King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
SYLLABUS
Semester II: 2004-2005**(042)**
(Dr. M. Sarhan)

Course #:   MATH 202
Title: Elements of Differential Equations
Textbook: A First Course in Differential Equations by D.G. Zill, 7th Edition

Week	Date	Sec.	Topics	Homework	(CAS)
1	Feb 12-16	1.1	Definition and Terminology	4, 7, 10, 13, 16, 19, 24, 25(b), 26(a)	**(49)**
		1.2	Initial-Value Problems	2, 8, 12, 16, 18, 23	--
2	Feb 19-23	2.1	Solution Curves *(light coverage)*	1, 17, 20	**(5,7)**
		2.2	Separable Variables	8, 14, 20, 22, 23, 27, 45	**(ex 4)**
3	Feb 26-Mar 02	2.3	Linear Equations	5, 13, 16, 18, 30, 36	**(5,9)**
		2.4	Exact Equations	2, 5, 8, 15, 25, 27, 29, 31, 42(a), 43, 44	--
4	Mar 05-09	2.5	Solutions by Substitutions	4, 6, 10, 13, 18, 21, 26, 30	--
		1.3	Mathematical Models (*reading*): Growth and Decay, Newton's Law of Cooling and Mixtures	*See Sec. # 3.1*	
		3.1	Modeling with Linear Equations	3, 8, 13, 14, 15, 19, 20	--
5	Mar 12-16	4.1	Preliminary Theory: Linear Equations		
		4.1.1	Initial-Value and Boundary-Value Problems	3, 10, 12, 13	--
		4.1.2	Homogeneous Equations	15, 21, 23, 28	--
6	Mar 19-23	4.1.3	Nonhomogeneous Equations	33, 36, 37(b,e)	--
		4.2	Reduction of Order	2, 3, 12, 14, 19	--
7	Mar 26-30	4.3	Homogeneous Linear Equations with Constant Coefficients	4, 9, 12, 15, 20, 34, 40, 51, 52	**(59)**
		4.5	Undetermined Coefficients – Annihilator Approach	8, 13, 22, 24, 34, 41, 48, 64, 73	--
8	Apr 02-06	4.6	Variation of Parameters	6, 11, 13, 24, 28	--
		4.7	Cauchy-Euler Equation (*Both Methods*)	4, 5, 10, 11, 14, 16, 19, 29, 32, 35, 37	**(42)**
	Midterm Break: Thursday-Friday, April 07-15, 2005				
9	Apr 16-20	6.1	Solutions About Ordinary Points		
		6.1.1	Review of Power Series	1, 9	--
		6.1.2	Power Series Solutions	13, 16, 18, 28	--
10	Apr 23-27	6.2	Solutions about Singular Points$^{©}$	3, 10, 13, 14, 19, 20, 27	**(ex 5)**
11	Apr 30-May 04	*App II*	Matrices and Linear Systems (*review*)	14, 15, 19, 23, 27, 29, 31, 33, 39, 43	--
			The Eigenvalue Problem	47, 49, 52, 53, 55	--
12	May 07-11	8.1	Preliminary Theory	4, 5, 8, 13, 15, 17, 23, 25	--
		8.2	Homogeneous Linear Systems with Constant Coefficients		
13	May 14-18	8.2.1	Distinct Real Eigenvalues	3, 7, 13	**(ex 2)**
		8.2.2	Repeated Eigenvalues	19, 21, 23, 25, 27	--
		8.2.3	Complex Eigenvalues	33, 34, 36, 39, 41	--
14	May 21-25	8.3	Variation of Parameters	1, 2, 13, 22	**(29(a,b))**
		8.4	Matrix Exponential	1, 5, 9, 2, 6, 4, 8	**(27(a))**
15	May 28-Jun 01	--	Pace Adjustment Review		

- For remarks about Homework Problems, **CAS** Assignments and exams, see the following page.

$^{©}$ Some statements about Bessel's equation and Legendre's equation should be included in the final remarks about Power Series Solutions. See the introductory paragraph of Section 6.3 in page 292.

Homework:

- The selected homework problems indicate the levels of the breadth and the depth of coverage. To acquire proficiency on solution methods, the students are strongly urged to solve much more problems than indicated in the syllabus.

- In Sec. 8.4, problems 1, 5 and 9 refer to the same matrix. The same is true for problems 2 and 6 and problems 4 and 8. The matrix e^{At} is to be computed by the definition given in (3). The material on *Laplace Transform* in page 401 is, of course, *omitted*.

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

- CAS assignments are at the discretion of the instructor.

- 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** given in the textbook and then, for *Mathematica*, pressing SHIFT---ENTER. The students are urged to try various types of problems.

- For assignments no. 49 in Sec. 1.1 and no. 27(a) in Sec. 8.4, the following commands can be used in *Mathematica*:

(1.1) – 49:	(8.4) – 27(a):
Clear[y]	A={{4,2},{3,3}};
y[x_]:=x Exp[5 x] Cos[2 x]	c={c1,c2};
y[x]	m=MatrixExp[A t];
Simplify [y''''[x] − ⋯ ⋯ ⋯ 841 y[x]]	sol=Expand[m.c]
	Collect[sol,{c1,c2}]//MatrixForm

Exams:

- The following dates for Major Exams I and II are set by the College of Sciences to avoid conflicts with other exams:
    - Exam I: Monday, March 14, 2005.
    - Exam II: Monday, April 25, 2005.
- The date, time and the place of the Final Exam will be announced by the Registrar.
- The Final Exam is Comprehensive.

Attendance:

- Attendance is compulsory. KFUPM policy with respect to attendance will be strictly enforced.

******Best Wishes for a Pleasant Semester******