Ph136B – Applications of Classical Physics

Lecture 1: 2015/01/05

Christian Ott
TA: Du Pei
Basics I

• Lecture times: Mon 2:30-4pm, Wed 2:30-4pm

• Will have substitute lecturers once in a while due to travel (e.g., 01/26, postdoc Jim Fuller).

• Lectures will be board + some PowerPoint for graphics and images (when appropriate).

• Will try to highlight most important concepts/aspects/equations and relationships.

• **Speak Up!** -> questions & interaction. Never feel a question may be too stupid to ask! Let’s make this class a dialogue! **Come to class!**
Basics II

• Class web page: 
  http://www.tapir.caltech.edu/~cott/ph136B

• TA: Du Pei, pei@caltech.edu,
  -> talk to him first about any issues.
  Office hours: Tue, 5:30-6:30pm, 446 Lauritsen

• Christian Ott, cott@tapir.caltech.edu; 338 Cahill
  Office hours: by appointment & walk ins welcome.
  (Note: will also be teaching Ay101 this term, so my time
  is very limited).

• We will communicate with you via e-mail.
  Do we have all your e-mail addresses?
Grading Scheme, Final, Midterm

- Grade: 65% homework, 15% mid term, 20% final exam.

- Midterm:
  15-20 minute board presentation on a special topic. Topics will be selected in week 3 of term (01/19-01/23). Presentations will be in week 5/6 (may need to find special time/day for the presentations or use lecture time).

- Final will (most likely) be take-home, closed book, one 8.5 x 11” sheet with equations/notes on both sides allowed. Can discuss this as the end of term draws closer.
Homework Sets

• 65% of grade.
• Will be assigned roughly weekly (may skip the odd week) on Wed, due next Wed before class.
• Problems mostly drawn from book with some exceptions.
• Homework should take about 6 hours to complete.
• Collaboration policy: Honor Code applies!
  – Science is a team sport:
    Work in groups, but hand in and fully understand your very own write up.
  – Do not look at solutions from previous years and/or solutions available on the web.
• Late homework policy:
  Automatic extension with note from health center, otherwise contact Du and/or Christian who may grant extensions under special circumstances. Otherwise 10% reduction of homework score per day late.
Literature

• Primary: Kip Thorne & Roger Blandford ("KR")
  Applications of Classical Physics
  http://www.pma.caltech.edu/Courses/ph136/yr2012/

• Secondary:
  – Clarke & Carswell, *Principles of Astrophysical Fluid Dynamics*
  – Faber, *Fluid Dynamics for Physicists*
  – Landau & Lifshitz, *Fluid Dynamics*
  – Mihalas & Mihalas, *Foundations of Radiation Hydrodynamics*
Rough Syllabus

• Fluid dynamics basics, stress tensor, ideal fluid, ideal gas
• Hydrostatics, hydrodynamics & conservation laws
• Viscous fluids
• Vorticity
• Turbulence
• Waves, convection
• Compressible flows, transsonic/supersonic flows, shocks
• Magnetohydrodynamics
• Plasma physics
Lecture / Notes Style

• Will stick largely with KR text + supplement with details. Some parts will be left out due to time constraints.

• Will also try to stick to tensor notation of KR. If you did not take Ph136A, then it is crucial that you work through KR chapter 1.

• Lecture notes (scanned) will be available upon request.