FAYETTEVILLE STATE UNIVERSITY
College of Arts and Sciences
Department of Mathematics and Computer Science
Math 431-01 Differential Equations II
Spring 2012

" In case FSU must close for an emergency during the semester, instruction will continue using Blackboard."

I. LOCATION INFORMATION:

Course Number & Name: Math 431-01 Differential Equations II
Semester Hours of Credit: 3

Time Class Meets: MWF: 9:00-9:50am. Where Class Meets SBE116
Instructor's name: Dr. Zhenlu Cui. Office Location: SBE 307D
Office Hours: MWF: 10:00am-12:30pm, F: 1:45-2:15pm or by appointment

Office Telephone: 672-1164
E-mail Address: zcui@uncfsu.edu
Website: http://faculty.uncfsu.edu/zcui

FSU Policy on Electronic Mail: Fayetteville State University provides to each student, free of charge, an electronic mail account (username@uncfsu.edu) that is easily accessible via the Internet. The university has established FSU email as the primary mode of correspondence between university officials and enrolled students. Inquiries and requests from students pertaining to academic records, grades, bills, financial aid, and other matters of a confidential nature must be submitted via FSU email. Inquiries or requests from personal email accounts are not assured a response. The university maintains open-use computer laboratories throughout the campus that can be used to access electronic mail. **Rules and regulations governing the use of FSU email may be found at** http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf

II. COURSE DESCRIPTION:

A continuation of MATH331, including the following topics: numerical methods, nonlinear differential equations and stability, the Fourier Series and classical partial differential equations, boundary value problems and the Sturm-Liouville Theory, system of linear differential equations, and the existence theory. Pre-requisites: Math331 and Math251.

III. DISABLED STUDENT SERVICES:

In accordance with Section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act (ACA) of 1990, if you have a disability or think you have a disability to please contact the Center for Personal Development in the Spaulding Building, Room 155 (1st Floor); Tel: 910-672-1203.

IV TEXTBOOK:

(a) Dennis G. Zill and Michael R. Cullen, Differential Equations with boundary value problems, 7th Edition, Brook/Cole/Cengage Learning, 2009.

(b) Calculator: Graphing Calculator.
(c) Mathematical Software: Maple V10

V. STUDENT LEARNING OUTCOMES:

Upon completion of this course, students will be able to:

Demonstrate the ability to solve system of linear differential equations and apply fundamental matrices.

Demonstrate the ability to solve nonlinear equations by numerical methods..

Demonstrate the knowledge of autonomous systems and stability theory by Liapunov method.

Demonstrate the ability to solve basic Boundary Value Problems.

Demonstrate the ability to apply Fouries Series method to solve classical partial differential equations.

Demonstrate the ability to use mathematical software such as Maple V to solve practical problems.

VI. Evaluation Criteria:

Major tests or projects will be given at the completion of each chapter. The lowest chapter test grade will be dropped. A comprehensive final will be given at the conclusion of the course. The grading scale and weights given to various activities for evaluation are listed below.

Tests - 60%, Homework & Class Commitment- 20%, Final Exam – 20%

A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, F= below 60%

VII. Course requirements:

1. Students are expected to attend all class sessions. Excessive absences may result in a reduction of your final grade.
2. Students are expected to enter the class room on time, and remain for the full class period. Students should not make other appointments in conflict with their class schedule. Three late arrivals and early departures will constitute an absence from the class.
3. All tests will be announced prior to their administration. A make-up exam will be given only if the student has a documented and valid written justification for unavoidable absence from the exam. There is no more than one make-up exam for each student during the semester.
4. The Instructor's office hours are times when you may seek assistance without prior appointment. You are encouraged to seek help as needed.
5. Students must refrain from smoking, eating and drinking in the classroom. The rights of others must be respected at all times.
6. Students are encouraged to ask questions of the instructor in class and to respond to those posed by the instructor. They should not discourage others from asking or answering questions. Other students often have the same questions on their minds, but are hesitant to ask.
7. Students are expected to complete all class assignments, to spend adequate time on their class work, and to read each topic prior to class discussion to insure that the course outcomes are met. At least two hours of home study is expected for each class.
8. Talking in class between students is strictly prohibited. Discussions should be directed to the instructor. Unacceptable behavior in the class will result in a reduction of your final grade.
9. Dishonesty on graded assignments will not be tolerated. Students must neither give nor receive help on any work to be graded. The university policy on cheating will be applied to any violations. The minimum penalty will

be a grade of zero on the assignment.

VIII. Course Outline

[7.1] Definition of the Laplace Transform
[7.2] Inverse transforms and transform of derivatives
[7.3] Operational Properties I
[7.4] Operational Properties II
[7.5] The Dirac Delta function
Exam #1
[8.1] Preliminary theory—linear systems
[8.2] Eigenvalues
[8.3] Nonhomogeneous linear systems---undermined coefficients
[8.4] Matrix exponential

[9.1] Euler methods and error analysis
[9.2] Runge-Kutta methods
[9.3] Multistep methods
Exam #2

[10.1] Autonomous systems
[10.2] Stability of linear systems
[10.3] Linearization and local stability
[10.4] Autonomous systems as mathematical models

[11.1] Orthogonal functions
[11.2] Fourier Series
[11.3] Fourier Cosine and Sine Series
Exam #3

[12.1] Separable partial differential equations
[12.2] Classical PDEs and boundary value problems
[12.3] Heat equation
[12.4] Wave equation
[12.5] Laplace equation
[12.6] Nonhomogeneous boundary value problems
[12.7] Orthogonal series expansions
[12.8] Higher-dimensional problems
Exam #4

[13.1] Polar coordinates
[13.2] Polar and cylindrical coordinates
[13.3] Spherical coordinates

Final Exam

IX. References and Academic Support Resources

1. Jane Cronin, Differential Equations: Introduction and Qualitative Theory, Marcel Dekker, Inc., New York, 1994

2. Stephen L. Campbell and Richard Harberman, Introduction to Differential Equations with Boundary Value Problems, Houghton Mifflin Company, Poston, 1996

3. R. Kent Nagle and E. B. Saff., Fundamentals of Differential Equations, Addison-Wesley Publishing Company, 1996.

4. Earl D. Rainville, Phillip E. Bedient, and Richard E. Bedient, Elementary Differential Equations, Pretice-Hall, 1996

5. Paul Waltman, A Second Course in Elementary Differential Equations, Academic Press, New York, 1986.

6. William E. Boyce and Richard C. DiPrima, Elementary Differential Equations and Boundary Value Problems, John Wiley & Sons, Inc., 1997.

Academic Assistance Program " Smartthinking" is available to all FSU students; access through http://blackboard.uncfsu.edu. Mathematical software such Maple V and Mathematica are installed in FSU Computer Labs.

X. Teaching Strategies:

The majority of the material of the course will be given in lecture format. There is a short review before and after each lecture. There will be a comprehensive review after the completion of each chapter. Graphing calculators and Maple (mathematical software) will be used in the class to help students develop a firm grasp of the underlying mathematical concepts. A help session will be set up after the first week to provide tutorial assistance for students in this class.