

## AMATH 568 WINTER QUATER 2023

Instructor: **J. Nathan Kutz**

Website: <https://faculty.washington.edu/kutz/am568/am568.html>

### SCHEDULE

Lecture 1 (1/4): Phase-Plane Analysis for Nonlinear Dynamics

Lecture 2 (1/6): Fixed Points and Stability

Lecture 3 (1/9): Linear Operator Theory

Lecture 4 (1/11): Eigenfunction Expansions and BVPs

Lecture 5 (1/13): Sturm-Liouville Theory and Self-Adjointness

Lecture 6 (1/18): Green's Functions, Delta Functions and BVPs

Lecture 7 (1/20): Green's Functions for Sturm-Liouville Problems

Lecture 8 (1/23): Modified Green's Function

Lecture 9 (1/25): Regular Perturbation Theory

Lecture 10 (1/27): Poincare-Lindsted Method

Lecture 11 (1/30): The Forced Duffing Oscillator

Lecture 12 (2/1): Multiple Scale Expansions

Lecture 13 (2/3): The Van der Pol Oscillator

**Exam** (2/6): Midterm 1

Lecture 14 (2/8): Boundary Layer Theory

Lecture 15 (2/10): Dominant Balance, Distinguishing Limits and Matched Asymptotic Expansions

Lecture 16 (2/13): Initial Layers and Limit Cycles

Lecture 17 (2/15): WKB Theory

Lecture 18 (2/17): WKB Theory and Turning Points

Lecture 19 (2/22): Bifurcation Theory

Lecture 20 (2/24): Normal Forms and Imperfections

Lecture 21 (2/27): Pattern Forming Systems: Introduction

Lecture 22 (3/1): Linear Stability and Order Parameters

Lecture 23 (3/3): Floquet Theory

Lecture 24 (3/6): The Pendulum and Floquet Theory

Lecture 25: (3/8): Data-Driven Floquet Theory

**Exam** (3/10): Midterm 2

### Grading

For AMATH 568, your course grade will be determined by homework (50%) and exams (25% for each midterm).