Course Outline/Syllabus: APPM 5430 Fall 2019

Methods in Applied Mathematics– Applications Of Complex Variables

Instructor: M.J. Ablowitz <mark.ablowitz@colorado.edu>; ph:2-5502; off. ECCR 255

Class time: MW 3:00–4:15; Classroom: ECCR 257; Off hrs 2:00–3:00PM MW or by appointment

Text: Introduction and Applications of Complex Variables by M.J. Ablowitz and A.S. Fokas, Cambridge University Press, second edition, 2003. Check Errata for typos/corrections: see MJA web page: https://sites.google.com/site/ablowitz/

- Homework assignments will be assigned, usually biweekly.
- A project will be required on a topic relevant to the course. The project will be at the end of the course. At a mid point of the semester a one page description of the topic you will study will be required. For graduate students the project is to be done individually. The project will consist of a presentation of approximately 35 minutes plus 5 minutes for questions. Undergraduates can either share the project with another UG: total 40 minutes plus 5 minutes for questions or give a presentation individually of approximately 20 minutes plus 5 minutes for questions.
- It is expected that students will present a presentation of approximately 35 min on course material using the text or equivalent. These presentations will occur during the latter part of the semester and will be integrated into the course lectures. Instructor will likely make clarifying comments on presentation; students listening can and should ask questions as normal. Assignments/topics will be made approximately 1-2 weeks in advance.

Course Topics to be covered

1. Review of fundamentals of complex variables including complex differentiation, multi-valued functions, Riemann surfaces, contour integration, Cauchy and related theorems,

generalized Cauchy Theorem, infinite series, analytic continuations, singularities, infinite products, Weierstrass and Mitagg-Leffler expansions, differential equations in the complex domain, residue calculus, Fourier-Laplace transforms and their use to find solutions of PDEs (8 weeks)

2. Conformal mapping and applications; Schwarz-Christoffel transformation; bilinear transformations; conformal mapping with circular arcs (5 weeks)

3. Riemann-Hilbert problems, Dbar problems and applications of complex analysis to inverse scattering and nonlinear wave equations (2 weeks)

Approx. grade distribution : HW: 55%: Course presentation: 15%; Project report and presentation: 30%

See also: Additional Syllabus Statements:
https://www.colorado.edu/academicaffairs/policies-customs-guidelines/required-syllabus-statements