone: 903-886-5958   Office Hours: MWF 10:00 AM – 11:00 AM
                                                                         TR 2:00 PM – 3:00 PM
Office: Binnion 306   or by appointment
Website: http://faculty.tamuc.edu/twang/   Email: tingxiu.wang@tamuc.edu

   I.   <u>Course</u>: MATH 315, Ordinary Differential Equations, 3 credit hours

   II. <u>Course Description:</u> First order differential equations, higher order differential equations, series solutions, the Laplace transformations, systems of first order linear equations, initial-value problems. Prerequisites: Math 192.

   III. <u>Textbook</u>: Elementary Differential Equations with Boundary Value Problems, previously published by Brooks/Cole Thomson Learning, 2000. Free download at http://digitalcommons.trinity.edu/mono/9/

        Student Solutions Manual for Elementary Differential Equations with Boundary Value Problems, previously published by Brooks/Cole Thomson Learning, 2000. http://digitalcommons.trinity.edu/mono/10/

        Tentatively, we will cover Chapters 1, 2, 3.1-3.2, 4.1-4.4, 5, 6.1-6.2, 7.1-7.4, 8.1-8.5, 9, and 10.1-10.4.

   IV. <u>Technology</u>: We will use Mathematica or TI-89 to solve a differential equation. TI-89 is highly recommended.

   V.   <u>Student Learning Outcomes:</u> Upon successful completion of this course, students will be able to:
        1. Classify differential equations into partial differential equations and ordinary differential equations, linear or nonlinear, homogeneous or nonhomogenous, first order, second order or higher order differential equations.
        2. Explain a general solution and a particular solution, an initial-value problem, the Existence and Uniqueness Theorem; Wronskian Determinants and fundamental set of solutions; Explain Growth-Decay Model and Predator-and-Prey Model that use differential equations to model real world problems.
        3. Use methods such as Separating Variables, Variation of parameters, Finding a Potential Function, Substitution and Euler's Method to solve 1st order differential equations for explicit solutions and approximation solutions.
        4. Explain the solution structure of higher order linear differential equations and solve some higher order linear differential equations with constant coefficients, some second order linear differential equations with general coefficients, and some system of first order linear differential equations.

   VI. <u>Methods of Instruction</u>**:** Instruction will include lecture, demonstration and models, and some group work, based on time available.

VII.   Methods of Evaluation:

Evaluation methods can include grading homework, chapter or major tests, quizzes, and computer assignments.

Attendance: It is essential. You are responsible for all announcements and materials presented in the class.

Homework: Homework assignments are listed in the end of this file. They will be collected weekly on each Tuesday. Selected questions will be graded. Homework of each week is worth 5 points. Late work will be subject to reduction of 2 points. Homework will not only affect your course grade, but also your tests. Without sufficient practice, you cannot do a test well. Late homework for a test will not be accepted after the test. To be eligible for taking a test, one must complete at least half of the homework for the test. If one takes a test without completing at least half of the homework, the test will not be graded and its score is zero. In this case, there will be no makeup for the test. <mark>If one does not complete at least half of all homework assignments, the course grade will be F</mark>.

Tests: There will be 3 exams. Each exam is worth 80 points. A make-up exam (except the last one) will be given only under a very special circumstance and if I am notified before the exam. The make-up exam may be *more difficult* than the classroom exam and must be made up within one week. To be eligible for taking a test, one must complete at half of the homework for the test.

Final Test: The Final exam will be comprehensive and is worth of 120 points. It is scheduled at 8:00 AM – 10:00 AM, Thursday, May 10, 2018.

Extra Credit: The Mathematics Department offers colloquia and math club activities. You will receive 2 points of extra credit for each colloquium and a math club activity you attend up to 12 points. You need to watch flyers posted in the hallways. There is no make-up for extra credit.

The math department will organize a differential equation team for a modeling competition in April. If you are selected and participate in the practice and the competition, you will get 12 points of extra credit. Please let Dr. Wang know if you would like to join the team.

Grades: If one does not complete at least half of all homework assignments, the grade will be F. The maximum possible points available in this course are:

Homework	60 points
Tests	240 points
Final	120 points
Total	420 points

Your course grade will be based on the percentage of the points you make to the total points available in the course:

A>=90%,   B>=80%,   C>=70%   D>=60%   F<60%.

Other Information
- The information for students with disability: 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 have a disability requiring an accommodation, please contact: Office of Student Disability Resources and Services, Texas A&M University-Commerce, Gee Library, Room 162, Phone (903) 886-5150 or (903) 886-5835, Fax (903) 468-8148, email: StudentDisabilityServices@tamuc.edu.

