MO1903
Mathematics for ISSO Space Systems Operations Specialization
November-December (AY04 Q1), 2003
SYLLABUS

The course is a brief survey of the following topics: Ordinary Linear Differential Equations and their Applications, Complex Numbers, Fourier Series and the Fourier Transform Specific goals for each topic are provided in the attached Course Objectives.

Instructor: Bard Mansager, Office G364, 656-2695, bkmansag@nps.navy.mil
              Office Hours Posted or by appointment,

Text: **Differential Equations** (Second Edition), by Richard Bronson,
Schaum's

              Outlines, McGraw-Hill, 1973. (**DE**)

              Fourier Analysis by Carroll Wilde and Bard Mansager. Class Notes,
              1992. (**FA**) Provided in class.

              Applied Fourier Analysis by H.P. Hsu. College Outline Series, Harcourt
              Brace **a**nd Jovanovich, 1984. (**AFA**) Provided in class.

              Mathematics Tables, Mathematics Department, Naval Postgraduate
              School. (Optional)

              "Electronic Communications Systems and the Frequency Domain: An
              Illustrated Primer for C3 Students" by Bruce Kevin Babcock, NPS
              Masters thesis, June 1990. Provided in class. (Optional)

Hours	Topic
6	1st Order ODEs
2	Theory of ODEs
6	2nd Order ODEs
5	Complex Numbers
7	Fourier Series
5	Fourier Transforms
1	Review
3	Exams
1	Holiday
36	Total

Exams: Use of Math Dept. Tables and one 8.5"x11" piece of paper permitted.

Grade: 60% Quizzes (3)
     40% Comprehensive Final

Lsn	Topic	Assignment
1	Basic Concepts; Classifications of First order DEs	READ: **DE**, Chap 1 , p 1-2. Solved Problems: 1.1 – 1.3, 1.5, 1.7, 1.9, 1.11, 1.13, p 3-6. Supp Problems: 1.14 - 1.54 (even), p 6-7.
2	Separable, First Order DEs	READ: **DE**, Chap 2, p 8-9(exclude Bernoulli, Homogeneous Equations) Chap 3, p. 14-15 (exclude Reduction of Homogeneous Eqns) Solved Problems: 2.1-2.7, 2.10-2.11, p 9-12. 3.1-3.8, p 15-18 Supp Problems: p 13, 2.15-2.25, 2.26, 2.28; p.23, 3.24, 3.39, 3.40, 3.45
3	Exact First Order DEs	READ: **DE**, Chap 4 (exclude Integrating Factors), p 24 Solved Problems: p 26-30, 4.1-4.13 Supp Problems: p. 33; 4.24-4.27, 4.59, 4.60.
4	Linear First Order DEs	READ: **DE**, Chap 5 (exclude Reduction of Bernoulli Eqns), p. 35. Solved Problems: p. 35-39; 5.1-5.15 Supp Problems: p. 41; 5.20-5.36 (even), 5.50- 52.
5	Applications of First Order DEs (Growth/Decay, Temperature Problems)	READ: **DE**, Chap 6, p. 43 Solved Problems: 6.1-6.6, 6.8-6.10, p 46-52. Supp Problems: 6.26, 6.31, 6.33, 6.36, 6.45, 6.48, p 60-63
6	Applications of First Order DEs Falling Body Problems, Electrical Circuits	READ: **DE**, Chap 6, p 43-45. Solved Problems: 6.11-6.13, 6.19, 6.20, 6.22, p 58-59. Supp Problems: 6.51, 6.58, 6.71, 6.76, p 63-65.
7	Linear DEs:Theory of Solutions	READ: **DE** Chap 7 p 67-68 Solved Problems: 7.1-7.3, 7.5-7.12, 7.16-

7.23 p. 68-73
Supp Problems: 7.33-7.35, 7.36-7.54
(even), 7.65-7.67 p. 75-76.

