

# Syllabus for Math 308

## Differential Equations

### Fall 2016

Section 502

**Instructor:** Volodymyr Nekrashevych

**Office:** BLOC 513c

**Office hours:** Office hours: Wednesday 2:00–3:00 PM and Friday 12:00–1:00 PM or by appointment.

**e-mail:** [nekrash@math.tamu.edu](mailto:nekrash@math.tamu.edu)

**Home-page:** <http://www.math.tamu.edu/~nekrash>

**Class hours:**

MWF 9:10–10:00 AM      BLOC 128

**MATH 308 web page:** The web page of the course is

<http://www.math.tamu.edu/~nekrash/teaching/16F/M308.html>

The Mathematics Department has a web page for Math 308. Its URL address is

<http://www.math.tamu.edu/courses/math308/>

You can find there: Weekly schedule of the course, suggested homework problems, and other information.

**Text.** Boyce, DiPrima *Elementary Differential Equations* 10th edition, Wiley, ISBN 978-0-470-45832-7.

I will provide handouts with introduction to MatLab. The following book might be helpful:

Hunt, Lipsman, Osborn, Rosenberg *Differential Equations with Matlab* 2nd edition, Wiley, ISBN 978-0471-71812-3

A personal copy of MatLab is useful, but not necessary, since you will be able to work remotely on Calclab computers.

**Topics covered.** This is a course in differential equations. Topics include linear ordinary differential equations and systems of linear differential equations, second order linear equations, solutions using Laplace transforms, numerical methods.

**Grading.** Your grade will be determined by homework, two midterm exams and a *cumulative* final exam. The weights of each of these are as follows.

Homework	Exam I	Exam II	Final Exam	Total
20 pt	25 pt	25 pt	30 pt	100
weekly	Sept 28	Oct 31	Dec 12 8–10 AM	

I may curve any grade and will then compute the course grade by the following rule: *A* for at least 90 points, *B* for at least 80 points, *C* for at least 70 points, *D* for at least 60 points and *F* for less than 60 points.

**Plan of lectures.**

**8/29** 1.1. Basic mathematical models, direction fields. 1.2. Solutions of some differential equations.

**8/31** 1.3. Classification of differential equations.

**9/2** 2.1. Linear equations; Method of integrating factors.

**9/5** 2.2. Separable equations.

**9/7** 2.3. Modelling with first order equations.

**9/9** 2.4. Differences between linear and non-linear equations.

**9/12** 2.5. Autonomous equations and population dynamics.

**9/14** 2.6. Exact equations and integrating factors.

**9/16** 3.1. Homogeneous equations with constant coefficients.

**9/19** 3.2. Solutions of linear homogeneous equations; the Wronskian.

**9/21** 3.3. Complex roots of the characteristic equation.

**9/23** 3.4. Repeated roots; reduction of order.

**9/26** 3.5. Non-homogeneous equations; Method of undetermined coefficients.

**9/28** Exam I.

**9/30** 3.6. Variation of parameters.

**10/3** 3.7. Mechanical and electric vibrations.

**10/5** 3.8. Forced vibrations.

**10/7** 6.1. Definition of the Laplace transform.

**10/10** 6.2. Solution of initial value problems.

**10/12** 6.3. Step functions.

- 10/14** 6.4. Differential equations with discontinuous forcing functions.
- 10/17** 6.5. Impulse functions. 6.6. The convolution integral.
- 10/19** 7.1, 7.2. Introduction and review of matrices.
- 10/21** 7.3. Linear algebraic equations: linear independence, eigenvalues, eigenvectors.
- 10/24** 7.3. Linear algebraic equations: linear independence, eigenvalues, eigenvectors.
- 10/26** 7.4. Basic theory of systems of first order linear equations.
- 10/28** 7.5. Homogeneous linear systems with constant coefficients.
- 10/31** Exam II
- 11/2** 7.6. Complex eigenvalues.
- 11/4** 7.7. Fundamental matrices.
- 11/7** 7.8. Repeated eigenvalues.
- 11/9** 7.9. Nonhomogeneous linear systems.
- 11/11** 5.1. Review of power series.
- 11/14** 5.2. Series solutions near an ordinary point, part I.
- 11/16** 5.3. Series solutions near an ordinary point, part II.
- 11/18** 5.4. Euler equations; Regular singular points.
- 11/21** 5.5. Series solution near a regular singular point, part I.
- 11/28** 5.6. Series solution near a regular singular point, part II.
- 11/30** 8.1. The Euler or tangent line method.
- 12/2** 8.2. Improvements of the Euler method.
- 12/5** 8.3. The Runge-Kutta method. 8.4. Multistep methods.
- 12/7** Overview.

**Make-up policy:** Make-ups for missed quizzes and exams will only be allowed for a university approved excuse in writing. Wherever possible, students should inform the instructor before an exam or quiz is missed. Consistent with University Student Rules , students are required to notify an instructor by the end of the next working day after missing an exam or quiz. Otherwise, they forfeit their rights to a make-up.

**Scholastic dishonesty:** Copying work done by others, either in-class or out of class, is an act of scholastic dishonesty and will be prosecuted to the full extent allowed by University policy. Collaboration on assignments, either in-class or out-of-class, is forbidden unless permission to do so is granted by your instructor. For more information on university policies regarding scholastic dishonesty, see University Student Rules.

Remember the Aggie Code of Honor: *“An Aggie does not lie, cheat, or steal or tolerate those who do.”*

**Copyright policy:** All printed materials disseminated in class or on the web are protected by Copyright laws. One xerox copy (or download from the web) is allowed for personal use. Multiple copies or sale of any of these materials is strictly prohibited.

**Americans with Disabilities Act (ADA) Policy Statement:** The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit <http://disability.tamu.edu>.