EE 209: Transient Phenomena

Fall Semester 2014
MWF 11:45 AM–12:35 PM
369 Votey Hall

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Catalog Description: Study of complex variable basis of Laplace and Fourier transforms; applications to transient behavior of lumped and distributed parameter systems. Nyquist criterion and two-dimensional field problems. (3 credit hours)

Prerequisites: EE 4


Course Outline:

M 8/25 Topic 1: Introduction to Transient Phenomena
Read Chapter 1 of text.

W 8/27 Topic 2: Complex Numbers: Moduli & Complex Conjugates
Provide details for solved problems 4, 7, 9–11, and 13–15.
Do problems 58 and 59.

F 8/29 Topic 3: Complex Numbers: Exponential Form
Provide details for solved problems 19 and 20.
Do problems 79, 87, and 88.

M 9/1 ⟨ Labor Day, No Class ⟩

W 9/3 Topic 4: Complex Numbers: Roots
Provide details for solved problems 28, 31, 35, 36, 38, 41, 42, 44, 45, 47, 51, 52.
Do problems 133, 165, 166, and 168.

F 9/5 ⟨ Exam #1 on Topics 1–4 ⟩ (10%)

M 9/8 Topic 5: Functions of a Complex Variable & Mappings
Read Chapter 2 of text.
W 9/10  Topic 6: Analytic Functions: Limits
   Provide details for solved problems 4–6.
   Do problems 57–59, 67, 68, 83, and 100.

F 9/12  Topic 7: Analytic Functions: Continuity & Derivatives

M 9/15  Topic 8: Cauchy-Riemann Equations & Differentiability
   Read Chapter 3 of text.
   Provide details for solved problems 2, 4, 5, and 6.

W 9/17  Topic 9: Polar Coordinates
   Provide details for solved problems 10, 21, 22, and 24.

F 9/19  Topic 10: Analytic Functions
   Provide details for solved problems 27, 28, 37, 38, and 42.

M 9/22  Topic 11: Harmonic Functions
   Do problems 46–50, 52, 84, 109, and 115.

W 9/24  Topic 12: Uniqueness & Analytic Continuation
   Read the first section of Chapter 10.

F 9/26  ⟨ Exam #2 on Topics 5–12 ⟩ (10%)

M 9/29  Topic 13: Exponential & Logarithmic Functions
   MATLAB assignment.

W 10/1  Topic 14: Complex Exponents
   MATLAB assignment.

F 10/3  Topic 15: Trigonometric & Hyperbolic Functions
   MATLAB assignment.

M 10/6  Topic 16: Derivatives & Definite Integrals of Functions
   Read Chapter 4 of text.

W 10/8  Topic 17: Contours & Contour Integrals
   Provide details for solved problems 3, 4, and 6–10.

F 10/10 Topic 18: Upper Bounds
   Do problems 47–49, and 53.

M 10/13 Topic 19: The Cauchy-Goursat Theorem
   Provide details for solved problems 11, 13–18.
   Do problems 64, and 75.
W 10/15 Topic 20: Simply & Multiply Connected Domains
Provide details for solved problems 20–22, 25, and 27.

F 10/17 ⟨ Exam #3 on Topics 13–19 ⟩ (10%)

M 10/20 Topic 21: Cauchy Integral Formula
Read Chapter 5 of text.
Provide details for solved problems 1–4 and 6.
Do problems 30, 31, 34, 35, and 38.

W 10/22 Topic 22: Derivatives of Analytic Functions
Provide details for solved problems 7–9.
Do problems 53, 57, and 83.

Provide details for solved problems 10 and 11.

M 10/27 Topic 24: Maximum & Minimum Modulus Theorems
Provide details for solved problems 12–14 and 16–18.

W 10/29 Topic 25: Poisson's Integral Formulas
Provide details for solved problems 21 and 22.

F 10/31 ⟨ Exam #4 on Topics 21–25 ⟩ (20%)

M 11/3 Topic 26: Convergence of Sequences & Series
Read Chapter 6 of text.

W 11/5 Topic 27: Taylor Series
Provide details for solved problem 22.

F 11/7 Topic 28: Laurent Series
Provide details for solved problems 25, 26 and 28.

M 11/10 Topic 29: Absolute & Uniform Convergence, Continuity
Provide details for solved problems 32–34.

W 11/12 Topic 30: Integration & Differentiation of Power Series, Uniqueness
Do problems 78, 79, 81, 86, 88, 92, 96, and 113.

F11/14 ⟨ Exam #5 on Topics 26–30 ⟩ (20%)

M 11/17 Topic 31: Residue & Cauchy's Residue Theorem
Read Chapter 7 of text.

W 11/19 Topic 32: Isolated Singular Points, Residues at Poles
Provide details for solved problems 1–6.
F 11/21 Topic 33: Zeros & Poles
Provide details for solved problems 7–9.

M 11/24–F 11/28 ⟨ Fall Recess, No Class ⟩

M 12/1 Topic 34: Evaluation of Improper Integrals
Provide details for solved problems 12, 15, 18–20.
Do problems 40, 42, 44, 49, and 60.

W 12/3 Topic 36: Improper Integrals from Fourier Analysis, Jordan’s Lemma
Do problem 75.

F, 12/12 Final Exam (30%)
1030–1315 (10:30AM–1:15PM), 369 Votey