

MO1901
 MATHEMATICS FOR ISSO
 SYLLABUS

This is a brief survey of selected calculus and post-calculus topics – single variable derivatives and integrals, infinite series and sequences, complex numbers, and Fourier series and transforms. Specific goals for each topic are provided in the attached **Course Objectives**.

Text: **Differential and Integral Calculus (Third Edition)** by Frank Ayres, Jr. and Elliott Mendelson. Schaum's Outlines, McGraw Hill, 1990. **(DIC)**

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

Applied Fourier Analysis by H.P. Hsu. College Outline Series, Harcourt Brace and Jovanovich, 1984. **(AFA)**

Hours	Topic
3	Functions
6	Derivatives
3	Max/Min
6	Integrals
3	Series and Sequences
3	Complex Numbers
3	Fourier Series
6	Fourier Transforms

TOTAL: 33 Hours

<u>Lsn</u>	<u>Topic</u>	<u>Assignment</u>
1	Functions: Basic Definition; Lines	READ: DIC Chap 6, p 53-54 Solved Probs: p 55, 1-3 PROBS: p 56; 11-13, 16, 18abce READ: DIC Chap 3, p 18-23 Solved Probs: p 23-24, 1,3 PROBS: p 27; 9-10, 12-14, 19
2	Functions: Quadratics; Polynomials	READ: DIC Chap 5, p 39-40 (Parabolas) Solved Probs: p 42-43; 2, 3 PROBS: p 50; 19a, 20a READ: Functions Handout
3	Functions: Exponentials; Natural	READ: Function Handout

	Logarithms, Trigonometric functions	REVIEW(as necessary): DIC Chap 16 p141-145(thru 16.5) READ: DIC Chap 17, p 120-122
4	Derivatives: Definition; Differentiation Rules	READ: DIC Chap 9, p 73-74 Solved Probs: p 74-75; 1, 2, 4 PROBS: p 77; 14-16, 18abc READ: DIC Chap 10 (Differentiation Rules 1-4)
5	Derivatives: Derivatives of Polynomials; Higher Derivatives	READ: DIC Chap 10, p 79 (Rule 10), p 81 (Higher Derivatives) Solved Probs: 1, 3-7, 21, 22 PROBS: 25-29, 49,50
6	Derivatives: Exponentials; Natural Logarithms and Trigonometric Functions	READ: DIC Chap 17, p 127 (Differentiation Formulas); DIC Chap 19, p 133 (Differentiation Formulas 27, 29)
7	Derivatives: Product and Quotient Rules	READ: DIC Chap 10, p 79 (Differentiation Formulas 5-9) Solved Probs: p 83, 12; p 124, 11-13; PROBS: p 85, 33; p 139, 29
8	Derivatives: Chain Rule	READ: DIC Chap 10, p 80 (Composite Functions: the Chain Rule; Alternative Formulation of the Chain Rule) Solved Probs: p 83, 8-11, 13,14; p 123-124, 5, 6, 11-13; p 135-136, 4-9, 11-17 PROBS: p 85-86, 30-32, 34-43; p 127-128, 26,32, 35-38; p138-139, 25-28, 32-34, 39-43
9	Derivatives: Maximum and Minimum Values	READ: DIC Chap 13 p 96-98 Solved Probs: p 98-101, 2-4, 9, 10, 15 PROBS: p104, 22, 23 abcd, 24ac
10	Integrals: Antiderivatives	READ: DIC Chap 30 p206 (If $F(x)$ is a Function, Fundamental Integration Formulas) Solved Probs: p 208, 1-8 PROBS: p 215, 96-99
11	Integrals: Definite Integrals; Properties	READ: DIC Chap 38 p 251-252

	of Definite Integrals	(The Definite Integral, Properties of Definite Integrals)
12	Integrals: Fundamental Theorem of Calculus	READ: DIC Chap 38 p 252 Solved Probs: p 256, 8-13 PROBS: p 258, 28abcr
13	Integrals: Method of Substitution	READ: DIC Chap 30 p207 (The Method of Substitution, Quick Integration by Inspection) Solved Probs: p 208, 9abcd PROBS: 115, 119, 123, 129, 137
14	Integrals: Integration by Parts	READ: DIC Chap 31 p 219 (exclude Reduction Formulas) Solved Probs: p 220, 1-3 PROBS: p 223, 13, 20, 22
15	EXAM I	REVIEW: Lessons 1-14
16	Complex Numbers: Introduction	READ: FA p 1-3 PROBS: p 3, 1-13
17	Complex Numbers: Geometry of Complex Numbers	READ: FA p 4-7 PROBS: p 7, 1-13
18	Complex Numbers: Trigonometric Form of Complex Numbers	READ: FA p 8-10 PROBS: p 11, 1-25
19	Complex Numbers: Euler's Formula	READ: FA p 12-14 PROBS: p 14, 1-18
20	Series/Sequences: Introduction	READ: FA p 1-4 (Sequences and Series) PROBS: p 4, 1-13
21	Series/Sequences: Series	READ: FA p 5-8 PROBS: p 8, 1-14
22	Series/Sequences: Power Series and Fourier Series	READ: FA p 9-12 PROBS: p 12, 1-6
23	Fourier Series: Periodic Waveforms	READ: AFA p 1-2 Solved Probs: p 11-1-3 PROBS: p 19, 18

