

King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences

SYLLABUS

Semester II: 2006-2007 (062)

(Dr. Mohammad Samman)

Course #: MATH 202 (Sec. 7 & 11)
Title: Elements of Differential Equations
Textbook: A First Course in Differential Equations by D.G. Zill, 8th Edition
Lecturer Info: Office: **5-409** P hone: **2674** E-mail: msamman@kfupm.edu.sa
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 Office hours: 12: 10 – 1: 10 pm SMW (Or by appointment)

Week	Date	Sec.	Topics	Homework	(CAS)
1	Feb 17-21	1.1 1.2	Definition and Terminology Initial-Value Problems	4, 7, 8, 9, 10, 13, 16, 20, 27, 28, 30 2, 12, 20, 22, 27	(55) --
2	Feb 24-28	2.1 2.2	Solution Curves (<i>light coverage</i>) Separable Variables	1, 21, 24 8, 14, 20, 22, 23, 27, 45	(5,7) (ex 4)
3	Mar 03-07	2.3 2.4	Linear Equations Exact Equations	5, 13, 16, 18, 30, 37 2, 5, 8, 15, 25, 27, 29, 31, 42(a), 43, 4	(5,9) --
4	Mar 10-14	2.5 1.3 3.1	Solutions by Substitutions Mathematical Models (<i>reading</i>): Growth and Decay, Newton's Law of Cooling and Mixtures Linear Models	4, 6, 10, 13, 18, 21, 26, 30 <i>See Sec. # 3.1</i> 3, 6, 13, 14, 15, 19, 20, 21, 23	-- -- --
5	Mar 17-21	4.1 4.1.1 4.1.2	Linear Equations: Basic Theory Initial-Value and Boundary-Value Problems Homogeneous Equations	3, 10, 12, 13 15, 21, 23, 28	-- --
6	Mar 24-28	4.1.3 4.2	Nonhomogeneous Equations Reduction of Order	33, 36, 37(b,e) 1, 3, 12, 14, 19	-- --
7	Mar 31-Apr04	4.3 4.5	Homogeneous Linear Equations with Constant Coefficients Undetermined Coefficients – Annihilator Approach	4, 9, 12, 15, 20, 34, 40, 49, 50, 51 8, 13, 22, 24, 34, 41, 48, 64, 67, 73	(57) --
8	Apr 07-11	4.6 4.7	Variation of Parameters Cauchy-Euler Equation (<i>Both Methods</i>)	6, 11, 13, 24, 25, 28 3, 5, 10, 11, 14, 16, 19, 31, 34, 37, 39	-- (44)
Midterm Vacation: Thu-Sun, April 12-15, 2007					
9	Apr 16-18	6.1 6.1.1 6.1.2	Solutions About Ordinary Points Review of Power Series Power Series Solutions	1, 10, 11 15, 17, 20, 22, 32	-- --
10	Apr 21-25	6.2	Solutions about Singular Points [©]	3, 10, 13, 14, 19, 20, 27	(ex 5)
11	Apr 28-May02	<i>App II</i>	Matrices and Linear Systems (<i>review</i>) The Eigenvalue Problem	14, 15, 19, 23, 27, 29, 31, 33, 39, 43 47, 49, 52, 53, 55	-- --
12	May 05- 09	8.1 8.2	Preliminary Theory Homogeneous Linear Systems	4, 5, 8, 14, 15, 17, 23, 25	--
13	May 12-16	8.2.1 8.2.2 8.2.3	Distinct Real Eigenvalues Repeated Eigenvalues Complex Eigenvalues	3, 7, 10, 13 19, 21, 23, 25, 27 33, 34, 36, 39, 41, 45	(ex 2) -- --
14	May 19-23	8.3 8.3.2 8.4	Nonhomogeneous Linear Systems Variation of Parameters Matrix Exponential	11, 12, 23, 32 1, 5, 9, 2, 6, 4, 8	(35 (a,b)) (27(a))
15	May 26-30 + June 02	--	Pace Adjustment Review	Last day of classes: Sunday, June 03, 2007.	

© Some statements about Bessel's equation and Legendre's equation should be included in the final remarks about Series Solutions. See the introductory paragraph of Section 6.3 in page 259.

Computer Algebra Systems (CAS) [Mathematica, Matlab, Maple, ...]:

- The entire assignments may be divided into *two* parts and collected *twice* as “projects”.
- The selected assignments are *simple*. In general, nothing is required beyond typing the **commands** and then, for *Mathematica*, pressing **SHIFT**---**ENTER**. The students are urged to try various types of problems.
- For assignments no. 55 in Sec. 1.1 and no. 27(a) in Sec. 8.4, the following commands can be used in *Mathematica*:

(1.1) – 55:

```
Clear[y]
y[x_]:=x Exp[5 x] Cos[2 x]
y[x]
Simplify [y'''[x] - ... .. 841 y[x]]
```

(8.4) – 27(a):

```
A={{4,2},{3,3}};
C={c1,c2};
M=MatrixExp[A t];
sol=Expand[m.c]
Collect[sol,{c1,c2}]/MatrixForm
```

- Remember that “**The best way to learn Mathematics is to do Mathematics.**” **Working as a group is ok. However, each student needs to write his own solution.**

Homework:

- Homework assignments will be collected every Monday. Late homework will not be accepted.
- There will be pop quizzes from the homework exercises.

Exams:

- Exam I: Wednesday, March 21, 2007.
- Exam II: Wednesday, April 25, 2007.
- Final Exam will be announced by the registrar later.

Attendance:

- Attendance is compulsory. KFUPM policy with respect to attendance will be strictly enforced.
- $\frac{1}{2}$ point will be deducted for each absence.

Evaluation policy:

Homework	5% submitting + 10% pop quizzes out of the HW
Matlab	5%
Attendance	4%
Exam I	20%
Exam II	20%
Final Exam (Comprehensive)	36%