

College of Staten Island, City University of New York (CUNY)

## Math 330 (Section 7699 ): Fall 2015 Syllabus

### Applied Mathematical Analysis I

Instructor: **Joseph Maher**

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Office hours: M 4:40-6:20, W 4:40-5:30

Course location: MW 6:30 - 9:10 1S-115

Textbook: O'neil, *Advanced Engineering Mathematics*, 6th edition, Cengage  
ISBN: 978-1111427412

Grading policy: 10% Homework and attendance

50% Midterms

40% Final

Additional info:

Disability policy: Qualified students with disabilities will be provided reasonable academic accommodations if determined eligible by the Office for Disability Services. Prior to granting disability accommodations in this course, the instructor must receive written verification of student's eligibility from the Office of Disability Services, which is located in 1P-101. It is the student's responsibility to initiate contact with the Office for Disability Services staff and to follow the established procedures for having the accommodation notice sent to the instructor.

Integrity policy: CUNY's Academic Integrity Policy is available online at  
[http://www.csi.cuny.edu/privacy/cuny\\_academic\\_integrity.pdf](http://www.csi.cuny.edu/privacy/cuny_academic_integrity.pdf)

THE COLLEGE OF STATEN ISLAND  
DEPARTMENT OF MATHEMATICS  
COURSE OUTLINE

4Cr/6Hr

MTH 330 APPLIED MATHEMATICS I

SPRING 2008

SW/M  
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TEXT: Advanced Engineering Mathematics, Sixth Edition  
by Peter O'Neil, PWS-Kent Publishing Co.

Note: Each numbered lesson corresponds to a two-hour class session.

<u>Week</u>	<u>Lesson</u>	<u>Sections</u>	<u>Homework Problems</u> <u>Topics</u>	<u>(Page/Number)</u>
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I		1.1	Introduction to Differential Equations	10/5,7,11,15
		1.2	Separable Differential Equations	20/1-19(odd)
	2	1.3	Linear Differential Equations	26/1,5,7,13,16
		1.4	Exact Differential Equations	32/1,3,7,11,13,15
	3	1.5	Integrating Factors	37/3,5,9,14,15
		1.6	Special First Order Differential Equations (Homogeneous DE's)	46/5,7,8,10,12
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II	4	1.7	Applications - Electrical Circuits, Orthogonal Trajectories	55/19,23,25
		1.8	Existence and Uniqueness	60/1,5,6
	5	2.1	Introduction - Second Order Differential Equations	
		2.2	Theory of Solutions of Second Order DE's	69/3,5,8,10,11,13
	6	2.3	Reduction of Order	72/3,5,7,15
		2.4	Constant Coefficient Homogeneous Linear Equations	77/1,3,5,9,11,13,17,21

MTH 330 Course Outline  
Homework Problems

<u>Week</u>	<u>Lesson</u>	<u>Sections</u>	<u>Topics</u>	<u>(Page/Number)</u>
III	7	2.5 2.6	Euler's Equation Method of Variation of Parameters	81/1,3,7,9,19 93/1-6
	8	2.6	Method of Undetermined Coefficients	93/7,11,12,13,15,
	9	2.7	Models of Mechanical Systems - Simple & Damped Harmonic Motion	105/1,4,5,11,13
IV	10	2.7 2.7	Forced Motion Electrical Circuits	110/19,21,23 110/25,27
	11		REVIEW	
	12		EXAM 1	
V	13	2.6	Higher Order DE's Summary of Second Order Linear DE's - matrix representation and geometrical interpretation.	
	14	6.1	Algebra and Geometry of Vectors	210/1,3,7,11,13,19 23,25,27,28,29,32,36
	15	6.2 6.3	Dot Product Cross Product	217/5,9,15,17,19 222/1,5,9,15,17,23,31
VI	16	6.4	Vector Space $R^n$	228/5,7,9,11,13,15
	17	6.5	Linear Independence and Dimension	235/1,5,9,17,19,25,27
	18	7.1	Matrices	250/3,5,9,11,15,17,21,23,27