- 24 **Fourier Series:** Fourier Series READ: AFA p 3
- 25 **Fourier Series:** Evaluation of Fourier Coefficients READ: AFA p 5-8
Solved Probs: p 14, 8
PROBS: p 19-20, 20-22
- 26 **Fourier Series:** Mean Square Error READ: AFA p 9-10
Solved Probs: p 17, 11
PROBS: p 21, 26
- 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:** Complex Frequency Spectra READ: AFA p 43-45
Solved Probs: p 49-50, 5
PROBS: p 52, 15
- 29 **Fourier Transforms:** Unit Impulse Function and Unit Step Function READ: AFA p 54-57
Solved Probs: p 66-68, 1,3,4
- 30 **Fourier Transforms:** READ: AFA p 75-76
Solved Probs: p 85, 1-3
- 31 **Fourier Transforms:** Properties of Fourier Transforms READ: AFA p 76-81
Solved Probs: p 85, 4-7
- 32 **EXAM II** REVIEW: Lsns 16-31
- 33 **Fourier Transforms:** Fourier of a Periodic Function READ: ADA p 103-104
Solved Probs: p 111, 15
PROBS: p 114, 29

3 Functions: Natural Logarithms, Exponentials, Trigonometric functions READ: DIC Chap 25, p 226-227

(Properties of the Natural Logarithm: 25.2-4, 25.7-9); Chap 26, p 234-236 (Properties of e^x : 26.1-4, 26.8-14); Chap 17, 153-155 (Graph $\sin x$, Graph of $\cos x$, Examples 1-3)
PROBS: p164, 20, 21
REVIEW (as necessary): Chap 16, p 141-145 (thru 16.5)

- 5 10, p 86 (Diff Formulas 1-5)
6 Solved Probs: p 80-81, 1-4
7 PROBS: p 84, 14-16, 18abc
- 5 READ: DIC Chap 10, p 86 (Formula
10), p 89 (Higher Derivatives)
Solved probs: p 89-94, 1, 5-8, 24, 25
PROBS: p 94-96, 28-32, 52, 53
- 6 READ: DIC Chap 17, p 153 (Diff
Formulas 17.3, 17.4); Chap 25, p 225,
(Formula 25.1); Chap 26, p 235
Solved probs: p 238, 1
PROBS: p332, 11, 12; p 241, 11abc
- 7 READ: DIC Chap 10, p 86 (Diff
Formulas 5-8)
Solved probs: p 160, 9; p 238, 2d
PROBS: p164, 25e; p231, 8h; p 92, 15
- 8 READ: DIC Chap 10, p 87-88
(Composite Functions: the Chain Rule;
Alternate Formulation of the Chain
Rule)
Solved probs: p 91-92, 9, 11, 12, 14,
15-17; p 229, 4; p 238-239, 2
PROBS: p 95, 32-46 (even); p 231, 8;
P 240, 8ac
- 9 READ: DIC Chap 14, p 115-118
Solved probs: p 118, 1ab, 2
PROBS: p 126-127, 23abc, 24abc, 26a
- 10 READ: DIC Chap 22, p 196-197 (thru
Example 4)
Solved probs: p 199, 1-7
PROBS: p 202, 24
- 11 READ: DIC Chap 23, p 206
PROBS: 6ab,14 (HINT: Use simple
geometry to find the area under the
curve)
- 12 READ: DIC Chap 24, p 216-218
PROBS: p 321, 8-12

13

READ: DIC Chap 22, p 197-198
(Law 8 and Law 9)
Solved Probs: p 199-200, 8-11, 15, 16
PROBS: p 202-204, 24, 45, 46, 50-54

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READ: DIC Chap 31, p 281-283
Solved Probs: p 283, 1, 3, 5
PROBS: p 287-288, 14, 18, 19