SIO203C/MAE294C Spring 2017

Administration

Class times: Lectures are from 3:30pm to 4:50pm on Tuesdays and Thursdays. The recitation is scheduled from 5:00pm to 6:00pm on Thursdays — I'll try to find a more humane time for the recitation.

Instructor: Bill Young. My office is Room 353 in the Keck building and email is `wryoung@ucsd.edu`. I won't enter into extended electronic correspondence. But for a quick question please feel free to email. This is particularly useful if you suspect there is a misprint in class notes, or if you're stuck on an apparently insoluble homework problem.

TA: The TA is Navid Constantinou. Navid's office is Keck Room 254 with email `navid@ucsd.edu`. Navid will help with the recitations and grading. You can also ask Navid for help with assignments etc. Navid has office hours on Tuesdays from 2pm to 3:30pm.

Homework: I'll set five or six assignments with a few hand-in problems. Answers to the hand-in problems should be presented in latex or an equivalent mathematical typesetting program — I'll distribute a latex template via email. The assignments will be discussed during the recitation section. Recitations will be conducted as recitations: you'll be expected to come to the board and present the answers.

Collaboration: Discussing and working the assignments with your colleagues is encouraged. But please write-up your own hand-in answers.

Website: I'll set-up a class website where you'll find assignments, the pdf notes and copies of past exams. There are misprints and mistakes in the notes. If something is confusing or screwy it may be a mistake, and you should ask.

Assessment: The mid-term is in-class on Thursday, May 4th from 3:30pm to 4:50pm. The final is in exam week. I'll grade the hand-in problems and give some credit for completion of those. Exam questions will be *very similar* to the assigned problems. The exams are closed book with no computers, calculators or iphones. Exams are "open notes" — you can being in any amount of hand written (or hand typed) material.

Advice: The only way to learn the material in this class is to solve problems — lots of them. In past years I've distributed answers to many of these

problems, and I'll do that again this year. No doubt you'll be able to get advance answer sheets from your colleagues who've taken this class in 2015 and 2016. You should resist that temptation. It is a waste of our time to hand-in work you've copied from last year's answer sheets.

Prerequisites

I'll assume that you're familiar with the material covered by Stefan Llewellyn Smith in MAE294B/SIO203A&B. Stefan used the gigantic book

> *Mathematical Methods for Scientists and Engineers* by Riley, Hobson & Bence (hereafter **RHB**).

From part A you should be familiar with the material on partial and ordinary differential equations in chapters 12, 14, 15, 17, 20 and 21 of **RHB**. From part B you should have a working knowledge of complex analysis and integral transforms. This material is in **RHB** chapters 13, 24 and the first half of **RHB** chapter 25.

Textbook and other references

My notes will be on the class website. I learnt much of this material from

> *Advanced Mathematical Methods for Scientists and Engineers* by C. M. Bender and S.A.Orszag (**BO**).

The class notes strongly reflect that experience. I also like parts of

> *Perturbation Methods* by E.J. Hinch (**H**).

Hinch has the advantage of brevity (perhaps too much so in places). We'll incidentally use some special functions. Special functions are covered in chapter 18 of **RHB**, and very nicely in

> *Special Functions and Their Applications* by N.N. Lebedev.

I also draw your attention to the NIST Digital Library of Mathematical Functions (**DLMF**) at `dlmf.nist.gov`. Other useful references for the material in this class are:

> *Introduction to Perturbation Methods* by Mark H. Holmes;
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> *Multiple Scale and Singular Perturbation Methods* by J. Kevorkian and J.D. Cole;
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> *Asymptotics and Special Functions* by Frank W. J. Olver;
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> *Perturbation Methods* by Ali H. Nayfeh.