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<u>Week</u>	<u>Lesson</u>	<u>Sections</u>	<u>Topics</u>	<u>(Page/Number)</u>
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VII	19	7.2	Elementary Row Operations, Elementary Matrices	258/1,3,5,7,9,11
		7.3	The Row Echelon Form of a Matrix	265/3,5,7,11
	20	7.4	The Rank and Row/Column Space of a Matrix	271/3,5,7,9,11,17
		7.5/7.6	Homogeneous Systems of Linear Equations	279/1,3,5,7,9,13,17
	21	7.7	Nonhomogeneous Systems of Linear Equations	292/3,5,7,11,13,15
		7.8	Matrix Inverse	298/3,5,7,9,13,15,17
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VIII	22	8.1/8.2	Definition of the Determinant	
		8.3	Properties of Determinants	
		8.4/8.5	Evaluation of Determinants	313/1,3,7,9,11,13
	23-24		Using MATLAB for manipulating matrices: (I) Input; size; determinant; inverse (II) Solution of systems of equations. (HANDOUT)	
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IX	25	8.7	Matrix Inverse	318/3,5,7,9
		8.8	Cramer's Rule	320/3,5,7,9
	26	9.1	Eigenvalues and Eigenvectors	320/1,3,5,7,11,13,15,17,19,20
	27	9.2	Diagonalization	339/1,3,5,7,9,12,13
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X	28	9.3	Orthogonal and Symmetric Matrices	347/1,3,5,9,11
	29-30		Diagonalization using MATLAB - extracting Eigensolutions (HANDOUT)	

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<u>Week</u>	<u>Lesson</u>	<u>Sections</u>	<u>Topics</u>	<u>(Page/Number)</u>
XI	31		REVIEW	
	32		EXAM 2	
	33	10.1	Theory of Systems of Linear DE's	
			373/1,3,5,7,9,17,19,21,25,31,33	
		10.2	Solution of $X'=AX$ When A is Constant	392/7,13,21,25,27,33, 35,41,43,47
XII	34	10.3	Solution of $X'=AX+G$	401/15,17,19,23
	35-36		Using MATLAB to solve systems of Linear First Order DE - ODE23/ODE45 (HANDOUT)	
XIII	37	3.1	Laplace and Inverse Laplace transforms	121/1,3,5,7,9,13,15,17,25,29
	38	3.2	Laplace Transform Solution of Initial Value Problem	126/1,3,5,8,10,13
	39	3.3	Shifting Theorems and the Heaviside Function	139/1,3,5,7,9,11,15,17,19
XIV	40	3.3	Shifting Theorems (Cont'd)	139/23,25,27,31,35,37
	41	3.4	Convolution Theorem	146/1,5,7,9,13,19,21
		3.5	Unit Impulses and the Dirac Delta Function	151/1,3,5
	42		PROBLEM REVIEW REVIEW for FINAL EXAM	

## ROLE IN CURRICULUM

One of MTH 330 and 334 required for the mathematics major. Required for the Engineering Science major and the Physics major.

## LEARNING GOALS AND ASSESSMENT PLAN

Learning Goal	Assessment
The student will be able to apply standard techniques for solving first-order ordinary differential equations (ODEs).	NA
The student will learn the theory of second- order linear ODEs and be able to solve second- order constant-coefficient ODEs	NA
The student will learn fundamental concepts of linear algebra and matrix theory and be able to apply them to solve linear systems of differential equations with constant coefficients.	NA
The student will learn introductory Laplace transform theory and be able to apply it to solve linear constant-coefficient ODEs	NA

When assessment activities are done, the results will be summarized in memorandum form and filed with the department chairperson for record keeping purposes.

Information obtained from assessment will be used to assess and self-reflect on the success of the course and to make any necessary changes to improve teaching and learning effectiveness.

## Undergraduate Catalog Course Description

### College of Staten Island

Course prefix:	MTH
Course number:	330
Course title:	Applied Mathematical Analysis I
Subject	Mathematics
Minimum credits:	4.0
Maximum credits:	4.0
Hours per week:	6.0
Course description:	Advanced mathematics for engineering and science students. Linear algebra, ordinary differential equations, eigen value problems, transforms, and special functions.
Prerequisite:	MTH 233 or MTH 236.
Comments:	Credit will not be given for both MTH 330 and MTH 334.