UNIVERSITY OF NEBRASKA AT OMAHA

MATH 4350/8356: Ordinary Differential Equations

Fall 2022 | MW 4:00 - 5:15 PM | Dr. Kass

Description. In this course we will further explore initial- and boundary value problems along with linear systems of ordinary differential equations.

We will learn how these problems arise, what existential theory is applicable, and what (if any) methods are available to try and solve them. Towards these ends we will deploy the terminology and techniques of linear algebra to unify the study of nth order linear ODEs and systems of linear ODEs into one cohesive theory – and along the way will obtain important characterizations of stability. Special attention will be given to the study of boundary value problems for which we will develop Green's functions and Fourier series methods.

Since many important differential equations cannot be explicitly solved we will explore other techniques to determine what behaviors a solution must exhibit using notions such as phase space, bifurcation diagrams, stability analysis, local linearization, Poincaré maps, and more.

As time permits we may explore the connections these topics have to the study of partial differential equations (PDEs).

Pre-Requisites. MATH-1970, 2050, and 2350 with a grade of "C-" or better, or permission of instructor.

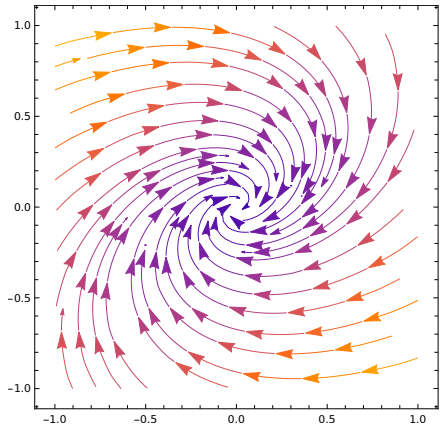
Textbooks. *Differential Equations with Boundary-Value Problems, 9e*. Dennis G. Zill. Cengage, 2013. (Required)

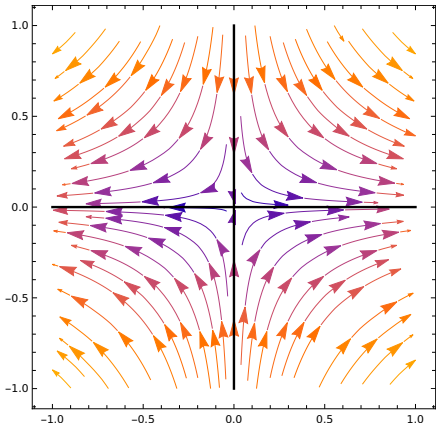
An Introduction to Ordinary Differential Equations. R. Agarwal and D. O'Regan. Springer, 2008. (Optional)

Differential Equations, Dynamical Systems, and an Introduction to Chaos, 3e. M. Hirsch, S. Smale, and R. Devaney. Elsevier, 2013. (Optional)

Software. Mathematica and MATLAB will be demonstrated and used when and where appropriate. (Access to both is free for UNO students.)

Teaching / Grading. Primarily lecture with opportunities for interaction. Grading based on a midterm, final exam, and homework sets.





For More Information:

Dr. Nicholas Kass | 402.554.3431 | nkass@unomaha.edu

University of Nebraska Omaha