- Basic Tenets of Common Decency: "All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment." (Student's Guide Handbook, Policies and Procedures, Conduct.) This means that rude and/or disruptive behavior will not be tolerated.
- Free tutoring service is provided by the Math Skill Center (Binnion Hall Room 328) with the following hours: M and W, 8am–8pm; T and R, 8am–6pm; and F 8am–12pm.
- Campus Concealed Carry: Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations. For a list of locations, please refer to ((http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34Safety OfEmployeesAndStudents/34.06.02.R1.pdf) and/or consult your event organizer). Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

Welcome to This Class

Math 315 Homework Assignments

Section 1.2: 2(d, f), 3(c, d, e), 4(e, f), 6(b)
Section 1.3: 3(also sketch a solution curve passing through (1, 1), use the method of isoclines: 15, 17
Section 2.1: do not do slope fields for these questions: 3, 7, 13, 21, 33, 37
Section 2.2: do not do slope fields for these questions: 3, 7, 15, 23, 29, 35
Section 2.3: 4, 10, 11, 19, 20
Section 2.4: 1, 3, 7, 9, 17, 23, 31. Also solve $y'+1=e^{-(x+y)}\sin x$

Section 2.5: 3, 7, 11, 13, 21. Also solve $\left(x^2 y^3 - \dfrac{1}{1+9x^2}\right)\dfrac{dx}{dy} + x^3 y^2 = 0$

Section 3.1: 7, 21
Section 3.2: 7, 21 (Compare to the solutions you did in Section 3.1)

Test 1 covers Chapters 1, 2, and 3

Section 4.1: 1, 3, 14, | 9, 10, 18, | 15, 16, 17, 23 (three types of problems are grouped together)
Section 4.2: 1, 3, 5, 7, 9, 11

Section 5.1/9.1: We study Chapters 5 and 9 together as Higher Order Differential Equations
1. Determine if each of the following sets of functions is linearly dependent of linearly independent:

a. $f_1(x) = x^2 - 1, f_2(x) = x + 1, f_3(x) = x$

b. $f_1(x) = 2x + 20, f_2(x) = x + 1, f_3(x) = 10$

c. $f_1(x) = e^{2x} - 1, f_2(x) = e^{-x} + 1, f_3(x) = x$

2. Section 5.1: 1, 3, 5 (a, b, f. Use Wronskian to determine if the functions are linearly dependent or linearly independent.)

3. Section 9.1: 5, 6 (a, b, c)

Section 5.2/9.2: Section 5.2, 1, 5, 7, 13

Section 9.2, 1, 3, 5, 13, 23

Section 5.4/5.5/9.3: Section 5.4, 3, 5, 7, 15, 17, 25

Section 5.5: 1, 5, 12

Section 9.3, 1, 7, Make assumption for y_p: 51, 54

Test 2 covers Sections 4.1, 4.2, 5.1, 5.2, 5.3, 5.4, 5.5, 9.1, 9.2, 9.3

Section 5.6:   2, 9, 21, 25

Section 5.7, 9.4: Section 5.7, 1, 3, 5, 11; Section 9.4, 3, 6

Section 6.1:   2, 3, 6, 7, 10

Section 6.2:   2, 3, 4

Section 7.1:   3(b, c, d, e), 11, 13, 14

Section 7.2:   1, 4, 16, 17

Section 7.3:   1, 3

Section 7.4:   1, 3, 5, 12

Section 7.5:   23, 33

More exercises will be given on Chapters 8 and 10 as we get there.

Test 3 covers all after Test 2.

CLASS SCHEDULE, Spring 2018
MATH 315.001
TR: 9:30 AM-10:45 AM, Room Binnion 326

Week of	Monday	Tuesday	Wednesday	Thursday	Friday
Jan. 8		Syllabus 1.1, 1.2		1.2, 1.3	
Jan. 15	No classes Martin Luther King Day	2.1, 2.2		2.2, 2.3	
Jan. 22		2.3, 2.4		2.4	
Jan. 29		2.5		3.1, 3.2	
Feb. 5		Review		Test 1	
Feb. 12		4.1		4.2	
Feb. 19		5.1/9.1		5.2/9.2	
Feb. 26		5.3/5.4		5.5/9.3	
March 5		Review		Test 2	
March 12	Spring Break,	Spring Break,		Spring Break	
March 19		5.6		5.7/9.4	
March 26		6.1		6.2	
April 2		7.1, 7.2		7.3	
April 9		7.4		7.5	
April 16		10.1, 10.2		10.3	
April 23		Review		Test 3	
April 30		Review		Review	
May 7				Final 8:00 AM- 10:00 AM	
	Final Exams*, May. 5 –11, 2018; the schedule is at http://www.tamuc.edu/admissions/registrar/academicCalendars/final-exam-schedule.aspx				

* This schedule is for reference. The actual coverage of each day may be different. Please attend each class to learn what is taught. If you miss a class, you need to catch up by yourself.

WELCOME TO THIS CLASS
HAVE A SUCCESSFUL SEMESTER