MAE294B/SIOC203B: Methods in Applied Mechanics Winter Quarter 2017
http://web.eng.ucsd.edu/~sgls/MAE294B_2016/

Preliminaries

Instructor

My names is Stefan LLEWELLYN SMITH. My e-mail address is sgls@ucsd.edu. My e-mail address is sgls@ucsd.edu, but if you have a question, talk to me before or after class, or come to office hours.

Schedule

TuTh 9:30–10:50 am in the Sea Cave. Problem classes: Fr 12–1 pm in EBUII 105. I will also aim to be in my office on Thursday mornings. It is your responsibility to come and find me if you have questions, concerns, etc...

Homework

There will be four homeworks. They will be posted a week before they are due; see the website for dates. No late homework will be accepted; hand in (or get someone else to hand in) what you have done on the due date.

Website

See top of page. Homework, solutions, etc... will be posted on the website.

Assessment

The grade in this course is based on homeworks, a midterm, and a final exam. An approximate division is 20%, 30% and 50%, but this is by no means definite. Exams will be "open-note and open-textbook", i.e. you may bring in hand-written material and the textbook. No calculators, no cell phones, no computers during midterm or final exams. There will be no make-up exams except in exceptional circumstances.
Your final grade is the culmination of a quarter-long effort. I do not like giving C grades and lower for graduate courses. Please try and keep me happy.
I encourage you to discuss the material among yourselves. When it comes to assigned homework however, everything you turn in should be essentially your own. If you and a friend have worked too closely on a problem, please say so. Needless to say, collaboration is not permitted during exams.

Prerequisites

In theory, calculus, differential equations, linear algebra, complex analysis, freshman physics. In practice, MAE 294A/SIO 203A. This is a graduate class. If you think you can master these prerequisites concurrently, you can try.

Textbooks

The "textbook" for this class is *Mathematical Methods for Physics and Engineering* by Riley, Hobson and Bence (RHB; 2006, Cambridge University Press, 3rd edition, 1362 pages). It's probably worth buying. I have placed it on reserve at the library. Two other useful books, on reserve at the library, are *Complex Variables* by Ablowitz & Fokas and *Functions of a Complex Variable* by Carrier, Krook & Pearson.
A classic reference on the subject as a whole is *Methods of Mathematical Physics* by Jeffreys & Jeffreys. A remarkable book even today. Two other good books on the material we cover, which concentrate on the physical background, are *Methods of Mathematical Physics* by Mathews & Walker, and *Mathematical Methods for Physicists* by Arfken (I prefer the second edition). An advanced book for PDEs is *Applied Partial Differential Equations* by Ockendon, Howison, Lacey and Movchan.
You should start becoming familiar with mathematical handbooks. The one true word is in the *Handbook of Mathematical Functions*, formerly edited by Abramowitz & Stegun, but now replaced by the Digital Library of Mathematical Functions, available online and in hard copy. For integrals, series and products, see *Table of Integrals, Series, and Products* by Gradshteyn & Ryzhik (many editions).

Rough syllabus

I will cover material from Chapters 23–25, but not all of it and not in the same order.
Review of complex variable. Conformal maps. Contour integration. Integral transforms. Possibly if we have time: integral equations. Unlikely: shocks.
MAE294C/SIO203C (Spring) will cover approximate solutions to ODEs, multiple scales, phase plane, boundary layers, WKB and asymptotic methods.

Academic integrity

I remind you of UCSD's policy on this issue. There is a link on the class web page. Don't do it.