**Differential Equations**
MA 650 1F, Fall 2025

**Instructor:** Dr. Y. Zeng, UH 4012

**Time & Location:** MWF 13:25 - 14:15, UH 4004

**Office Hours:** Monday, Wednesday 14:30 –15:30 (or by appointment)

**Text:** Ravi P. Agarwal and Donald O'Regan, *An introduction to Ordinary Differential Equations*, Springer, New York, 2008

**Reference:**

- William E. Boyce and Richard C. DiPrima, *Elementary Differential Equations*, 10th Edition, John Wiley & Sons, 2012
- Fred Brauer and John A. Nohel, *The Qualitative Theory of Ordinary Differential Equations, An Introduction*, Dover Publications, 1989

**Grading Policy:**

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| Homework assignments | 50 % |
| Midterm exam (in-class; closed book) | 20 % |
| Final exam (take-home) | 30 % |

**Homework Assignments:** Homework will be assigned weekly on Monday and due the following Monday, unless announced otherwise. Homework will NOT be accepted late. However, the two lowest homework grades will be dropped to account for any missed assignments due to illness or any other circumstances. I am not planning on accepting any excuses except in extraordinary circumstances AND you have missed two assignments.

**DSS Accommodation:** If you wish to request a disability accommodation, please contact DSS at 934-4205 or dss@uab.edu

**Learning Outcomes:** By the end of the course, students will be able to do the following.

1. Solve exact equations, elementary first-order equations, first-order linear equations and second-order linear equations.
2. Understand the theory on existence and uniqueness of solutions.
3. Understand and apply a variety of differential inequalities.
4. Understand the theory of well-posedness.

5. Understand the theory on existence and uniqueness of solutions of systems.
6. Understand general properties of linear systems.
7. Understand properties of fundamental matrix solution.
8. Solve systems with constant coefficients using linear algebra.
9. Understand a basic theory on periodic linear systems.
10. Understand asymptotic behavior of solutions of linear systems.
11. Understand a basic theory on stability of solutions including solutions to quasi-linear systems.
12. Understand qualitative behavior of two-dimensional autonomous systems.
13. Understand limit cycles for periodic solutions.