

Math 4381/6V80 – Nonlinear PDEs Spring 2018

CRN 31021/31020

Meeting times: T,Th 2:40 – 3:35 pm

Room: MCS 212

Instructor: Dr. Danny Arrigo

Website: www.danielarrigo.com

Office location: MCS 201

Office telephone No.: 450-5668

Office hours: MW 2:00-3:00pm, TTh 2:00-4:00pm

Textbook: None. I will supply handouts.

Suggested: Nonlinear Partial Differential Equations for Scientists and Engineers, 3rd Ed. by Lokenath Debnath, Birkhauser Publishers 2012

Use of cell phones (including texting), MP3 players, web browsers, ear buds/plugs is **NOT ALLOWED during class time**. **Cell phones must be turned off**. Instructor may also disallow use of any other technology not relevant to the instruction. Use of any type of laptop during class time requires consent of the instructor.

Prerequisites

Before enrolling in this course, you must have passed Math 4315 PDEs or its equivalent.

Introductory Remarks

This course is basically a course introducing a variety of techniques for solving a variety of nonlinear partial differential equations. Some of these equations naturally arise in fields such as, the geometry of surfaces, fluid mechanics, solid mechanics, quantum mechanics and minimal surfaces to name just a few.

Course Outline

- 1) Review- first order PDEs and the method of characteristics, separation of variables, simple transformations of the standard model equations.
- 2) Nonlinear Topics
 - (i) Charpit's method,
 - (ii) Nonlinear Separability
 - (iii) Compatibility
 - (iv) Variable transformations and Burger's equation
 - (v) Darboux transformations
 - (vi) First integrals
 - (vii) Hodograph transformations
 - (viii) Point and contact transformations
 - (ix) Similarity transformations
 - (x) Bäcklund transformations

Grades

Your grade for this course will be determined by homework and a seminar. Your homework will be assigned every class and collected Friday's. The homework will count 80% of your final grade. The remaining 20% of your grade will be in the form of seminar. This is based on a paper taken from the literature where the student will understand the topic and present it in the form of a short seminar (about 10-15 minutes) given to the entire class. I prefer seminar groups of two students.

Grade		Grade Scale	
Homework:	80%	90% - 100%	A
Seminar:	20%	80% - 89%	B
		70% - 79%	C
		60% - 69%	D
		0% - 59%	F.

Lecture Format

We have lectures scheduled MW 3 – 4:15pm, however, we will typically have class for about an hour with time for discussion whether before or afterwards.

Attendance

Attendance is highly recommended (after all, it is a graduate class). If you are absent for approximately 10% without a valid excuse, where appropriate, you will be dropped from the course.

An **Emergency Procedures Summary (EPS)** for the building in which this class is held will be discussed during the first week of this course. EPS documents for most buildings on campus are available at <http://uca.edu/mysafety/bep/>. Every student should be familiar with emergency procedures for any campus building in which he/she spends time for classes or other purposes.

Academic Integrity: The University of Central Arkansas affirms its commitment to academic integrity and expects all members of the university community to accept shared responsibility for maintaining academic integrity. Students in this course are subject to the provisions of the university's Academic Integrity Policy, approved by the Board of Trustees as Board Policy No. 709 on February 10, 2010, and published in the Student Handbook. Penalties for academic misconduct in this course may include a failing grade on an assignment, a failing grade in the course, or any other course-related sanction the instructor determines to be appropriate. Continued enrollment in this course affirms a student's acceptance of this university policy.

Americans with Disabilities Act statement: The University of Central Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this Act due to a disability, please contact the UCA Office of Disability Services, 450-3613.

Please familiarize yourself with all other policies listed in the Student Handbook. For example, the sexual harassment policy and the various academic policies.