8	Second Order Linear Homogeneous DEs with constant coefficients	READ: **DE** Chap 8. P 77-78. Solved Problems: 8.1-8.15, p 78-81. Supp Problems: 8.17, 8.23, 8.27, 8.31, 8.35, 8.39, 8.43.
9	Nth Order Linerar Homogeneous with Constant Coefficients	READ: **DE** Chap 9 p83-84 Solved Problems: 9.1-9.8, p84-85
10	Undetermined Coefficients	READ: **DE** Chap 10 p 88-89. Solved Problems: 10.1-10.3 p 89-90. Supp Problems: 10.15, 10.19, 10.21, 10.44, 10.49
11	Variation of Parameters	READ: **DE** Chap 11 Solved Problems: 11.3, 11.4 Supp Problems: 11.9, 11.13, 11.16
12	Initial Value Problems	READ: **DE** Chap 12, p104. Solved Problems: 12.1, 12.3, p 104-105. Supp Problems: 12.7-12.13 (odd) p 107
13	Applications of Second Order Linear DEs	READ: **DE** Chap 13, p 108-111 Solved Problems: 13.1 – 13.12 Supp Problems: 13.26 – 13.51 (every third problem)
14	Applications of Second Order Linear DEs	READ: **DE** Chap 13, p 108-111 Solved Problems: 13.1 – 13.12 Supp Problems: 13.26 – 13.51 (every third problem)
15	Review Session	REVIEW: Lessons 1-14
16	**QUIZ I**	REVIEW: Lessons 1-14
17	**Complex Numbers**: Introduction	READ: **FA** p 1-3 PROBS: p 3, 1-13
18	**Complex Numbers**: Geometry of Complex Numbers	READ: **FA** p 4-7 PROBS: p 7, 1-13
19	**Complex Numbers**: Trigonometric	READ: **FA** p 8-10

	Form of Complex Numbers	PROBS: p 11, 1-25
20	**Complex Numbers**: Euler's Formula	READ: **FA** p 12-14 PROBS: p 14, 1-18
21	**Series/Sequences**: Demo	READ: Waveform Handout PROBS: Handout
22	**QUIZ II**	REVIEW Lsns 17-21
23	**Fourier Series**: Periodic Waveforms	READ: **AFA** p 1-3 Solved Probs: p 11-12, 1-3 PROBS: p 19, 18
24	**Fourier Series**: Evaluation of Fourier Coefficients	READ: **AFA** p 5-8 Solved Probs: p 14, 8 PROBS: p 19-20, 20-22
25	**Fourier Series**: Evaluation of Fourier Coefficients	READ: **AFA** p 9-10 Solved Probs: p 17, 11 PROBS: p 21, 26
26	**Fourier Series:** Waveform Symmetry	READ: **AFA** p 22, 25-26 (even and odd functions)
27	**Fourier Series**: The Complex Form of Fourier Series	READ: **AFA** p 40-41 Solved Probs: p. 47, 1 PROBS: p 52, 12
28	**Fourier Series**: The Complex Form of Fourier Series	READ: **AFA** p 40-41 Solved Probs: p. 47, 1 PROBS: p 52, 12
29	**Fourier Series**: Complex Frequency Spectra	READ: **AFA** p 43-45 Solved Probs: p 49-50, 5 PROBS: p 52, 15
30	**Fourier Transforms:** Unit Impulse Function and Unit Step Function	READ: **AFA** p 54-57 Solved Probs: p 66-68, 1,3,4
31	**Fourier Transforms**:	READ: **AFA** p 75-76 Solved Probs: p 85-86, 1-3

32	**Fourier Transforms**:	READ: **AFA** p 75-76
		Solved Probs: p 85-86, 1-3
33	**Fourier Transforms**: Properties of	READ: **AFA** p 76-81
	Fourier Transforms	Solved Probs: p 87-88, 4-7
34	**Fourier Transforms**: Properties of	READ: **AFA** p 76-81
	Fourier Transforms	**Solved Probs: p 87-88, 4-7**
35	Review Session	REVIEW: Lsns 23-31
36	**QUIZ III**	REVIEW: Lsns 23-31

(9/22/03)