

Instructor: Dr Hermann G W Burchard, burchard@math.okstate.edu

Office: MS 433, ext 45690/45688 W 4:00-5:00, TTh 2:30-4:00

Text: W E Boyce & R C DiPrima, Elementary DEs with BVP, 8th ed. (2005)

Prerequisites: Calculus I & II

Course Objectives, Outline: The course naturally follows the Calculus. We study differential equations (DEs) arising in the sciences, *e.g.* as equations of motion, or as laws for electrical currents and voltages. Numerous solution methods are known, especially for common types of linear DE. Examples of DE from Calculus:

- If $y = ax + b$, then $\frac{d^2 y}{dx^2} = 0$.
- If $y = e^x$, then $\frac{dy}{dx} = y$.
- If $y = \tan x$, then $\frac{dy}{dx} = 1 + y^2$.
- If $y = \sin x$ or $y = \cos x$, then $\frac{d^2 y}{dx^2} + y = 0$.
- If $y = e^x$. then $\frac{d^2 y}{dx^2} - y = 0$.
- If $\psi(x, y) = \text{const}$, then $\frac{\partial \psi}{\partial x} dx + \frac{\partial \psi}{\partial y} dy = 0$.

The last example, an *exact DE*, §2.6, is a rule for *implicit differentiation*. The course covers the first half of the text.

1: Introduction

2: 1st Order DE

3: 2nd Order Linear DE

4: Higher Order Linear DE

5: Power series solutions (chpt. covered in part)

6: Laplace transform

(The remaining chapters are the subject of the course *Intermed Diff Equ*, Math 4233.)

Style of Course:

- Lectures, problem solving, Q&A, quizzes, exams, labs
- HW problems solved in class
- Calculators allowed
- Course Information posted on web page

<http://www.math.okstate.edu/~burchar>

- E-mail Q&A available (answers to class list, anonymous)

Exams:

- Semester Point Total (SPT) max 600 points, as follows
- Three (3) hour exams @ 100 pts: Fri Feb 2, Wed Mar 7, Fri Apr 13
- Twelve (12) quizzes @ 10 pts, max credit 100 pts
- Final Exam @ 200 pts: Wed, May 2, 10:00–11:50 am
- All exams comprehensive – all deadlines flexible – all schedules tentative

Grading Procedures:

- Grade determined by $SPT \leq 600$ pts
- Grade of A guaranteed for 540 pts=90%, B for 480 pts=80%, etc
- A *curve* may be applied to SPT, rarely more than 1%
- Consistently high scores required for grade of A, if *curved*
- Similar, lesser requirements for grade of B or C, if *curved*
- Partial credit for incomplete work generous, often lenient

Etcetera:

- Make-ups: Major exams only with valid excuse (OSU rules)
- No make-ups: All quizzes, projects, including official absences
- Daily attendance: Essential in a math course, strongly recommended
- Martin Luther King Day: Mon Jan 15
- Spring Break: Sat Mar 17 – Sun Mar 25
- Pre-Finals Week: Mon Apr 23 – Fri Apr 27
- Finals Week: Mon Apr 30 – Fri May 4