Math 557   Applied Asymptotic Analysis   Winter 2020

Instructor: Robert Krasny, 4830 East Hall, 763-3505, krasny@umich.edu

Time/Location: TuTh 1-2:30pm, 3088 East Hall

Office Hours: Tu 2:30-4:30pm, Wed 12-1pm, and by appointment or just drop in

Textbook: "Asymptotic Analysis" by J.D. Murray, Springer-Verlag, ISBN-10 0387909370
`https://link.springer.com/book/10.1007%2F978-1-4612-1122-8`

Recommended: "Applied Asymptotic Analysis" by P.D. Miller, AMS, ISBN 0-8218-4078-9

Website: www.math.lsa.umich.edu/∼krasny/math557.html

In calculus we learn how to integrate functions and find exact solutions of differential equations. In situations where these techniques don't apply, one can often find useful approximate solutions by numerical methods or asymptotic analysis. Math 557 is an introduction to the techniques of asymptotic analysis commonly used in science and engineering. The topics include: asymptotic expansions, method of steepest descent, method of stationary phase, asymptotic evaluation of Fourier and Laplace transforms, WKB method, turning points, singular perturbations, method of multiple scales, matched asymptotic expansions, boundary layers, plus other topics as time permits.

Prerequisites

    differential equations (Math 216, 286, 316 or 404)

    advanced calculus (Math 450, 451, or 454)

    complex variables (Math 555 or 596)

Grading Policy

    midterm exam : Thursday, February 27, in class (20%)

    final exam : Tuesday, April 28, 1:30-3:30pm, room tba (40%)

    homework (40%)

Homework Policy

1. Homework will be assigned every 2-3 weeks.

2. Students may discuss the homework problems with each other, but each student should write up and submit their own solutions.

3. Students may check their answers using symbolic software, but they should write up the derivations and make sure to understand them in case they appear on an exam.

4. Homework solutions should be written clearly and legibly. Thank you!